Time-limit
By Speed post

GOVERNMENT OF KERALA

Water Respources (WS-B) Department

No.B2/222/219/WRD 27/11/2019,Thiruvananthapuram

From
Secretary to Government

To
Dr.M.Dhinadhayalan
Adviser (PHEE)
Nirman Bhawan, Ministry of Housing
and Urban Affairs ,Government of India
New Delhi - 110032.

Sri.A.Sudhakar DH,WQM-I Division,
Central Pollution Control Board,
Parivesh Bhawan, East Arjun Nagar,
New Delhi - 110032.

Sir,

Sub: Water Resources Department - Hon'ble NGT order dtd 11.09.2019 passed in O.A.No.496/2016 in the matter of News item published in Hindusthan Times dtd 19.06.2015 - Consolidated Report of the State of Kerala - submitting of - reg

Ref: a.Letter No.Q-1514/1/216-CPHEEO dated 25/1/219 of the Ministry of Housing and Urban Affiars, New Delhi
b)Letter F.No.A-14011/325-2015/2019-WQM-II dated 24.10.2019 of the Central Pollution Control Board.

With reference above, I am directed to forward herewith consolidated report of State of Kerala regarding the present status of the implementation and aciton plans on Rain Water Harvesting for Conservation of Water for the purpose of filing a combined report before Hon'ble NGT in compliance with the judgment dated 11.09.2019.

Yours Faithfully,
GOPAKUMARAN NAIR B
ADDITIONAL SECRETARY

For Secretary to Government.

WATER RESOURCES DEPARMENT

GOVT. OF KERALA

SIGNIFICANCE OF RAIN WATER HARVESTING FOR CONSERVATION OF WATER

Status of implementation and Action Plan

KWA, GWD & KRWSA - Consolidated Report

Index

1. Introduction.

Kerala is a blessed land with green vegetation, rivers, backwaters and vast natural resources. The state receives an average annual rainfall of 3000 mm. But Kerala faces severe water scarcity between February and mid May every year which leads to acute water shortages during summer, especially in the drinking water sector. Paucity of water during this period for drinking and other needsimpact adversely the health and livelihood of the people especially rural poor. This situation is expected to persist in the coming years also. It is estimated that Kerala needs 5823 million cu. metres of water additionally over and above the existing resources every year to meet its needs. Despite 44 rivers and world's largest well density, per capita surface and groundwater availability of the State is lower than that of other States in the country. Harvesting rainwater, which is abundantly available, for dry months lends itself as a viable solution in Kerala for solving the shortage of drinking water. If even a small proportion of the huge volume of rainwater lost to the sea can be successfully harvested, it can solve the problem of drinking water scarcity in Kerala especially in the dry months. Government of Kerala has embarked on a special campaign for promoting Rain Water Harvesting (RWH). The efforts taken at various levels are observed to be attracting large population to practice RWH. Moreover the programme is well accepted by people in Kerala, especially those who are living in hilly, costal and remote areas with limited access to potable water.

Rainwater harvesting is a technique or strategy for the collection of rainwater and storing it in the right way for future use. The water can be collected from various surfaces and platforms and stored for later use. In most cases, the water is usually collected from rooftops and other hard surfaces. Rainwater harvesting is considered as a very reliable way to conserve water. One of the simplest ways of storing water from the collection is storage tanks. The systems used for water collection is based on simple techniques that are very easy to maintain. The overall expenses used in setting up harvesting methods are much cheaper compared to other purifying or pumping means. Also, its maintenance is feasible on the economic front as it does not require deep pockets. Another important advantage is that it reduces dependency on other ground water sources.

As we all know, Kerala has a sloppy terrain and the rain water we receive will flow into the sea within a day. It emphasise the importance of conscious efforts to conserve this precious resource. We should adopt local specific and eco-friendlymethods and techniques to conserve the rain water and thereby enrich our ground water level. It is evident that we have developed so many models of rainwater harvesting and ground water recharging.

2. NOTE ON THE SIGNIFICANCE OF RAIN WATER HARVESTING FOR CONSERVATION OF WATER.

A. KERALA RURAL WATER SUPPLY & SANITATION AGENCY (KRWSA)

1. Implementation of RWH units through Jalanidhi Projects

Scaling up of rooftop rainwater harvesting programme with the component of ground water recharge is found suitable for the individual households as alternative method for providing drinking water and gradually improving the water table. Hence the technology was adopted in implementing the World Bank aided Kerala Rural Water Supply and Sanitation Project (**popularly known as Jalanidhi**) since 2001. The project has been implemented with people participation for setting up of small and large water supply scheme managed and operated by the beneficiary themselves. The cost is shared by Government (GoK), concerned Gramapanchayath (GP) and beneficiary (BG) in definite proportion.

Many of the GPs especially belonging to hilly and coastal regions are seriously planning to adopt RWH as technology option to provide the source of the water supply schemes. The RWH technology for providing as a source of the water supply scheme is more economical and the water so obtained is free from quality issues. The agency could so far construct 23,390 nos of RWH structures all over Kerala through Jalanidhi phase-1 & Phase 2 project. Details are as shown below,

JALANIDHI - Details of RWH structures constructed				
Status as on 30.06.19				
Sl No.	**District**	**Jalanidhi-Phase-1 (FY2000-2008)**	**Jalanidhi-Phase-2 (FY 2012-2019)**	**Total RWH structures constructed**
1	Trivandrum	-	-	0
2	Kollam	695		695
3	Alappuzha	-	-	0
4	Pathanamthitta	754	89	843
5	Kottayam	1645	3073	4718
6	Iddukki	900	6123	7023
7	Ernakulam	690		690
8	Thrissur	393		393
9	Palakkad	2183		2183
10	Malappuram	1395		1395
11	Kozhikkode	1701		1701
12	Wayanad	79		79
13	Kannur	840	488	1328
14	Kasargode	2029	313	2342
	Total	**13304**	**10086**	**23390**

2. Implementation of RWH units under State Plan Scheme by Rain Centre-KRWSA

Rain Centre functioning under KRWSA was constituted in the year 2004 to promote Rain Water Harvesting and Ground Water Recharge activities in the State. Initially the Centre was focusing on promoting the concept of Rain Water Harvesting and as part of it a number of IEC activities along with training programmes were conducted throughout the State. Demo RWH tanks of various capacities were constructed in public institutions with the idea of disseminating the ferro cement technology to the general public.

Initially World Bank assistance and MGP funds were provided for promoting Rain Water Harvesting activities. Considering the need for inculcating the habit of rain water harvesting as alternate source of water among people, a detailed proposal was submitted to the Planning Board for including in the 12th Five Year Plan. The proposal was approved and budget allocation was sanctioned from the first year of 12^{th} Plan.

Scaling up of roof top Rain Water Harvesting programme with the component of Ground Water Recharge is found suitable for the individual households as alternative method for providing drinking water and gradually improving the water table. The programme is well accepted by the people in the State, especially those who are living in hilly, coastal and remote areas with limited access to potable water.

. During the last six years the Centre was assisting individual households and schools to construct RWH structures with the primary objective of minimizing the drinking water issues. The programme is implemented utilizing the Plan provision provided in the State Budget of every Financial Year.

Many of the Grama Panchayths, especially those located at hilly and coastal regions are seriously implementing Rain Water Harvesting as a technology option to solve the drinking water issues of their GPs. Similarly, many institutions with demand for large quantity of water have evinced interest in establishing rain water harvesting units as an additional source of drinking water.During the last six year period 7100 Nos .of families in 34 Grama Panchayaths and 840 Nos. Govt. Schools in the state have been assisted under the programme.

The assistance of the programme was extended to schools belonging to both Government and aided sector. The programme named as **'JalaSowhrudhaVidhayalayam'** was implemented State wide by assisting the selected Government/Aided schools to construct RWH structures. The selection of schools under the programme was entrusted to the Education Department.

The RWH &GWR programme is implemented on a cost sharing basis, the capital cost sharing pattern being 5% for BPL and 10% for APL category. The estimated unit cost for the construction of 10,000 litre capacity ferro cement RWH unit is Rs.65600/-. The unit cost is likely to vary from location to location based on the rate fluctuations of materials in the market.The State has recognized need and importance of Rain Water Harvesting programme once again especially under the light of recent floods.

The rain water harvested and stored in the RWH tanks becomes a blessing to several families as they have enough pure water to survive the drought and flood period. Also the concerned GPs and households take initiatives to share the water with the families that had shortage of drinking water. Considering the increased demand for RWH as an alternative and additional source of water, it is essential that financial support is extended from Government at least till such time that the technology gains wide acceptance.

a) Aim of the scheme

The broad aim of the programme is to improve the drinking water facility of the individual households and schools that are facing acute shortage of water. Rain Water harvesting is adopted as alternative source for drinking water as the existing water sources of most of the households and schools in remote and hilly areas dry up from the month of January onwards. The RWH tanks provided as part of this programme will be used as a supplementary source during the rainy season and the water stored at the end of the rainy season is carefully utilized in the summer months.

The concept of harvesting rain water for drinking and other purposes are made known to the general community and student community while they are involving in the implementation and post implementation period of the programme. The message of rain water harvesting as alternative source of water and conservation of the rain water for the future is passed on to generations irrespective of their age, social status etc. The programme is contributing to the sustainability of the water bodies as it ensures ground water recharge along with rain water harvesting and that in turn will be long term measures taken for addressing the water scarcity problems.

b) Objective of the programme

The specific objectives of the programme are:

1. To popularize RWH with individual households as alternative solution to drinking water scarcity.
2. To institutionalize RWH as a means of water conservation and alternate/additional solution for drinking water in public/Government institutions.
3. To promote the concept of RWH & GWR across the State aimed at building awareness of the general public on water conservation.
4. To initiate campaign for popularizing the concept of well recharge for improving the water table towards ensuring water security.
5. To establish replicable Rain Water Harvesting models for the State.

c) Plan Fund Allocation Status - year wise

Sl.No	Financial Year	Fund allocated (lakhs)	Fund Released (Lakhs)	Beneficiary share mobilized (Lakhs)	Remarks
1	2012 – 13	1202.00	802.00	60.56	Work completed.
2	2013 – 14	420.00	400.00	35.58	Work completed.
3	2014 – 15	400.00	420.00	31.96	Work completed.
4	2015 – 16	420.00	420.00	00	Work completed. No cost sharing for school RWH programme
	2016 – 17	1000.00	200.00		
5	2017-18	1820.00	500.00	73.04	Work completed.
6	2018-19	1500.00	1127.00	67.42	Work completed.
7	2019-20	2031.00	500.00	00	Work under progress.
	Total		**4409.00**	**265.56**	

Physical Status - Year Wise.

Financial Year	Name of District	No. of GPs	Name of GPs covered	No. of RWH units constructed
2012-13	Kannur	6	Udayagiri	246
	Idukki		Konnathadyp	500
			Velliyamattom	350
			Kanjikuzhy	45
	Kottayam		Manarcadu	280
			Parathodu	530
2013-14	Idukki	4	Karunapuram	450
			Kokkayar	425
	Ernakulam		Pallipuram	105
			Nayarambalam	55
2014-15	Idukki	5	Kattapana	200
			Kamakshy	200
			Peruvanthanam	200
	Kasargod		West Eleri	200
			Mangalpady	200
2015-16 & 2016-17	State vide – 14districts	All the districts	Implemented in selected 840 Govt. Schools	840
2017-18	Thiruvananthapuram	9	Anad	62
	Kollam		Clappana	57
			Kalluvathukkal	215
	Pathanamthitta		Niranam	53
			Puramattom	175
	Kottayam		Koruthodu	303
			Thalanadu	175
	Palakkad		Thrikkaderi	235
	Kasargod		Valiyaparamba	300
2018-19	Thiruvananthapuram	10	Aryanadu	4
			Aryamgodu	122
	Pathanamthitta		Vechoochira	175
	Alappuzha		Edathwa	175
			Neelamperoor	175
			Ramankari	175
	Kottayam		Poonjar	175
			Thrikodithanam	175
	Idukki		Karimkunnam	175
			Senapathy	175
	TOTAL	**34**		**7927**

Various stages of construction of Rain Water Harvesting Tank of 10000 Litres capacity.

RWH units constructed in individual households.

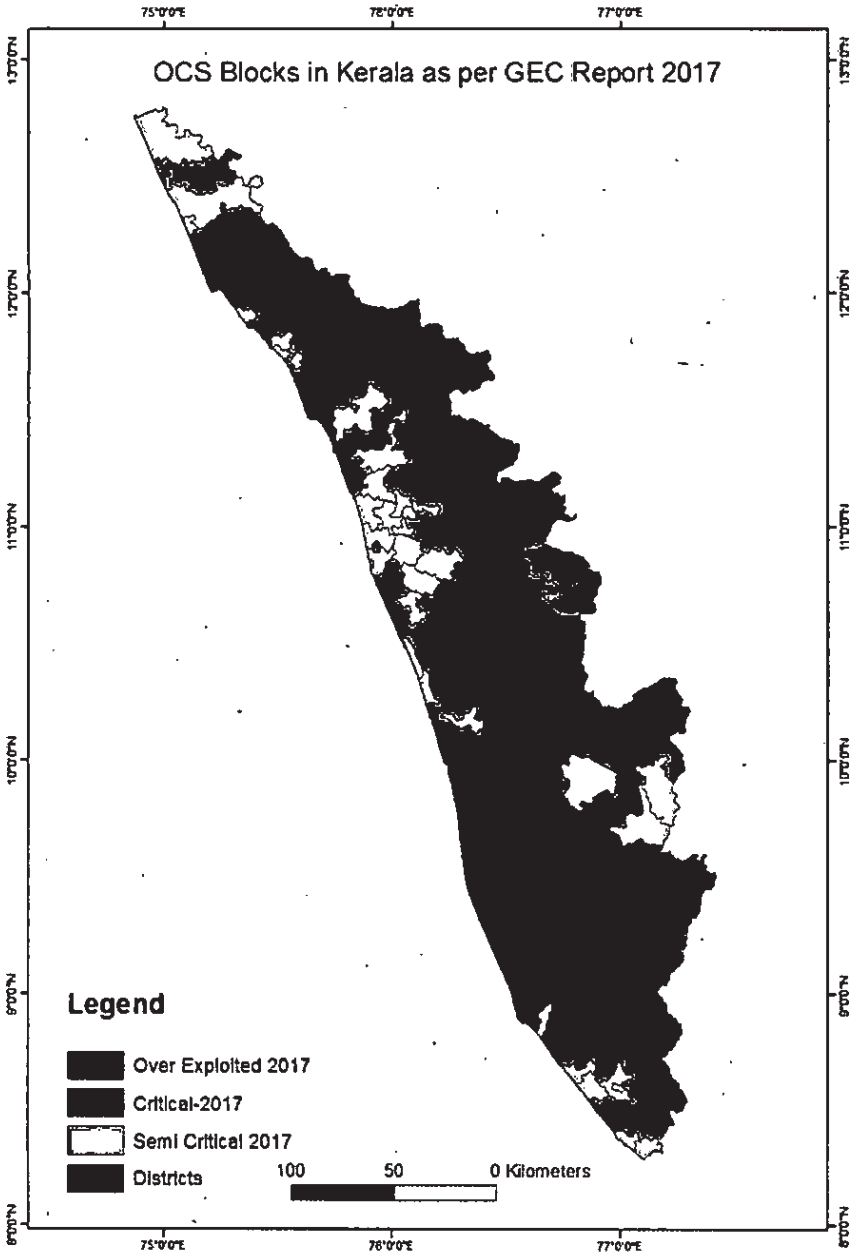
B. GROUND WATER DEPARTMENT (GWD)

The State of Kerala is blessed with abundant rainfall that amounts to an average of 3,000 mm, which is two times more than that of National average. But the pattern in rainfall distribution indicates 69 % of the annual rainfall is received during the Southwest Monsoon (June to September) and 16 % received during Northeast Monsoon (October to December) and the remaining is from the Summer Rains. . The intensity of rainfall is high and the precipitation occurs in short spells lasting only few hours. The rainfall is the major source of groundwater recharge. As per the latest groundwater resource estimation, the annual groundwater availability in Kerala as on March 2017 has been computed as 5.21 BCM, in which rainfall recharge accounts for about 82% of the annual recharge, with the remaining contributed by other sources. In Kerala the topography is highly undulating and steep and hence the rain falls on the ground drains fast into the sea without contributing much to groundwater recharge.

About 88% of the total geographic areas are underlined by massive hard rocks. Whereas, the weathered laterite that forms the cap rock acts as phreatic aquifer is not appreciable enough (20 meters approx.) to store entire rainfall. Due to this reason, the hilly areas often experience water scarcity immediately after the rainfall due to hydrogeological and other natural topographic complexities.

Categorization of Areas

Based on the periodic groundwater resource assessment jointly carried out by Central Groundwater Board and State Groundwater Department, the assessment units (Development Blocks) have been categorized into Safe, Semi-Critical, Critical and Over-Exploited according to the stage of groundwater development. On the Basis of recent estimation; out of 152 Nos of blocks a total number of 119 blocks are categorized as Safe and, 30 blocks are categorized as Semi-critical and 2 blocks as Critical and 1 as Over-Exploited. Special attention is being given to recharge groundwater in these OCS blocks through roof top rainwater harvesting by making use of recharge wells/pits. It is also seen that number of bore wells are increasing and deep groundwater extraction also depleting the groundwater resources rapidly. The list of OCS blocks and its stage of development is given in the Annexure-I.



Scheme for Groundwater Conservation and Recharge

Groundwater Department is implementing a "Scheme for Groundwater Conservation and Recharge". Under this scheme, rain water collected from the roof-top is harvested for recharging the aquifer through dug wells and recharge pits. The recharging of deep aquifers through bore wells are also being experimented. The total budget outlay during the period 2019-20 was450 lakhs. It is estimated that there are about 65 Lakhs dug wells in Kerala and the groundwater extractions by means of traditional dug wells are prevalent source of fresh water. There are number of public dug wells left abandoned and needs renovation. These dug wells can be considered as suitable structures to recharge groundwater. The Central Groundwater Board has prepared a Block wise master plan in 2015 to take up artificial groundwater recharge to groundwater. The same canbe used as a guideline to stream line groundwater recharge activities of the Department.

Groundwater recharging initiatives of Groundwater Department

Groundwater department is engaged in recharging groundwater through roof top rainwater harvesting in public buildings and government institutions. Department had successfully carried out roof top rainwater harvesting in Kattakada Legislative Assembly Constituency of Thiruvananthapuram District. This constituency was officially declaredas the first Assembly constituency in Kerala to implement artificial groundwater recharging structures in all Government offices and Schools in November 14th 2019. The details of groundwater recharging initiatives carried out by groundwater department in government institutions and public buildings are given in the Annexure-II

The Department had undertaken a program to assess the scope of groundwater recharge through bore wells through experimental studies across the State. The interim results of bore well recharging studies from Idukki District ispromising. Due to limited storage spaces in the phreatic aquifer zones, the scope of storing huge volume of groundwater in the deep aquifers through bore wells is being explored. Groundwater department had already prepared a proposal in the Karadikunnu Watershed of Chittor Block of Palakkad District to carry out bore well recharging.

Roof top Rainwater Harvesting

Rainwater Harvesting is the technique of collection and storage of rainwater in any form of container for the use at the time of need. This is also called insitu rainwater harvesting. The excess water can be diverted for recharging groundwater table. In Kerala insitu rainwater harvesting is recommended in the coastal area and also elevated hilly areas where groundwater quality/quantity may not be suitable/sufficient for drinking purpose. Artificial recharge to groundwater is a process by which the groundwater reservoir is augmented at a rate exceeding the natural conditions of replenishment. If the source water for recharge is rainwater, then it is generally called rainwater harvesting to recharge groundwater. It is to be noted that the Roof Top Rainwater Harvesting structures are mandatory in all new buildings in Kerala, but the enforcement mechanism is not sufficient. By considering the availability of large number of open wells and roof tops in the OCS blocks the scope of groundwater recharging through roof water harvesting is high.

Roof Top Rainwater Harvesting in Public Buildings

Successful recharging structure depends on the hydrogeology of the area, nature and extent of the aquifer, soil cover, topography, depth to water level and quality of groundwater. The availability of source water and clean roof tops are the prime requisite for groundwater recharging. The source for groundwater recharge is basically assessed in terms of non-committed surplus monsoon run off. Kerala is blessed with abundant rainfall and utilizable monsoon run off is quantified as about 42,000 MCM. The areas having a post monsoon water level of >6m can be considered as ideal for artificial groundwater recharging.

Groundwater Department proposed to recharge groundwater through plan scheme from the year 2020 to 2025. The roof top rainwater harvesting projects can be achieved by making use of the dug wells, recharge pits, bore wells in government institutions and public buildings.A total number of 33 Blocks in Kerala belongs to OCS category as per the latest groundwater resource estimation as on March 2017. A total number of 1010 different artificial groundwater recharge structures are proposed to be implemented in government owned buildings and institutions in these blocks for an amount of Rs.1025.25 lakhs. The proposed structures in each district, its expected cost and its implementation plan are given in the Annexure-III (a-e).

Annexure-I

List of Blocks in the OCS Category in Kerala

Sl. No	District	Name of the Block	Category	Stage of Groundwater Development
1	Ernakulam	Parakkadavu	Semi Critical	79.12
2	Idukki	Elam Desom	Semi Critical	73.8
3	Idukki	Kattappana	Semi Critical	81.43
4	Idukki	Nedumkandam	Semi Critical	84.28
5	Kannur	Kannur	Semi Critical	80.74
6	Kannur	Panur	Semi Critical	89.84
7	Kannur	Thalassery	Semi Critical	79.42
8	Kasargod	Kanhangad	Semi Critical	77.67
9	Kasargod	Kasaragod	Critical	97.68
10	Kasargod	Karadka	Semi Critical	82.03
11	Kasargod	Manjeswar	Semi Critical	83.36
12	Kollam	Mukhathala	Semi Critical	73.13
13	Kozhikode	Ballussery	Semi Critical	84.7
14	Kozhikode	Kunnamangalam	Semi Critical	82.56
15	Malappuram	Kondotty	Semi Critical	84.72
16	Malappuram	Kuttippuram	Semi Critical	77.92
17	Malappuram	Malappuram	Semi Critical	74.91
18	Malappuram	Thanur	Semi Critical	83.86
19	Malappuram	Thriurangadi	Semi Critical	82.57
20	Malappuram	Tirur	Semi Critical	77.75
21	Malappuram	Vengara	Semi Critical	79.84
22	Palakkad	Chittur	Over Exploited	104.49
23	Palakkad	Pattambi	Semi Critical	81.37
24	Palakkad	Thrithala	Semi Critical	76.64
25	Palakkad	Malampuzha	Critical	97.72
26	Thiruvananthapuram	Athiyannur	Semi Critical	88.91
27	Thiruvananthapuram	Chirayinkil	Semi Critical	83.06
28	Thiruvananthapuram	Parassala	Semi Critical	81.94
29	Thiruvananthapuram	Pothencode	Semi Critical	87.71
30	Thiruvananthapuram	Nedumangad	Semi Critical	85.02
31	Thrissur	Chowannur	Semi Critical	75.94
32	Thrissur	Mathilakom	Semi Critical	81.24
33	Thrissur	Thalikkulam	Semi Critical	75.22

Annexure-II

Details of Groundwater Conservation and Recharge Schemes implementedby Groundwater Department in Government Institutions and Buildings.

Financial Year	Budget Allocation in Lakhs	Expenditure in Lakhs	Structure
2012-13	50	44	In the 12th 5 year plan(2012 -2017) , Total Budget Allocation was 260 lakhs in which 219.91 lakhs expenditure incurred for completing 1 Subsurface dyke 169 Nos of Recharge Pit/ Dug well Recharge Schemes and 4 Nos of Check dams
2013-14	60	58.57	
2014-15	70	39.46	
2015-16	40	38.15	
2016-17	40	39.68	41 Recharge pit/Dugwell
2017-18	157	124.32	83 Recharge pit/Dugwell Recharge Scheme 5 Borewell Recharge Scheme
2018-19	350	129.09	76 Recharge pit/Dugwell Recharge Scheme 5 Borewell Recharge Scheme

C. Kerala Water Authority (KWA)

It may be noted that the issue for consideration in the OA 325/2015 is identification, protection and restoration of water bodies whereas in the OA 253/2015 (afterwards OA 496/2016) the issue is the problem of water quality on account of contamination of groundwater. In the order dated 10.05.2019 in the OA 325/2015, the Principal Bench of NGT has observed that reuse of treated sewage water as well as restoration of water bodies are connected to ground water conservation, which in turn is connected to remedying the pollution of polluted river stretches and directed all the States and UTs to review the existing framework of restoration of all the water bodies by preparing an appropriate action plan, while in OA 496/2016, the Principal Bench of NGT noted the need for comprehensive groundwater management plan covering Rain Water Harvesting (RWH) systems, use of treated water for ground water recharge and regulation of extraction of groundwater, apart from revival and rejuvenation of water bodies.

The above directions in the two original applications before the Principal Bench indicates the need for a comprehensive action plan consisting mainly of actions pertaining to pollution control of rivers, sewage management, ground water management and rain water harvesting. The indicative guidelines (copy attached) published by CPCB in June 2019 in compliance to the order dated 10.05.2019 of the Principal Bench of NGT in OA 325/2015 contains the key activities and components and agencies to perform the task. As per this the agencies responsible for rainwater harvesting (RWH) are Local Bodies and District Magistrates and hence the comprehensive action plan for RWH is to be submitted by those departments. However, KWA has plans to implement RWH in assets owned and managed by KWA. Though KWA gives priority to perennial surface water sources while designing schemes, groundwater extraction is resorted to in small/mini water supply schemes. When such schemes are changed to comprehensive water supply schemes based on surface water sources in a phased manner, KWA has plans to handover the sources (tube/bore wells) of such small/min schemes to Ground Water Department for using them as a source for ground water recharging. Besides this, roof top rainwater harvesting is now practiced in some buildings and water treatment plants of KWA and we have plans to adopt this to the maximum possible extent in buildings owned by KWA.

The actions on the other points mentioned in the indicative guidelines published by CPCB in June 2019 in compliance to the order dated 10.05.2019 of the Principal Bench of NGT in OA 325/2015 and pertaining to KWA is detailed below.

2 (g) GW Protection - Capping of contaminated tube wells and potable water supply through alternate measures in the affected areas of ground water

As per status in IMIS, the web portal of the Ministry of Jal Shakti, Government of India as on 01.04.2015 there were 95 Fluoride affected habitations in the State. Out of the above, 63 habitations have been covered with piped water supply as on 31.03.2019. As per the current status 32 habitations are remaining to be covered and ongoing projects are available for 17 habitations which will be covered by 2021 March.

Regarding the remaining 15 habitations, repeated water quality tests were conducted based on directions from the Ministry of Jal Shakti to ensure detection of contamination. As per the test

results, now fluoride content is within the Acceptable / Permissible limit in 7 out of these 15 habitations. Action is being taken to cover the remaining 8 habitations with piped water supply by 2021 March for which feasible proposals are being prepared. Aggressive RWH and recharging these quality affected sources will also help redeem the situation.

3. Sewage Management

(a) Identification of cities,towns and villages discharging sewage into river/tributary

Though 21 river stretches in Kerala were identified as polluted by the Hon'bleNGT , it was observed that only one river in Trivandrum, viz, Karamana River is reported with problem of direct discharge of sewage in to the river/tributary.The Action Plan for this river was approved by NGT. Out of the remaining 20 rivers, no river was identified as having problem of pollution due to direct discharge of sewage into the water body. Action plan for 13 rivers approved by the River Rejuvenation Committee (RRC) were submitted to CPCB and Hon'ble NGT in 06/2019 and permission was sought for exempting the remaining 7 rivers from the list as these stretches were having BOD less than 3 mg/L.Based on the direction by CPCB that these cannot be exempted and action plan has to be submitted the action plan for these rivers also have been prepared by KPCB.

The status report as on 07.11.2019 on the actions (short term)to be taken by KWA as per the Approved Action Plan of Karamana River is indicated below:

No.	Activity	Cost Rs. in Cr.	Source of fund	Timeline	Present Status
a)	Pumping lines from the terminal pumping station Kuriyathi, to be connected directly to STP at Muttathara	3.375	AMRUT	May-19	Work completed and commissioned.
b)	Rehabilitation/upgradation of Thaliyal and Aranoor Sewerage Pumphouse by rehabilitation of existing well, construction of new well and grit chamber, installation of new pump sets	2.37	Plan scheme	May-20	Work order issued for Thaliyal. No offer received for Aranoor. To be retendered.
c)	5 MLD sewage treatment plant at Medical College	19.2	AMRUT	May-20	Work started. The progress of work is slow due to lack of permission for dumping excavated earth.
d)	Installation of adequate pumps in Mudavanmughal and Enchakkal pumping stations	0.23	Plan scheme	Mar-20	No response to tender. Presently retendered.

e)	DG sets in all lift and pumping stations – Mudavanmughal, , Kuriyathi, Pattoor, Kannammola, Plamoodu,Murinjapalam	0.92	Plan scheme	May-20	AS issued by Government in State Plan 2019-20 Bharat Heavy Electrical Limited has submitted their report and the report is under scrutiny.
f)	Reconnect sewer at Rajaji Nagar, stop outflow of sewage into Amayizhanchanthodu, control stormwater entry into sewer to avoid overflow in Thampanoor area. Sewage generated in Rajaji Nagar shall be diverted to main sewer line. Sewage generated in Thoppil area shall be diverted main sewer line	0.1	Maintenance work	Dec-19	Work could not proceed since the foundation of the bus terminal falls in the alignment. The scope of the work to be revised by rerouting the pipeline through main road.
g)	Divert the sewer line from the School compound of Government Karamana High School	0.42	Plan Scheme	May-20	Agreement executed. Road restoration charges remitted to PWD. Road restoration estimate from NH to be obtained.
h)	Rehabilitation by laying new lines increasing size of undersized main and reconstruction by dilapidated manholes for the last 3 years		Plan Scheme/ AMRUT	May-20	Works completed – 23 No. (Rs. 3.58 cr.)
	Total works in progress (62No.)	15.26			In progress – 39 No. (Rs. 11.68 cr.)
	Works in tendering stage (16No.)	4.05			Tendered/To be tendered – 16 No. (Rs. 4.05 cr.)
i)	Extension of sewer network wherever technically feasible in new areas of existing blocks		Plan scheme / AMRUT	May-20	Works completed - 11 No. (Rs. 1.68 cr.)
	In progress(20 No.)	15.78			In progress – 9 No. (Rs. 14.1 cr.)
	Tendering(9 No.)	9.31			Tendered/To be tendered – 9 No. (Rs. 9.31 cr.)
j)	Around 155 houses in Kurukuvilakom, Kannettumukku shall be provided with septic treatment system.	To be estimated			Not technically feasible to connect to the existing sewer system. Septic tanks will be provided by Corporation.

k)	Procurement of sewer cleaning machines and equipment maintenance	3.17	Plan Scheme	May-20	Work tendered. No response to first tender. Work retendered.
l)	Establishment of six additional blocks in uncovered areas		JNNURM& AMRUT	May-20	Works completed - 1 No. (Rs. 2.28 cr.)
	In Progress (10 nos.)	87.33			In progress – 9 No. (Rs. 85.05 cr.)
	Tendering (10 nos)	25.59			Tendered/To be tendered – 10 No. (Rs. 25.59 cr.)

(b) Identifying drains joining river and their quantification and characterization of pollution load

This has to be done by the LSGIs

(c) Preparation of DPR for interception and diversion of drains to STPS for which suitable site to be identified and plan for utilisation of treated sewage

(f) Restoration of natural drains for carrying only stormwater(but not sewage)

(h) Interception and diversion of sewage from drains and connectivity to STPs

The above action points (c,f,h) are interrelated. The main activities mentioned like restoration of natural drains for carrying only stormwater, preparation of DPR and interception and diversion of sewage from all drains are to be carried out by the local bodies/irrigation/PCB. However, as part of the action plan for Karamana river,the drain carrying sewage to the river from the terminal pumping station at Kuriyathi was intercepted and separate pumping main was laid to convey sewage directly to STP at Muttathara. This has resulted in taking about 20 MLD sewage additionally to STP (increasing the capacity utilisation from 50 MLD to 70 MLD.

(d) Execution of STP works and necessary infrastructure and ensuring household sewer connection for full utilisation of STP.

The present generation of sewage in Thiruvananthapuram city is estimated as 140MLD. Sewage presently treated is around 70MLD at the Muttathara treatment facility with a capacity of 107 MLD with facility for co-treatment of septage. The remaining sewage is managed through individual septic tanks and pit latrines. Around 30 tankers of septage are emptied at the STP on a daily basis. The projected sewage generation/day in the year 2051 is 153 MLD. With 80% coverage through piped sewerage system, additional STP required is only for 15 MLD (Existing capacity of STP is 107 MLD).Inorder to ensure household sewer connection and full utilisation of the STP long term measures are planned as below. The plan is to complete these activities within a period of three years.

No.	Long term measures proposed	Amount Required (Rs.in Crore)	Present Status
a)	Extension of sewerage system to Block F to G coastal belt	200	AS for the proposal for engaging Consultants for preparation of Detailed Engineering Report has been received under RKI (Rs. 17 Crores)
b)	Extension of sewerage system to Block H toR	700	
c)	Extension of sewerage system to Newly added areas of corporationviz, Kazhakootam, Sreekaryam,Kudappanakunnu, Vattiyoorkavu&Vizhinjam	300	
d)	Providing sewerage system in Block A to E	100	
e)	Rehabilitation of existing network and pump house in block A to E	100	
f)	Procurements of equipment for maintenance sewerage system	10	
g)	Additional STP requirement	60	
h)	**Total Amount required**	**1,470**	

(g) Ensuring utilisation of treated sewage for beneficial use such as agriculture, construction activity, washing/flushing/cleaning/industrial cooling etc.

In order to promote the reuse of treated water, treated sewage water from STP had been given free of cost. But only very few are using the facility. As potential users are very less for the treated sewage water (only secondary treatment), it has been decided to provide tertiary treatment for a part of the treated water as an initial step to enhance the reuse of water. Accordingly Administrative sanction has been accorded by the Government for 5MLD tertiary treatment at STP, Muttathara vide GO(Rt) No. 419/2019/WRD dated 14.06.2019. This can overcome the apprehension of people in using treated sewage water to a large extent.Weshall generate awareness among builders to utilize the treated effluent (tertiary treated) for construction purpose. Once tertiary treatment plant at Muttathara is completed as detailed above, more demand for the treated water is expected.The identified potential users are as follows

Travancore Titanium Ltd (1.50 MLD)
English India Clay (0.5 MLD)
VSSC (0.2 MLD)
Railway terminals (0.5 MLD)
Airport 2 terminals (0.5 MLD)
BSF (0.1 MLD)
Air force station (0.1 MLD)
NHAI-median wetting (0.2 MLD)
Construction agencies (0.5 MLD)
Educational Institutions around Muttathara (0.1 MLD)
Resort and Hotels around Kovalam (0.3 MLD)
Dairy farm-irrigation (0.5 MLD)

As the agency responsible for both water supply and sewage services, KWA shall make sure that needful action is taken as per the plan.

Plan of Action

Rain Water Harvesting for Conservation of Water.

a) Kerala Rural Water Supply & Sanitation Agency (KRWSA)

b) Ground Water Department (GWD)

c) Kerala Water Authority (KWA)

a) Kerala Rural Water Supply & Sanitation Agency (KRWSA)

Plan of Action for the RWH & GWR activities proposed for Financial Years 2019-20 and 2020 -21.

a) Construction of Individual household level RWH tanks of 10000 ltrs capacity.

The household level RWH tanks provided shall help the families to directly harvest the rain water and use it for drinking and other domestic purposes. The proposed structure can store rain water for the three summer months, thereby addressing water scarcity during summer.

The programme envisages covering 3000 Nos. of households selected from 20 GPs who shall be provided assistance for 300 Nos. of RWH units per GP. The support under this programme shall be considered in order to fill the gap of water supply coverage. Thus the assistance shall be provided to households where there are no facilities at all for drinking water at present. Major criteria for selecting the GPs will be low percentage of water supply coverage. The 10% beneficiary contribution shall ensure an increased sense of responsibility and ownership among the beneficiaries and sustainability of the structure in the long term.

b) Installation of Open well Recharge system for sustainability.

The broad aim of the programme is to improve the water quantity and quality levels of homestead open dug wells. The sustainability of the water sources is ensured by promoting rain water harvesting and ground water recharge activities and that in turn will become long term measures for addressing the water scarcity problems.

It is envisaged to recharge 13500 Nos. of seasonal and quality affected wells of 20Nos. of selected GramaPanchayths where the water quality and quantity problems are severely affected. The GPs that are categorized under critical blocks and JalanidhiPanchayaths shall be prioritized while selecting the GPs. The wells shall be made sustainable through recharging the same by directing rain water from the roof tops. The water quality of these wells is ensured by protecting them from pollution. Possible measures shall be taken in order to sanitize the well as part of sustainability. The sources of rural water supply schemes which require the support for recharging through rain water harvesting will also be included under the programme. The programme will be implemented on a cost sharing basis.

c) Community Managed Rain Water Harvesting storage tanks for SC/ST/other backward colonies where water scarcity is acute.

Common rain water harvesting storage tanks shall be constructed for providing water to a group of families living together. There are several SC/ST/other backward colonies where water is a major issue and people residing in such colonies had to walk long distance for fetching water. The public well provided with in the colony may not be yielding sufficiently to provide water to the requirement of the people in the colony. The common RWH storage tank provided shall serve as a substitute source and the overflow from the storage tank shall be directed to the public well as recharge mechanism.

In order to sustain the scheme, the existing open/bore well source in the colony shall be rehabilitated or additional well shall be provided with the arrangement for pumping and

distribution system to the households in the colony. The scarcity of water during the summer months can be managed by utilizing the sources alternatively.

The structure shall be constructed in a common place and water shall be collected from the houses located nearby the structure. The colony shall be mobilized to form into a beneficiary group and the post operation activities shall be entrusted with the group. The structure shall be constructed on a cost sharing basis to ensure the participation of the households for ownership and responsibility. The size of the structures shall be decided based on the number of households in selected colony. It is proposed to implement the programme in 7 Nos. of selected colonies.

d) Implementing RWH & GWR activities for Govt. institutions in Tvpm city.

A portion of the Plan provision is proposed to be utilized for RWH projects in Thiruvanathapuram city complementing 'Operation Anantha – II', the flood control project being implemented in Thiruvanathapuram city.

One of the major activities proposed for controlling flood in Thiruvanathapuram city is adoption of rain water harvesting and roof top rain water collection and storage systems. The various efforts taken as part of 'Operation Anantha – I' has resulted in controlling the flood to a great extent in the city. In flood control and management measures, the water retention measure reduces the flow of water discharged to the canals and drains, thereby avoiding the overflow of canals and drains. Rain Water harvesting and roof top rain water storage systems help in holding the runoff and will reduce the chances of flooding, besides improving the ground water table. The improved water table will reduce the dependency on piped water also.

Sl.No	Name of activity proposed	Financial Year 2019-20		Financial Year 2020-21	
		No. of units approved	Estimated Amount (Rs. in crore)	No. of units proposed	Estimated Amount (Rs. in crore)
1	Construction of Individual household level RWH tanks of 10000 ltrs capacity with GWR system	1000 Nos. of individual house holds	7.10	2000 Nos. of individual house holds	14.00
2	Installation of Open well Recharge system for attainability of wells.	8500 Nos. of individual house holds	9.35	5000 Nos. of individual house holds	20.00
3	Community Managed Rain Water Harvesting storage tanks in SC/ST/other backward colonies where water scarcity is acute	2 Nos. of Colonies	0.10	5 Nos. of Colonies	0.50
4	Implementing RWH & GWR activities for Govt. institutions in Tvpm city. ***	10 Nos of Govt. Institutions	3	12 Nos of Govt. Institutions	2
	Total		**19.55**		**36.5**

*** *See annexure for details*

***Annexure

Sl No.	Name of Institution	Component	Units
1	Fire and Rescue Services Head quarters	Construction of 1 No. of Open well with pump and accessories	1
		Construction of 1 No. of GLSR (26000 litre)	1
		Installing pipe lines for the collection of rain water from existing building	1
2	ARP Camp	Construction of 1 No. of Rain Water Harvesting and Flood Moderation Pond at ARP Camp, Nandavanam, Thiruvananthapuram (239000 litres capacity)	1
		Construction of 50 Nos. of Rain Water Recharge pits at ARP Camp, Thiruvananthapuram	50
		Construction of 50Nos. of Rain pits at ARP Camp, Thiruvananthapuram	50
3	SAP Camp	Developing and renovating the exiting Rain Water Harvesting and Flood Moderation Pond (1976500 litres capacity)	1
		Construction of 200Nos of rain water Recharge pits.	200
		Construction of 200Nos. of Rain pits.	200
		Supply and Fixing of 1 No. of Syntex tank(5000 ltr)	1
4	SAP Quarters	Construction of 1 No. of Open well at SAP, Quarters Area, Peroorkada, Thiruvananthapuram	1
		Construction of 100Nos. of Rain Water Recharge pit	100
		Construction of 100Nos. of Rain pits.	100
		Supply and Fixing 1 No. of ofSyntex tank(5000 ltr capacity)	1
5	Kerala Legislative Assembly Complex	**Museum**	
		Renovation of 1 No. of existing 5.00 lakhs litre capacity RWH units of Museum building	1
		Cleaning of the existing well	1
		Construction of 1 No. of rain pit	1
		At Secretary's Residence	
		Renovation of 1 No. of existing 10,000.00 litre capacity RWH units	1
		At Deputy Speaker's Residence	
		Renovation of 1 No of existing 10,000.00 litre capacity RWH units	1
		Construction of 1 No. of rain pit	1
		At Hon'ble Speaker's Bungalow	
		Renovation of 1 No. of existing 10,000.00 litre capacity RWH units	1
		At Main building premises	
		Renovation of 1 No.of existing 5.00 lakhs litre capacity RWH units	2
		Construction of 10Nos. of Recharge pit pit	10

6	Govt. Ayurveda College	Renovation of existing 8 Nos. of RWH unit at the premises of Govt Ayurveda College - Thiruvananthapuram	1
		Construction of 30Nos. of rain water Recharge pit	30
		Renovation works 1No. existing well	1
		Construction of 100Nos. of Rain pits	100
7	SMV High School	Construction of 4Nos. of RWH units at SMV High School, Mg Road, Thiruvananthapuram	4
		Construction of 103Nos.Rain Water Recharge pits.	103
		Renovation of 1No.of existing open well	1
	Girls High School And Higher Secondary school premises cotton hill	Renovation of 1 No. of existing RWH unit at Govt. Girls high school and higher secondary school premises Cotton Hill, Thiruvananthapuram	1
		Construction of 120Nos. of Rain Water Recharge pits.	120
		Renovation of 1 No. of existing open well	1
8	Girls Pre-Primary & Primary School Cotton Hill	Providing RWH facilities at govt. Girls High School And Higher Secondary school premises, Manakkadu, Thiruvananthapuram	1
9	Girls High School And Higher Secondary school premises, Manakkadu	Renovation of 2Nos. of existing RWH units at the premises of the school	2
		Renovation of 1No. of existing open well	1
		Construction of 55 Nos. of Recharge pits.	55
10	Govt Teachers Training Institute, Manakkadu	Renovation of the existing RWH system	1
		Construction of 100 Nos.of Rain Water Recharge pits	100
		Renovation of 1No.of existing open well	1

b) Ground Water Department (GWD)

IMPLEMENTATION PLAN AT A GLANCE

Implementation Year	No of DWR	No of RCP	No BWR	Estimated Cost In Lakhs
2020-21	76	43	50	170.75
2021-22	89	44	57	193.25
2022-23	97	50	60	209.5
2023-24	108	52	59	220.75
2024-25	97	52	76	231
GRAND TOTAL				**1025.25**

*DWR – Dug Well Recharge
*RCP – Recharge Pits
*BWR – Bore well Recharge

Annexure-III a

Action Plan for Artificial Groundwater Recharge in OCS Blocks during 2021-22

Sl. No	District	Name of the Block	*DWR	*RCP	*BWR
1	Ernakulam	Parakkadavu	1	1	0
2	Idukki	Elam Desom	1	1	2
3	Idukki	Kattappana	1	1	2
4	Idukki	Nedumkandam	1	1	2
5	Kannur	Kannur	3	1	2
6	Kannur	Panur	3	2	1
7	Kannur	Thalassery	3	1	2
8	Kasargod	Kanhangad	3	2	1
10	Kasargod	Karadka	2	1	2
9	Kasargod	Kasaragod	3	1	1
11	Kasargod	Manjeswar	2	1	1
12	Kollam	Mukhathala	2	3	2
13	Kozhikode	Ballussery	3	1	1
14	Kozhikode	Kunnamangalam	2	1	1
15	Malappuram	Kondotty	2	1	1
16	Malappuram	Kuttippuram	2	1	1
17	Malappuram	Malappuram	2	1	1
18	Malappuram	Thanur	2	1	1
19	Malappuram	Thriurangadi	2	2	1
20	Malappuram	Tirur	2	2	1
21	Malappuram	Vengara	2	2	1
22	Palakkad	Chittur	3	1	1
25	Palakkad	Malampuzha	2	2	2
23	Palakkad	Pattambi	3	1	1
24	Palakkad	Thrithala	2	1	2
26	Thiruvananthapuram	Athiyannur	3	1	1
27	Thiruvananthapuram	Chirayinkil	2	1	1
30	Thiruvananthapuram	Nedumangad	3	1	1
28	Thiruvananthapuram	Parassala	3	1	1
29	Thiruvananthapuram	Pothencode	2	1	1
31	Thrissur	Chowannur	3	1	5
32	Thrissur	Mathilakom	3	2	4
33	Thrissur	Thalikkulam	3	2	3
	Total Number of Structures		**76**	**43**	**50**
	Estimated Unit Cost in Lakhs		**1**	**0.75**	**1.25**
	Total Amount Expected		**76**	**32.25**	**62.5**

Annexure-III b

Action Plan for Artificial Groundwater Recharge in OCS Blocks during 2021-22

Sl. No	District	Name of the Block	DWR	RCP	BWR
1	Ernakulam	Parakkadavu	2	2	0
2	Idukki	Elam Desom	1	1	2
3	Idukki	Kattappana	1	1	2
4	Idukki	Nedumkandam	0	1	2
5	Kannur	Kannur	4	1	2
6	Kannur	Panur	2	1	3
7	Kannur	Thalassery	2	1	1
8	Kasargod	Kanhangad	3	1	2
10	Kasargod	Karadka	3	2	1
9	Kasargod	Kasaragod	3	1	1
11	Kasargod	Manjeswar	3	2	1
12	Kollam	Mukhathala	2	2	3
13	Kozhikode	Ballussery	3	1	1
14	Kozhikode	Kunnamangalam	2	1	1
15	Malappuram	Kondotty	1	1	1
16	Malappuram	Kuttippuram	2	2	1
17	Malappuram	Malappuram	2	1	1
18	Malappuram	Thanur	2	2	1
19	Malappuram	Thriurangadi	2	1	1
20	Malappuram	Tirur	2	2	1
21	Malappuram	Vengara	2	1	1
22	Palakkad	Chittur	4	1	2
25	Palakkad	Malampuzha	4	1	2
23	Palakkad	Pattambi	4	1	2
24	Palakkad	Thrithala	3	2	2
26	Thiruvananthapuram	Athiyannur	5	1	2
27	Thiruvananthapuram	Chirayinkil	4	1	2
30	Thiruvananthapuram	Nedumangad	3	1	1
28	Thiruvananthapuram	Parassala	3	2	1
29	Thiruvananthapuram	Pothencode	3	1	1
31	Thrissur	Chowannur	4	2	5
32	Thrissur	Mathilakom	4	1	4
33	Thrissur	Thalikkulam	4	2	4
	Total Number of Structures		**89**	**44**	**57**
	Estimated Unit Cost in Lakhs		1	0.75	1.25
	Total Amount Expected in Lakhs		89	33	71.25

Annexure-III c

Action Plan for Artificial Groundwater Recharge in OCS Blocks during 2022-23

Sl. No	District	Name of the Block	DWR	RCP	BWR
1	Ernakulam	Parakkadavu	2	3	1
2	Idukki	Elam Desom	1	1	4
3	Idukki	Kattappana	0	0	2
4	Idukki	Nedumkandam	1	1	2
5	Kannur	Kannur	4	2	1
6	Kannur	Panur	3	2	2
7	Kannur	Thalassery	3	2	2
8	Kasargod	Kanhangad	3	2	2
10	Kasargod	Karadka	3	2	1
9	Kasargod	Kasaragod	3	2	1
11	Kasargod	Manjeswar	3	2	1
12	Kollam	Mukhathala	2	3	2
13	Kozhikode	Ballussery	3	1	1
14	Kozhikode	Kunnamangalam	2	1	1
15	Malappuram	Kondotty	2	2	1
16	Malappuram	Kuttippuram	2	1	1
17	Malappuram	Malappuram	2	1	1
18	Malappuram	Thanur	2	1	1
19	Malappuram	Thriurangadi	3	1	1
20	Malappuram	Tirur	3	1	1
21	Malappuram	Vengara	3	1	1
22	Palakkad	Chittur	3	2	2
25	Palakkad	Malampuzha	4	1	2
23	Palakkad	Pattambi	4	1	3
24	Palakkad	Thrithala	4	1	3
26	Thiruvananthapuram	Athiyannur	4	2	1
27	Thiruvananthapuram	Chirayinkil	4	2	2
30	Thiruvananthapuram	Nedumangad	4	1	2
28	Thiruvananthapuram	Parassala	4	2	2
29	Thiruvananthapuram	Pothencode	4	1	2
31	Thrissur	Chowannur	4	1	3
32	Thrissur	Mathilakom	4	2	4
33	Thrissur	Thalikkulam	4	2	4
	Total Number of Structures		**97**	**50**	**60**
	Estimated Unit Cost in Lakhs		1	0.75	1.25
	Total Amount Expected		97	37.5	75

Annexure-III d

Action Plan for Artificial Groundwater Recharge in OCS Blocks during 2023-24

Sl. No	District	Name of the Block	DWR	RCP	BWR
1	Ernakulam	Parakkadavu	2	2	1
2	Idukki	Elam Desom	1	1	4
3	Idukki	Kattappana	1	0	2
4	Idukki	Nedumkandam	1	1	2
5	Kannur	Kannur	3	2	2
6	Kannur	Panur	4	2	1
7	Kannur	Thalassery	4	1	2
8	Kasargod	Kanhangad	4	2	2
10	Kasargod	Karadka	4	2	1
9	Kasargod	Kasaragod	4	2	1
11	Kasargod	Manjeswar	4	2	1
12	Kollam	Mukhathala	2	3	2
13	Kozhikode	Ballussery	3	1	1
14	Kozhikode	Kunnamangalam	3	1	1
15	Malappuram	Kondotty	3	2	1
16	Malappuram	Kuttippuram	3	2	1
17	Malappuram	Malappuram	3	2	1
18	Malappuram	Thanur	3	2	1
19	Malappuram	Thriurangadi	3	1	1
20	Malappuram	Tirur	3	1	1
21	Malappuram	Vengara	2	2	1
22	Palakkad	Chittur	4	4	3
25	Palakkad	Malampuzha	4	2	4
23	Palakkad	Pattambi	4	2	3
24	Palakkad	Thrithala	4	2	3
26	Thiruvananthapuram	Athiyannur	4	1	2
27	Thiruvananthapuram	Chirayinkil	4	1	1
30	Thiruvananthapuram	Nedumangad	4	1	2
28	Thiruvananthapuram	Parassala	4	1	1
29	Thiruvananthapuram	Pothencode	4	1	2
31	Thrissur	Chowannur	4	1	2
32	Thrissur	Mathilakom	4	1	3
33	Thrissur	Thalikkulam	4	1	3
	Total Number of Structures		**108**	**52**	**59**
	Estimated Unit Cost in Lakhs		1	0.75	1.25
	Total Amount Expected		108	39	73.75

Annexure-III e

Action Plan for Artificial Groundwater Recharge in OCS Blocks during 2024-25

Sl. No	District	Name of the Block	DWR	RCP	BWR
1	Ernakulam	Parakkadavu	2	2	1
2	Idukki	Elam Desom	1	1	2
3	Idukki	Kattappana	1	0	2
4	Idukki	Nedumkandam	1	1	2
5	Kannur	Kannur	3	2	2
6	Kannur	Panur	3	2	2
7	Kannur	Thalassery	3	2	2
8	Kasargod	Kanhangad	4	2	2
10	Kasargod	Karadka	4	1	2
9	Kasargod	Kasaragod	4	2	2
11	Kasargod	Manjeswar	3	1	2
12	Kollam	Mukhathala	2	3	2
13	Kozhikode	Ballussery	3	1	2
14	Kozhikode	Kunnamangalam	3	1	2
15	Malappuram	Kondotty	2	2	2
16	Malappuram	Kuttippuram	3	2	2
17	Malappuram	Malappuram	3	2	2
18	Malappuram	Thanur	3	2	3
19	Malappuram	Thriurangadi	2	2	2
20	Malappuram	Tirur	3	1	2
21	Malappuram	Vengara	2	1	2
22	Palakkad	Chittur	3	1	3
25	Palakkad	Malampuzha	3	1	2
23	Palakkad	Pattambi	3	1	3
24	Palakkad	Thrithala	3	2	2
26	Thiruvananthapuram	Athiyannur	3	2	3
27	Thiruvananthapuram	Chirayinkil	4	3	2
30	Thiruvananthapuram	Nedumangad	4	2	3
28	Thiruvananthapuram	Parassala	4	2	3
29	Thiruvananthapuram	Pothencode	3	1	3
31	Thrissur	Chowannur	4	2	4
32	Thrissur	Mathilakom	4	1	3
33	Thrissur	Thalikkulam	4	1	3
	Total Number of Structures		**97**	**52**	**76**
	Estimated Unit Cost in Lakhs		**1**	**0.75**	**1.25**
	Total Amount Expected in Lakhs		**97**	**39**	**95**

c) Kerala Water Authority (KWA)

KWA has plans to implement RWH in feasible places. Roof top rainwater harvesting is now practiced in only one or two buildings and water treatment plants of KWA and we have plans to adopt this to the maximum possible extent in buildings owned by KWA. For this structures with roof top area exceeding 100 m^2 has been identified and action is planned to implement rooftop rain water harvesting in all these buildings within a span of two years. The Action plan is indicated below.

Name of Office	Name of District	Area of available roof tops >100m2	Approximate Qty of Rain Water that can be harvested (Litre/year)	Time Line
WS Division, Attingal	Thiruvananthapuram	3977	3579300	May 2020
Sewerage Division Patoor	Thiruvananthapuram	2275	2047500	May 2020
WS Division, Neyyatinkara	Thiruvananthapuram	1706.25	1535625	May 2020
Project Div Kollam	Kollam	1576	1418400	Sep 2020
PHD Kottarakkara	Kollam	7589	6830100	Sep 2020
PH Division Thiruvalla	Pathanamthitta	3830	3447000	Sep 2020
PH Division Pathanamthitta	Pathanamthitta	750	675000	Sep 2020
Project Adoor	Pathanamthitta	1150	1035000	Sep 2020
PHD Kottayam	Kottayam	3852	3466800	Jan 2021
Project Kottayam	Kottayam	1800	1620000	Jan 2021
PHD Kaduthuruthy	Kottayam	1252	1126800	Jan 2021
PH Division Thiruvalla	Alappuzha	800	720000	Jan 2021
PHD Alappuzha	Alappuzha	16079	14471100	Jan 2021
PHD Muvattuppuzha	Ernakulam	3962	3565800	May 2021
PH Division Thodupuzha	Idukki	8829	7946100	May 2021
Project DivNattika	Thrissur	3211	2889900	May 2021
PH. Dn. Thrissur	Thrissur	5180	4662000	May 2021

PH. Dn. Irinjalakkuda	Thrissur	2081	1872900	May 2021
Project DivNattika	Palakkad	750	675000	May 2021
PH. Dn. Palakkad	Palakkad	3833	3449700	Sep 2021
PHD Shornur	Palakkad	6953	6257700	Sep 2021
PH Division, Vadakara	Kozhikkode	2666	2399400	Sep 2021
PH Division, Kozhikode	Kozhikkode	34905.21	31414689	Sep 2021
PH Division, S.Bathery	Wayanad	6644.21	5979789	Sep 2021
P.H Division, Malappuram	Malappuram	2840	2556000	Dec 2021
P.H Division, Edappal	Malappuram	2480	2232000	Dec 2021
WS Division, Kannur	Kannur	23758	21382200	Dec 2021
WS Division, Thaliparamba	Kannur	13018.6	11716740	Dec 2021

IV. Conclusion.

While Kerala is considered to be a water surplus State, the irony is that the State regularly faces acute water scarcity in the summer months. Much of this can be attributed to poor water management practices and limited water conservation measures. Rain Water Harvesting, as a water conservation measure, needs to be popularized by the State as a means of involving the public in effective water management.

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