

KERALA STATE ENVIRONMENT PLAN



JANUARY 2022

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List of Abbreviations

AMR	-	Anti Microbial Resistance
BMW	-	Bio medical Waste
C&D	-	Construction and Demolition
CBMWTDF	-	Common Biomedical Waste Treatment and Disposal Facility
CEPI	-	Comprehensive Environmental Pollution Index
CHC	-	Community Health Centres
CKCL	-	Clean Kerala Company Ltd.
CPCB	-	Central Pollution Control Board
CTSDF	-	Common treatment Storage disposal Facility
DEP	-	District Environment Plan
D2D	-	Door to Door

DPR	-	Detailed Project Report
DBU	-	Designed Best Usage
DLFMC	-	District Level Facilitation and Monitoring Committee
EPR	-	Extended Producer Responsibility
FMCG	-	Fast Moving Consumer Goods
GKA	-	Greater Cochin Area
GSDP	-	Gross State Domestic Product
HKS	-	Haritha Karma Sena
HWM	-	Hazardous Waste Management
IMAGE	-	Indian Medical Association Goes-Eco Friendly
KARSAP	-	Kerala Antimicrobial Resistance Strategic Action Plan
KSPCB	-	Kerala State Pollution Control Board
KEIL	-	Kerala Environment Infrastructure Ltd
KSEPR	-	Kerala State Extended producer Responsibility
KSIDC	-	Kerala State Industrial Development Corporation
KINFRA	-	Kerala industrial Infrastructure Development Corporation
LSGD	-	Local Self Government Department
MCF	-	Material Collection Facility
MRF	-	Material Recovery Facility
MT	-	Metric Tonne
MLD	-	Million Litres per Day
NGT	-	National Green Tribunal
NHAI	-	National Highway Authority of India
NWMP	-	National Water Monitoring Programme
NRCP	-	National River Conservation Programme
PWD	-	Public Works Department
RRF	-	Resource Recovery Facility
RSPM	-	Respirable Suspended Particulate Matter
SIDBI	-	Small Industries Development Bank of India
SPM	-	Suspended Particulate Matter
SPA	-	Severely Polluted Area
SEP	-	State Environment Plan
SWM	-	Solid Waste Management
SEIAA	-	State Environmental Impact Assessment Authority
SWMP	-	State Water Quality Monitoring Plan
TPD	-	Tonnes per day
T	-	Tonne
ULB	-	Urban Local Bodies
VGF	-	Viability Gap Fund

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I. PREFACE

1.1 Orders of Hon'ble NGT in O.A.710/2017 & 360/2018

The Principal Bench of the Hon'ble National Green Tribunal vide order dated 15.7.19 in O.A. 710/17 filed by Shailesh Singh Vs. Sheela Hospital & Trauma Centre directed for the preparation of District Environment Plans (DEP) throughout the Country. The Central Pollution Control Board (CPCB) was directed to prepare a template on which the DEPs may be modelled with suitable changes as per local requirements for all districts in the Country. The Hon'ble Tribunal also directed for the preparation of State Environment Plans (SEP) based on the respective DEPs of the States vide order dated 26.09.2019 in O.A. 360/18 filed by Shreenath Sharma Vs. Union of India &ors.

The CPCB in compliance to the direction of the Hon'ble Tribunal prepared a template for DEP seeking information on the following thematic areas:

1. Waste Management Rules
 - a. Solid Waste Management
 - b. Plastic Waste Management
 - c. C&D Waste Management
 - d. Hazardous Waste Management
 - e. E-waste Management
 - f. Bio-medical Waste Management
2. Water Quality Management
3. Air Quality Management
4. Industrial Waste Water Management Plan
5. Mining Activity Management Plan
6. Noise Pollution Management Plan

This SEP has thus been prepared including the details contained in the DEP template.

I.2 Kerala at a Glance (<http://www.kerenvis.nic.in/Database>)

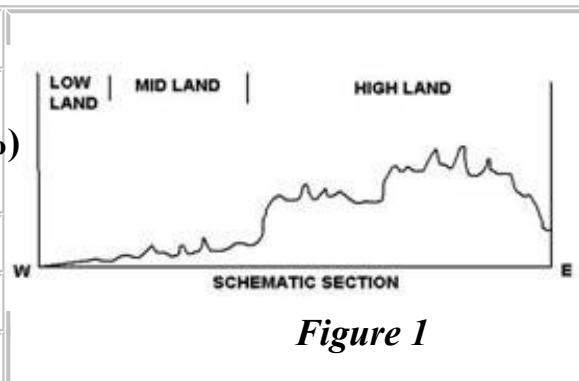
Kerala has a long history of art and cultural heritage and foreign trade with other countries. The State with the highest literacy rate in India is noted for its achievements in education, health, gender equality, social justice, law and order. In addition to these, the State has the lowest infant mortality rate in the country. Kerala lies between the Arabian Sea in the West and the Western Ghats (Sahyadris) in the East with an area of 38,863 sq km. It is one of the five states in the linguistic-cultural area known as South India. The neighbouring states of Kerala are Tamil Nadu and Karnataka. Mayyazhi (Mahe) is a part of Pondicherry (Puducherry) and lies within Kerala. Though the Lakshadweep in the Arabian Sea is part of the Union Territories, it has a close alliance with the linguistic and cultural heritage of Kerala. Before the independence of India, Kerala was one of the princely states in India. Later on 1st July 1949, the princely states of Travancore and Cochin united to form the Travancore-Cochin State. Later, the Malabar region (formerly part of Madras state) was added to the Travancore-Cochin State. The State was formed on 1st November 1956.

Kerala is known for its Unity in diversity, there are wide differences among districts regarding land, people, culture and traditions and lifestyle etc. [Malappuram](#) is the most populous district and [Wayanad](#) is the least populous district. [Thrissur](#) district is known as the cultural capital. [Kottayam](#) is known as the literal city and [Ernakulam](#) known as the commercial capital of Kerala. [Ernakulam](#) is also the first district in India to achieve complete literacy. Kollam is famous for its rich mineral deposits in its beaches and also being the largest exporter of processed cashew in the country. [Palakkad](#) district is the rice belt of Kerala. Idukki district is having the highest forest cover and the lowest population density. [Idukki](#) is home to the largest hydropower project in Kerala and the highest peak. Pathanamthitta is one of the richest districts in India with just 1.17% poverty as of 2013, which places the district among the top 5 districts in India with least poverty. [Kannur](#) district has the largest number of beaches. Kasargod is the northern most district of the State.

Table 1: Atitude and area of Physiographic Units

(Ref: <http://www.kerenvis.nic.in/Database>)

Physiographic units, altitudes and areas			
Unit	Altitude (m)	Area (km ²)	Area (%)
Lowland	0 - 7.5	3979.3	10.24
Midland	7.5 - 75	16231.2	41.76
Highland	> 75 m	18653.5	48.00



1.2.1 Administrative Divisions

There are 14 districts in Kerala, each district having its own unique peculiarities. The state's 14 districts are distributed among six regions: North Malabar (far-north Kerala), South Malabar (north-central Kerala), Kochi (central Kerala), Northern Travancore, Central Travancore (southern Kerala) and Southern Travancore (far-south Kerala). The districts which serve as administrative regions for taxation purposes are further subdivided into 27 revenue subdivisions and 77 taluks, which have fiscal and administrative powers over settlements within their borders, including maintenance of local land records. Kerala's taluks are further sub-divided into 1,674 revenue villages. Since the 73rd and 74th amendments to the Constitution of India, the local government institutions function as the third tier of government, which constitutes 14 District Panchayats, 152 Block Panchayats, 941 Grama Panchayats, 87 Municipalities, six Municipal Corporations and one Township. Mahe, a part of the Indian union territory of Puducherry, though 647 kilometers away from it, is a coastal exclave surrounded by Kerala on all of its landward approaches. The Kannur district surrounds Mahe on three sides with the Kozhikode District on the fourth.

Fig1: Administrative subdivisions of Kerala State

	No. of Administrative Units
Districts	14
Taluks	77
Villages	1670
Statutory Towns	59
Census Towns	461
Grama Panchayats	941
District Panchayats	14
Municipalities	87
Municipal Corporations	6
Cantonments	1(Kannur)



(Ref: <http://www.kerenvis.nic.in/Database>)

1.2.2 Geography

The State is wedged between the Lakshadweep Sea and the Western Ghats. Lying between northern latitudes $8^{\circ}18'$ and $12^{\circ}48'$ and eastern longitudes $74^{\circ}52'$ and $77^{\circ}22'$, Kerala experiences humid tropical rainforest climate with some cyclones. The State has a coast of 590 km and the width of the State varies between 11 and 121 km. Geographically, Kerala can be divided into three climatically distinct regions: the eastern highlands - rugged and cool mountainous terrain; the central mid-lands – rolling hills, and the western lowlands - coastal plains. Pre Cambrian and Pleistocene geological formations compose the bulk of Kerala's terrain. A catastrophic flood in Kerala in 1341 CE drastically modified its terrain and consequently affected its history; it also created a natural harbour for spice transport. The eastern region of Kerala consists of high mountains, gorges and deep-cut valleys immediately west of the Western Ghats' rain shadow. 41 of the

Kerala's west-flowing rivers and 3 of its east-flowing ones originate in this region. The Western Ghats form a wall of mountains interrupted only near Palakkad; hence also known Palghat, where the Palakkad Gap breaks. The Western Ghats rise on an average to 1,500 metre (4,900 feet) above sea level, while the highest peak reaches around 2,500 metre (8,200 feet). Anamudi in the Idukki district, the highest peak in South India, is at an elevation of 2,695 m (8,842 ft). The Western Ghats mountain chain is recognized as one of the world's eight "hottest hotspots" of biological diversity and is listed among UNESCO World Heritage Sites. The chain's forests are considered to be older than the Himalaya mountains. The Athirappilly Falls, which is situated on the background of Western Ghat mountain ranges, is also known as *The Niagara of India*. It is located in the Chalakudy River and is the largest waterfall in the State. Wayanad is the sole Plateau in Kerala. The eastern regions in the district of Wayanad, Malappuram (Chaliyar valley at Nilamboor), and Palakkad (Attappi Valley), which together form parts of the Nilgiri Biosphere Reserve and a continuation of the Mysore Plateau, are known for natural Gold fields, along with the adjoining districts of Karnataka.

Kerala's western coastal belt is relatively flat compared to the eastern region, and is criss-crossed by a network of interconnected brackish canals, lakes, estuaries, and rivers known as the Kerala Backwaters. Kuttanad, also known as *The Rice Bowl of Kerala*, has the lowest altitude in India, and is also one of the few places in world where cultivation takes place below sea level. The country's longest lake Vembanad, dominates the backwaters; it lies between Alappuzha and Kochi and is about 200 km² in area. Around eight percent of India's waterways are found in Kerala. Kerala's 44 rivers include the Periyar; 244 kilometre (152 mi), Bharathapuzha; 209 kilometre (130 mi), Pamba; 176 kilometre (109 mi), Chaliyar; 169 kilometre (105 mi), Kadalundipuzha; 130 kilometres (81 mi), Chalakudipuzha; 130 kilometres (81 mi), Valapattanam; 129 kilometre (80 mi) and the Achankovil River; 128 kilometre (80 mi). The average length of the rivers is 64 kilometre (40 mi). Many of the rivers are small and entirely fed by

monsoon rain. As Kerala's rivers are small and lacking in delta, they are more prone to environmental effects. The rivers face problems such as sand mining and pollution. The State experiences several natural hazards like landslides, floods and droughts. The State was also affected by the 2004 Indian Ocean tsunami, and in 2018 received the worst flooding in nearly a century.



Fig 2. Topography of Kerala

(<https://en-gb.topographic-map.com/maps/lpvo/Kerala/>)

Severe floods affected Kerala due to unusual high rainfall during the monsoon season in 2018 and 2019. The Indian government had declared 2018 flood as Level 3 Calamity, or "calamity of a severe nature. During this time, 35 out of the 54 dams within the State were opened and all five overflow gates of the Idukki Dam were opened at the same time, and for the first time in 26 years 5 gates of the Malampuzha dam of Palakkad were opened. Heavy rains in Wayanad and Idukki had caused severe landslides and had left the hilly districts isolated. The 2019 Indian floods were a series of floods that affected over thirteen states in late July and early August 2019, due to excessive rains. 2004 Tsunami was triggered by a powerful Earthquake in Indonesia. The worst effect was in Kollam where the tidal waves virtually washed away seashore.

1.2.3 Climate

With around 120–140 rainy days per year, Kerala has a wet and maritime tropical climate influenced by the seasonal heavy rains of the SouthWest summer monsoon and NorthEast winter monsoon (<https://www.encountertravel.com.au/solo-travel/asia/discover-north-india-solos-tour/more-info/weather/>). Around 65% of the rainfall occurs from June to August corresponding to the Southwest monsoon, and the rest from September to December corresponding to Northeast monsoon. The moisture-laden winds of the Southwest monsoon, on reaching the southernmost point of the Indian Peninsula, because of its topography, divides into two branches; the "Arabian Sea Branch" and the "Bay of Bengal Branch". The "Arabian Sea Branch" of the Southwest monsoon first hits the Western Ghats, making Kerala the first State in India to receive rain from the Southwest monsoon. The distribution of pressure patterns is reversed in the Northeast monsoon, during this season the cold winds from North India pick up moisture from the Bay of Bengal and precipitate it on the east coast of peninsular India. In Kerala, the influence of the Northeast monsoon is seen in southern districts only. Kerala's Annual average rainfall is around 3000mm (<https://mausam.imd.gov.in>). Some of Kerala's drier lowland regions average only 1,250 mm (49 in); the mountains of the eastern Idukki district receive more than 5,000 mm (197 in) of orographic precipitation: the highest in the state. In eastern Kerala, a drier tropical wet and dry climate prevails. During the summer, the state is prone to gale-force winds, storm surges, cyclone-related torrential downpours, occasional droughts, and rises in sea level. The mean daily temperature ranges from 19.8 °C to 36.7 °C. Mean annual temperatures range from 25.0 to 27.5 °C in the coastal lowlands to 20.0–22.5 °C in the eastern highlands.

Table 2 Climate details for Kerala

Climate data for Kerala													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	30 (86)	31 (88)	32 (90)	34 (93)	34 (93)	30 (86)	29 (84)	29 (84)	29 (84)	30 (86)	30 (86)	31 (88)	34 (93)
Average low °C (°F)	22 (72)	23 (73)	24 (75)	25 (77)	25 (77)	24 (75)	23 (73)	23 (73)	23 (73)	23 (73)	23 (73)	22 (72)	22 (72)
Average rainfall mm (inches)	8.7 (0.34)	14.7 (0.58)	30.4 (1.20)	109.5 (4.31)	239.8 (9.44)	649.8 (25.58)	726.1 (28.59)	419.5 (16.52)	244.2 (9.61)	292.3 (11.51)	150.9 (5.94)	37.5 (1.48)	2,923.4 (115)

(Ref: <https://mausam.imd.gov.in>)

1.2.4 Flora and Fauna

Most of the biodiversity is concentrated and protected in the Western Ghats (<https://kmhp.in/main-article-flora-and-fauna-of-kerala/>). Three quarters of the land area of Kerala was under thick forest up to 18th century. As of 2004, over 25% of India's 15,000 plant species are in Kerala. Out of the 4,000 flowering plant species; 1,272 of which are endemic to Kerala, 900 are medicinal, and 159 are threatened. Its 9,400 km² of forests include tropical wet evergreen and semi-evergreen forests (lower and middle elevations—3,470 km²), tropical moist and dry deciduous forests (mid-elevations—4,100 km² and 100 km², respectively), and montane subtropical and temperate (*shola*) forests (highest elevations—100 km²). Altogether, 24% of Kerala is forested. Three of the world's Ramsar Convention listed wetlands—Lake Sasthamkotta, Ashtamudi Lake and the Vembanad-Kol wetlands—are in Kerala, 1455.4 km² of the vast Nilgiri Biosphere Reserve and 1828 km² of the Agasthyamala Biosphere Reserve are in Kerala. Subjected to extensive clearing for cultivation in the 20th century, much of the remaining forest cover is now protected from clearfelling. Eastern Kerala's windward mountains shelter tropical moist forests and tropical dry forests, which are common in the Western Ghats. The world's oldest teak plantation 'Conolly's Plot' is in Nilambur. Kerala's fauna are notable for their diversity and high rates of endemism: it includes 118 species of mammals (1 endemic), 500 species of birds, 189 species of freshwater fish, 173 species of reptiles (10 of them endemic), and 151 species of amphibians (36 endemic). These are threatened by extensive habitat destruction, including soil

erosion, landslides, salinisation, and resource extraction. In the forests, *sonokeling*, *Dalbergia latifolia*, *anjili*, *mullumurikku*, *Erythrina*, and *Cassia* number among the more than 1,000 species of trees in Kerala. Other plants include bamboo, wild black pepper, wild cardamom, the calamus rattan palm, and aromatic vetiver grass, *Vetiveriazizanioides*. Indian elephant, Bengal tiger, Indian leopard, Nilgiritahr, common palm civet, and grizzled giant squirrels are also found in the forests. Reptiles include the king cobra, viper, python, and mugger crocodile. Kerala's birds include the Malabar trogon, the great hornbill, Kerala laughing thrush, darter and southern hill myna. In the lakes, wetlands, and waterways, fish such as Kadu, Red Line Torpedo Barb and *choottachi*; orange chromide—*Etroplusmaculates* are found. Recently, a newly described tardigrade (water bears) species collected from Vadakara coast of Kerala named after Kerala State; *Stygartuskeralensis*. The purple frog is one of only two species in the family Nasikabatrachidae. This family is endemic to the Western Ghats of India and has been evolving independently for around 100 million years.

1.2.5 Mineral Resources

Kerala State is endowed with a number of occurrences/deposits of minerals such as heavy mineral sands (Ilmenite, rutile, zircon, monazite, sillimanite), gold, iron ore, bauxite, graphite, china clay, fire clay, tile clay, brick clay, silica sand, lignite, limestone, limeshell, dimension stone (granite), gemstones, magnesite, steatite etc. (<https://dmg.kerala.gov.in/mineral-resources/>). However, mining activities on large scale are confined mainly to a few minerals-Heavy Mineral Sands, China Clay and to a lesser extent limestone/limeshell, silica sand and granite. In fact, heavy mineral sand and china clay contribute more than 90% of the total value of mineral production in the State.

Mineral Sand: The Heavy Mineral Sand deposits in Kerala contain an assemblage of Ilmenite, Rutile, Leucosene, Monazite, Zircon and Sillimanite. The State possesses one of the world class deposits of mineral sands in the coastal tracts between Neendakara and Kayamkulam. This, commonly known as the Chavara

deposit, after the main locality, covers a total length of 22 km and a width of about 8 km in the northern side and 6 km in the southern side. The Chavara barrier beach portion contains concentration of heavy minerals above 60%. The Chavara deposit is estimated to contain 127 million tonnes of heavy minerals with ilmenite content of 80 million tonnes from the total reserve of raw sand of the order of 1400 million tonnes. In the northern portion beyond KayamkulamPozhi extending up to Thottappally in Alappuzha district, the total reserve of heavy minerals estimated to the order of 17 million tonnes with ilmenite content of 9 million tonnes from the raw sand of 242 million tonnes.

China Clay: China clay (kaolin) consisting dominantly of kaolinite is one of the most sophisticated industrial minerals with a host of applications, viz., in ceramics, refractories, paper coating, filler for rubber, insecticides, cement, paint, textiles, fertilizers and others including abrasives, asbestos products, fibreglass, chemicals, cosmetics, pharmaceuticals, electrical ware, foundry and glass. The Department of Mining and Geology through their past investigation campaigns in parts of Kerala, identified two major china clay zones viz., the southern china clay zone between Thiruvananthapuram and Kundara (Thiruvananthapuram and Kollam districts) and the northern china clay zone between KannapuramMadayi-Cheruthazham in Kannur district to Nileswarm-Manjeshwaram in Kasargodu district. An estimated reserve of 172 million tonnes (probable reserve of 80 million tonnes and possible reserve of 92 million tonnes) of china clay of sedimentary and residual origin has been arrived at. Kerala china clay is one of the finest quality clay and is world class.

Table 3 Production and Royalty of Minerals in Kerala

Production & Royalty of Minerals in Kerala during 2018-19			
Sl. No	Mineral	Royalty (₹ Lakh)	Production (Tons)
Major Minerals			
1	Ilmenite	197.12	130071
2	Rutile	50.04	4969
3	Zircon	164.65	12598

4	Sillimanite	21.46	9212
5	Lime shell/Sea shell	17.65	22067
6	Lime stone	77.91	96780
7	Graphite	0.6	505
8	BR Ilmanite	6.01	1066
9	Quartz		
Total		535.44	277268
Minor Minerals			
1	Granite Building Stone	11990.25	35305043
2	Granite Building Stone	60.26	
3	Laterite (Building)	1230.10	3007297
4	Bauxite/Laterite (Cement)	19.19	19988
5	River Sand	6.78	12000
6	Ordinary Sand	485.56	363138
7	Lime /Sea Shell	2.47	747
8	Ordinary Earth	215.44	6281735
9	Brick Clay	293.08	428815
10	China Clay	200.53	399978
11	Silica Sand	142.85	48588
Total		14646.51	45867329
Grand Total		15181.95	46144597
<i>Source: Mining & Geology Dept</i>			

(Ref: <https://mines.gov.in/>)

1.2.6 Industries

Traditional industries manufacturing items; coir, handlooms, and handicrafts employ around one million people. Kerala supplies 60% of the total global produce of white coir fibre. India's first coir factory was set up in Alleppey in 1859–1860. The Central Coir Research Institute was established there in 1959. As per the 2006–2007 census by SIDBI, there are 14, 68,104 micro, small and medium enterprises in Kerala employing 30, 31,272 people. KSIDC has promoted more than 650 medium and large manufacturing firms in Kerala, creating employment for 72,500 people. A mining sector of 0.3% of GSDP involves extraction of ilmenite, kaolin, bauxite, silica, quartz, rutile, zircon, and sillimanite. Other major sectors are tourism, medical sector, educational sector, banking, ship building, oil refinery, infrastructure, manufacturing, home gardens, animal husbandry and business process outsourcing.

The major industries in Kerala including Fertilizer and Chemicals Travancore Ltd.(FACT), Kochi Refineries Ltd.(KRL), Hindustan Organic Chemicals (HOC),

Cominco Binani and Cochin Shipyard are located in Kochi availing the advantage of the port facilities. The world famous Chavara placer deposits of the Kollam district support three major mineral industries in Kerala viz. The Indian Rare Earths Ltd. (IRE), Kerala Minerals and Metals Ltd. (KMML) at Chavara (Kollam), The Travancore Titanium Products (TTP) at Veli (Trivandrum).

1.2.7 Agriculture

The major change in agriculture in Kerala occurred in the 1970s when production of rice fell due to increased availability of rice all over India and decreased availability of labour. Consequently, investment in rice production decreased and a major portion of the land shifted to the cultivation of perennial tree crops and seasonal crops. Profitability of crops fell due to a shortage of farm labour, the high price of land, and the uneconomic size of operational holdings. Only 27.3% of the families in Kerala depend upon agriculture for their livelihood, which is also the least corresponding rate in India. Kerala produces 97% of the national output of black pepper and accounts for 85% of the [natural rubber](#) in the country.

Coconut, [tea](#), [coffee](#), [cashew](#), and spices—including cardamom, [vanilla](#), [cinnamon](#) and [nutmeg](#) are the main agricultural products. Around 80% of [India's](#) export quality cashew kernels are prepared in [Kollam](#). The key cash crop is [coconut](#) and Kerala ranks first in the area of coconut cultivation in India. In 1960–61, about 70% of the coconuts produced in India were from Kerala, which have reduced to 42% in 2011–12. Around 90% of the total [Cardamom](#) produced in India is from Kerala. India is the second-largest producer of Cardamom in world. About 20% of the total [coffee](#) produced in India is from Kerala. The key agricultural staple is rice, with varieties grown in extensive paddy fields. Home gardens made up a significant portion of the agricultural sector. Related [animal husbandry](#) is touted by proponents as a means of alleviating rural poverty and unemployment among women, the marginalised, and the landless. The state government promotes these activities via educational campaigns and the development of new cattle breeds such as the [Sunandini](#). Though the contribution of the agricultural sector to the state economy was on the decline in 2012–13, through

the strength of the allied livestock sector, it has picked up from 7.0% (2011–12) to 7.2%. In the 2013–14 fiscal periods, the contribution has been estimated at a high of 7.8%. The total growth of the farm sector has recorded a 4.4% increase in 2012–13, over a 1.3% growth in the previous fiscal year. The agricultural sector has a share of 9.3% in the sectoral distribution of Gross State Domestic Product at Constant Price, while the secondary and tertiary sectors have contributed 23.9% and 66.7%, respectively (http://www.kerenvis.nic.in/Database/Economics_830.aspx).

1.2.8 Land use

Kerala has a diverse land use and cropping pattern. The land reforms introduced in the State brought in radical and comprehensive institutional changes leading to drastic transformation in the land holding pattern. This has resulted in shift in the land use pattern. Agriculture is the dominant land use type of the State. It accounts for over 55% of the geographical area followed by forest land (including degraded forest) of 28% but area under non-agricultural use is only 11% (Farm Guide, 2006). The land use pattern of Kerala during 2009-10 reveals that out of a total geographical area of 38.86 lakh ha., net sown area is about 56 percent. Forest occupies around 28 percent. Agriculture and forest sectors together accounts for over 84 percent of the land area.

As per the land use data of 2019-20, out of a total geographical area of 38.86 lakh ha, total cultivated area is 25.89 lakh ha (66.64 percent) and the net area sown is 20.26 lakh ha (52.13 percent). Land put to non-agricultural use is 11.73 percent and forest area is 27.83 percent. The cultivable waste and current fallow constituted 2.57 percent and 1.48 percent respectively. An analysis of changes in land use pattern over a period helps to comprehend the present scenario of agricultural land utilisation. Data on land use pattern for the year 2019-20 is given in the Table 4.

Table 4: Percentage of Geographical Area in Kerala

(Ref: ecostat.kerala.gov.in)

Classification of Land	2018-19	2019-20	Percentage Geographical areas	Change in area between 2018-19 and 2019-20	
				Actual	Percentage
Total Geographical Area	3886287	3886287			
Forest	1081509	1081509	27.83	0	0
Land put to non-agricultural uses	454047	455897	11.73	1850	0.41
Barren and uncultivated land	10281	10619	0.27	338	3.29
Permanent Pastures and Grazing land	0	0	0	0	
Land under miscellaneous tree crops	3118	2143	0.06	25	1.18
Cultivable waste	96497	99810	2.57	3313	3.43
Fallow other than current Fallow	45541	46931	1.21	1390	3.05
Current Fallow	57464	57387	1.48	-77	-0.13
Net area sown	2033631	2026064	52.13	-7567	-0.37
Area sown more than once	537470	563892	14.51	26422	4.92
Total cropped Area	2571101	2589956	66.64	18855	0.73

Source : Directorate of Economics and Statistics

II. PLAN ON WASTEMANAGEMENT RULES

The Principal Bench of the Hon'ble National Green Tribunal vide order dated 15.7.19 in O.A. 710/17 filed by Shailesh Singh Vs. Sheela Hospital & Trauma Centre directed for the preparation of District Environment Plans (DEP) throughout the Country. The Hon'ble Tribunal also directed for the preparation of State Environment Plans (SEP) based on the respective DEPs of the States vide order dated 26.09.2019 in O.A. 360/18 filed by Shreenath Sharma Vs. Union of India &ors. As directed by the NGT, the CPCB in compliance to the direction of the Hon'ble Tribunal prepared a template for DEP seeking information on the following thematic areas namely 1. Waste Management Rules - a. Solid Waste Management b. Plastic Waste Management c. C&D Waste Management d. Hazardous Waste Management e. E-waste Management f. Bio-medical Waste Management.

2.1 Solid Waste Management Plan

2.1.1 Statutory requirements

The Government of India notified the Solid Waste Management Rules, 2016 under the Environment Protection Act, 1986 for the management of solid waste. The statutory responsibilities of different departments are detailed in the SWM Rules. The time frame for implementation of activities namely 100% door to door collection; identification and procurement of land and for setting up of solid waste treatment plant; and common/regional secured landfill, and separate collection, storage and treatment of construction and demolition waste and for biomining of dumpsites are specified in Rule 22 of the SWM Rules. The Hon'ble National Green Tribunal also issued several orders in OA 606/2018 for the compliance of SWM Rules.

2.1.2 State Policy on Solid Waste Management

The State notified State Policy on Solid Waste Management in terms of rule 11 and 15 of Solid Waste Management Rule 2016 vide G.O. No.65/2018/LSGD dated 13.09.2018 to facilitate effective solutions for scientific management of wastes and to reiterate its commitment towards realizing the goals of the SWM Rules 2016 for the overall goal of transformation of Kerala into a garbage free and environmentally healthy State. The vision is to envisage a healthy, prosperous and resource efficient society in which wastes are reduced, reused, recycled and prevented wherever feasible and beneficial and disposed of in an environmentally safe manner. The key strategies prescribed are:-

- Mandatory segregation of waste at source level based on primary characteristics.
- Aerobic or anaerobic composting of biodegradable waste at source (household and institutions) as far as possible.
- Ensure decentralized community facilities for biodegradable waste that overflows from source.
- Establish door to door collection of non-biodegradable waste.
- Promote usage of storage bins for dumping wet and dry waste by all vendors and institutions.
- Enforce captive waste management systems for the bulk waste generators.

- Establish procedure for handling domestic hazardous waste and promote its implementation.
- Promote modern centralized waste processing facilities in major cities using state-of-the-art technologies.
- Develop regional sanitary landfill facility to dispose of ultimately unusable materials.
- Make use of the enabling environment created under the Haritha Keralam Mission to integrate the use of treated waste products, enhance organic agriculture and upkeep of fragile ecosystems.
- Undertake appropriate IEC campaigns.
- Implement appropriate capacity building programmes for stakeholders.
- Network with academic and research & development institutions for upgrading of technologies and application protocols

2.1.3 Institutional setup

Suchitwa mission has been set up in the State for giving technical support to the local self-government institutions. The Government constituted a State Level Advisory Committee on Waste Management chaired by the Chief Secretary; this Committee has conducted more than 36 meetings for monitoring solid waste management in the State on monthly basis. Government of Kerala constituted Clean Kerala Company Ltd. (CKCL) to provide waste management services, especially in the management of plastic and other recyclables, e-waste and operation and maintenance of resource recovery facilities established by the Urban Local Government and Block Panchayaths.

Environment Monitoring Cell was formed vide G.O. (Rt)No.22/2020/Envvt dated 27.02.2020 and is functioning in the office of the Chief Secretary. It consists of an Engineer from KSPCB, Legal Officer and an official from general administration dept. The Cell reports to the staff officer of the Chief Secretary who is an IAS Officer. All important matters in which Chief Secretary has to take action are brought to the notice of the Chief Secretary and departments concerned for speedy action.

The Kerala State Pollution Control Board (KSPCB) issued repeated directions to all local bodies for ensuring compliance of the Solid Waste Management Rules, 2016. Annual report on Solid Waste Management in the state as per SWM rules is prepared and submitted to Central Pollution Control Board every year.

2.1.4 Solid waste management in the State

2.1.4.a Status of Waste collection and treatment system

The Government of Kerala has been taking all efforts to implement the Solid Waste Management Rules, 2016 in the State. There are 6 Corporations, 87 Municipalities and 941 Grama Panchayats in Kerala. The total quantity of solid waste generated is 11,449 TPD of which 3452 TPD was generated from urban area and 7997 from rural area (Annual report 2021). District wise details are given in **Annexure 1**.

As per the Solid Waste Management Rules, 2016, 100% door to door collection from households and establishments is to be done. This includes treatment in the centralized and de-centralized systems. Centralized Windrow composting system exists at Brahmapuram, Kochi and at Njaliyan parambu, Kozhikode. However household level decentralized solid waste management facilities do exist at Kochi and Kozhikode Corporation [7]. 700 TPD treated is processed at source as reported by local bodies. More than 70% D2D collection of dry waste is achieved for households in 84 urban local bodies and for establishments in 70 urban local bodies as in May, 2022. Haritha Karma Sena is working in 92 urban local bodies and 923 Grama panchayaths for collection of dry waste[7]. For wet wastes disposal decentralized treatment methods such as aero bins, pipe compost, compost pits, kitchen bins, biogas plants etc. are followed. Dry wastes are collected, segregated and disposed through recyclers. In Kerala there are 147 plastic recycling units, 21 Steel mills, and 7 kraft paper units. Non-recyclable plastic waste is shredded in the RRFs and is used for the tarring of PWD and LSGD roads. During the period 2016-2021, Clean Kerala Company Limited (CKCL) has produced 2399.13 T of shredded plastics and given to various agencies (NHAI-12-18 T, PWD-947.76 T, LSGI-1151.2 T). The total length of polymerized road constructed during this period using shredded plastic is 3838.04km[7]. 1039 MCFs and 183 Resource recovery facilities have been provided in LSGIs (Status as on April 2022) [7].

Haritha Karma Sena (HKS), an enterprise group formed through the State Poverty Eradication Mission (Kudumbasree) has been engaged for the Door-to-Door

collection. The enterprise group is designed to have two persons for each ward for door-to-door collection of non-biodegradable waste on a regular basis and to help in managing the household institutional-community systems for composting biodegradable waste. The user fee is fixed by the respective local government depending on the services rendered and based on the guidelines issued vide G.O(Rt)No.2420/2017/ LSGD dated 15.07.2017. In order to sustain the operation of the door-to-door collection system, Government provided a Viability Gap Fund (VGF) support initially so as to make up the shortage of user fee collection in the initial stages such that each member of the group get at least minimum wage decided by the government.

The status of the present facilities for the treatment of biodegradable waste is given below (Annual report 2020-21):

TABLE 5: Status of facility for treatment of Biodegradable waste

FACILITY	TYPE OF PLANT	NUMBER	DETAILS
Centralized plant	Windrow composting plants (large)	2	Ernakulam Kozhikode (100TPD)
	Windrow composting plant (Small)	12	1. Attingal (13TPD) 2. North Paravur (3TPD) 3. Chalakkudy (2TPD) 4. Kodungallur (4TPD) 5. Kothamangalam 6. Kunnankulam 7. Guruvayoor (2TPD) 8. Chittur-Thathamangalam (4TPD) 9. Ottappalam (5TPD) Palakkad (4TPD) Thaliparambun Payyannur
Community Level	Vermicomposting plants (Small)	7	1. Attingal (0.25TPD) 2. Thodupuzha 3. North Paravur (1TPD) 4. Chavakkad (1.5TPD) 5. Manjeri (0.5TPD) 6. Koothuparambu 7. Mattannur (5 TPD)
	Aerobins	369	
	Biogas plants	287	
	Biobins in flats	500+	Thiruvananthapuram, Ernakulam, Trissur
	Material Collection Facility	685	
	Resource recovery facility	77	
Household Level	Pipe compost	1,31,559	Total-4,32,559
	Kitchen bin	79,146	
	Biogas plant	21,550	
	Biocomposter, Biobins, potbin	1,09,441	
	Ring compost	40,036	
	Bucket compost	6,903	
	Compost pit	43,924	
Institutional level	Biogas plants, aerobins, biobins		

2.1.4.b Setting up of modern centralized waste processing facilities in major Cities

Government of Kerala, through its Local Self Government Department, has taken steps to set up Waste to Energy Plants at identified locations across the State. The local bodies are expected to pay tipping fees to the company who run the plant and also take responsibility for waste collection in their jurisdiction. The collected waste will be segregated and taken to the plant by the company from designated collection points to

produce electricity or to produce fuel. The electricity produced at the plant will be sold to the Kerala State Electricity Board at the rates fixed by the Electricity Regulatory Commission.

The Government has accorded sanction for establishing Waste to Energy plants in 9 cites having 1 Lakh or more population and in two local bodies having population below 1 lakh. The sites are Njaliyanparambu at Kozhikode, Chelora at Kannur, Kanjikode at Palakkad, Kureepuzha at Kollam, Brahmapuram at Ernakulam, Munnar at Idukki. The construction work is to be started at Kozhikode after biomining. DPR prepared for Chelora, Kureepuzha and Kanjikode. Land is to be identified/procured for Thrissur, Malappuram and Thiruvananthapuram Corporation. The detailed project report for co-incineration of plastic waste in Malabar cement is being prepared. The details of Waste to energy plants is given in the Table 6.

Table 6 Status report of Waste to Energy Plant

Sl. No	Waste to Energyplant	Land Identified	Procured	Status
1	Kozhikode Njaliyanparambu	Kozhikode corporation	(Govt.land) 12.67acre at Njaliyanparambu	<ul style="list-style-type: none"> • Work awarded to Zonta Infratech Private Limited for the construction of Waste to Energy Plant. • Consent to establish was issued to Malabar Waste Management Private Limited on 12-8-2020 with a validity

				<p>upto 30-6-2023 for the generation of 6MW electricity and 20T of compost.</p> <ul style="list-style-type: none"> • Biomining of legacy waste is 50% complete. The total area for biomining is 1.8 acres. • All licenses from the corresponding departments were obtained for the construction of waste to energy plant. Work will be started only after monsoon.
2	Kannur Chelora	Kannur Corporation	(Govt.Land) 9.7 acres atChelora	<ul style="list-style-type: none"> • Work of WtE plant can be started only after the work of biomining is carried out. WtE plant is proposed in 9.7 acres of land after clearing the legacy waste. • Tendering completed and DPR prepared by Blue planet. Consent application is yet to be received. • For biomining, volume of legacy waste – 1,22,844 m³ (NIT). First given to Zonta and they asked to revise the amount of biomining. Again retendered and identified a suitable contractor, Jan-Adhar Sevabhavi Sanstha. Agreement to be executed • Waste characterization done on 18-4-2020. Six samples taken-10kg from upper and lower part at three locations- 50-70% inert, 15-25% recoverable- 12-18% organic compost. Cu in one sample, chromium in three and lead in four exceeded. Capping can be considered for maximum 10% residual rejects after biomining of stabilized waste.
3.	Palakkad Kanjikode	Palakkad Municipality	Land taken over from Kerala State Electricity Board Ltd. in advance possession 15 acres at Kanjikode	<ul style="list-style-type: none"> • Blue Planet Palakkad Waste Solutions Private Limited was formed to take up the development of the project. • Consent to establish was issued on 21-12-2021 to the project with a validity upto 30-11-2023. • 200T of municipal solid waste will be processed. The products include 4018kg/day of compressed biogas; 60TPD of RDF; 6 TPD of recyclables; 12 TPD of waste for sanitary landfills; 35.75 TPD of dry organic

				compost/manure
4	Kollam Kureepuzha	Kollam Corporation	7.05 acres at kureepuzha (Govt.land)	<ul style="list-style-type: none"> • The SPV constituted for setting up of the Waste to Energy Plant of Kollam Corporation, • M/s. Venad Waste Management Private Limited had applied for Consent to Establish on 09.09.2021. The proposed waste to energy plant is bio methanation based and is having a capacity of 200 TPD. • Consent to establish was issued to project on 10-1-2022 with a validity upto 9-1-2025 for the production of 8.165TPD of compressed biogas from 200TPD of municipal solid wastes • Biomining of legacy waste is 50% complete.
5	Ernakulam Brahmapuram	Kochi corporation	20 acres atBrahm apuram (Govt. land)	<ul style="list-style-type: none"> • Bio mining of legacy waste started on February first week by M/s Zonta Infratech Ltd. They have completed biomining of four sectors out of seven sectors. • For construction of Waste to Energy plant, work order was issued to M/s. Zonta Infratech. Based on the technical meeting held on 03.01.2022 by the Principal Secretary LSGD, representatives from M/s. Zonta Infratech informed that steps have been taken to transport the machineries from Delhi and Pune.
6	Idukki Munnar	Idukki Municipality	2 acres of land at Munnar	<p>Bio mining of legacy waste is going on and the authorities informed that it will be expected to complete before monsoon.</p> <p>The committee observed that the Consortium is meeting the technical and financial legibility Criteria.</p> <p>The consortium made a detailed presentation of their technical plan before the Bid evaluation Committee.</p> <ul style="list-style-type: none"> • SLAC after detailed discussion resolved to accord sanction to proceed

				with the financial evaluation of the Bid
7	Thrissur	Thrissur corporation	Identified land at Ollookkara village	<ul style="list-style-type: none"> • Thrissur Corporation identified land at Ollookkara village in Thrissur district. • Vide GO(Rt)No111/2020/LSGD dated 13/01/2020 State Government has accorded sanction to Thrissur Municipal Corporation to purchase the identified land at Ollookkara Village in Thrissur district and to hand over the same on lease basis to KSIDC for the development of the project • Secretary, Thrissur Municipal Corporation to report the status of price negotiation done with the owners of the land identified.
8	Malappuram	Malappuram munciplaity	8.09 acres of land at Kurumbathoor village in Tirur Taluk	<ul style="list-style-type: none"> • 8.09 acres of land identified by District Administration at Kurumbathur village. Tirur taluk forsetting up of WtE plant. The land is under possession of KSIDC. Details of this are reported to be submitted to Government already by LR Deputy Collector. Not submitted any application to the Board.
9.	Thiruvananthapuram	Thiruvananthapuram Corporation		<ul style="list-style-type: none"> • Land identification

2.1.4.c Sanitary landfill

The non-usable, non-recyclable, non-biodegradable, non-combustible and non-reactive inert waste and preprocessing rejects and residues from waste processing facilities shall only go to sanitary landfill and its specifications are given in zi of Rule 15 of the Solid Waste Management Rules, 2016. In Kerala, there are no secured land fill as per SWM Rules.

In the State, for a Regional Sanitary Landfill 25 acre of land has been earmarked by KINFRA at site of FACT at Ernakulam and action is being carried out to set up.

Now Clean Kerala Company Ltd (CKCL) is planning to procure 25 acres of land at Ambalamugal, Kochi almost in the near proximity of KEIL for construction of sanitary landfill. Another secured landfill is under construction in Attingal Municipality.

2.1.4.d Legacy Waste Handling

The indiscriminate and unscientific management of urban solid waste over the years resulted in formation of waste dumps posing environmental and public health hazards to the public. Bio-mining of these legacy waste dumping sites is at various stages in 41 sites (10 large dumpsites and 31 other dump sites).

Legacy waste clearing has been completed at ten dumpsites, namely 1. Erumakkuzhi, Thiruvananthapuram; 2. Palayam; 3. Punalur; 4. Kottarakkara; 5. Adoor; 6. Erumeli; 7. Vaikom; 8. Guruvayoor, Thrissur; 9. Pattambi; 10. Thathamangalam, Palakkad. The clearing is progressing at 1. Kozhikode; 2. Kunnamkulam; 3. Chalakkudy; 4. Irinjalakkuda; 6. Munnar 7. Kureepuzha and 8. Varkala. Biomining Work has been awarded to Chelora, Kannur. At Brahmapuram, KSIDC has tendered the work and the work is awarded to M/s Zonta Infratech Pvt.Ltd. Remediation work has commenced from January 2022 and as per the latest update received from Kochi Corporation [7]. Drone survey of the dumpsite was completed by NIT, Calicut. Two sites, Kottayam and Attingal are in the tendering stage. Action is being taken for the remaining large dumpsites at Vilappilsala in Thiruvananthapuram, Sarvodayapuram in Alappuzha, Laloor in Thrissur, BPL Koottupatha in Palakkad and Thalassery in Kannur. Also action is to be initiated for small dumpsites at Chanaganassery, Fathimapuram, Erattupetta-Thevarupara, Mundakkayam-Vettukallamkuzhy in Kottayam, Kattapana-Vandenmedu and Thodupuzha in Idukki, Kalamassery, Kothamangalam, Moovattupuzha and Northparavoor in Ernakulam, Chavakkad and Kumblagad, Wadakkanchery in Thrissur, Ottapalam in Palakkad, Karathodu-Puliyettummal, Manjeri and Thirur-Pottilathara trenching ground in Malappuram, Vadakara, Puthiyapp in Kozhikkode, Kalpetta and Sulthanbathery in Wayanad, Koothuparamba and Payyanur in Kannur, Kanjagad, Chemmatamvayal and Vidyanager in Kasargod. In Kureepuzha, Kollam around 30000 cubic metre of waste has been processed, 778 tonnes of RDF transported to cement factories. 20.98 tonnes

of Chappals transported. 2.6 Tonnes of tyres transported and 1.18 Acres of Land recovered out of 5.5 Acres [7].

2.1.4.e Rendering plant

Kerala state has more than 16,000 poultry stalls where around 18 lakh poultry are slaughtered and sold daily and it is estimated that about 1,080 TPD of poultry waste is produced. Though there are a number of units in the state for rearing, processing and selling poultry meat, very few have the facility for scientific processing of the waste. Policy framework to deal with the issues arising out of inappropriate management of chicken waste was issued vide GO(Ms.) No. 227/2021/LSGD dated 07.10.2021. These guidelines are intended to standardize facility requirement, procedure for licensing and operation of Poultry Meat Stalls in all Local bodies, regulate the approval, licensing and operation of Poultry waste rendering plants based on the quantity of waste generated and to develop a monitoring mechanism for the implementation of these regulations. A District Level Facilitation and Monitoring Committee (DLFMC) as per guidelines by GO(Ms.) No. 227/2021/LSGD dated 07.10.2021 constituted at all the districts to regulate the approval of proposed/existing rendering plants.

Rendering plant of capacity of about 40 TPD for treating the chicken waste in Kozhikode Corporation is in operation. Refrigerator is provided in the chicken stall for storage and collected waste is transportation in refrigerated vehicle. Chicken stall owner is to enter into agreement with the rendering plant and such plants are given license from Corporation and Pollution Control Board. This prevents wayside dumping and pollution of water bodies due to chicken wastes. There are other rendering plants in large and small scales in other parts of Kerala. Six units in Palakkad, three units in Kasargode, two units in Ernakulam, Kollam each, one unit in Pathnamthitta, Thrissur, Kozhikode, Wayanad each fourteen units in Malappuram and two units in Kannur are working. 5 large rendering plants and 30 small rendering plants(>80TPD) are in the State. The large rendering plants are in Kozhikode, Ernakulam, Kannur, Palakkad and Thrissur.

2.1.4.f Modern slaughter houses

Illegal slaughtering is to be stopped. The details of slaughter houses in the State is given as Annexure 2. Modern slaughter houses with control measures are to be provided in the State as per the order of the Hon'ble Supreme Court.

Table 7: Details of Slaughter Houses in Kerala

Sl no		Total Number	Sl no	Slaughter house
1	Working Slaughter Houses	11	1	Thrissur Corporation
			2	Meat processing plant, Thrissur
			3	Attingal (KIIFBI for modernization)
			4	Thiruvalla (KIIFBI for modernization)
			5	Kattappana
			6	Koothattukulam
			7	Varsha, Palakkad
			8	Malabar Meat- Brahmagiri Wayanad
			9	JJ Slaughtering Movattupuxha
			10	Geoproducts, Kothamangalam
			11	Tirur, Paralikkad Malappuram
			12	Evergreen Agro , Kooveri
2	Working and not complying	6	1	Kaloor
			2	Kayamkulam
			3	Thrippunnithura
			4	Chalakkudy
			5	Malappuram-Manjeri-Vettikode
			6	Palakkad
3	Not working	3	1	Erattupetta
			2	Kodimatha
			3	Alamanar, Kannur
4	Under Construction	3	1	Thiruvananthapuram
			2	Kollam
			3	Kannur

The project proposals of slaughter house at Attingal, Thiruvananthapuram; Punalur, Kollam, Thiruvalla, Pathanamthitta; Perinthammanna, Malappuram are under processing by KIFBI.

2.1.4.g Sanitary waste

To enforce the mandate of Rule 17(3) of Solid Waste Management Rules, 2016, Hon'ble NGT passed an order dated 12.03.2021 in OA 237/2020 regarding the disposal of sanitary waste. As per the order, the urban local bodies are directed to collect the segregated non-recyclable dry waste namely sanitary napkin, diapers etc through authorized waste pickers and the segregated sanitary waste shall be

treated in incinerators of CBMWTDF of KEIL in Ernakulam. Also, the manufactures and brand owners of sanitary napkin and diapers were directed to provide a pouch or wrapper for disposal of each napkin or diapers along with the packet of their sanitary products. A methodology for registration of LSGIs with KEIL and agencies for collection, transportation and generators is being developed. Pilot project to manage household sanitary & biomedical waste at Common Biomedical Waste Treatment plant at Ambalamedu, Kochi is being initiated 6 ULBs near to KEIL-Kochi Corporation, Kalamassery, Thrikkakara, Aluva, Cherthala and Alappuzha Municipalities [7].

2.1.4.h Scrap dealers

As per rule 11(m) of SWM Rules 2016, a scheme on registration of waste pickers and waste dealers is to be started by the Secretary, Urban directorate. Guidelines for consenting scrap collection centers was issued vide document number PCB/HO/SEE-3/TECH/130/2021 dated 26.10.2021. There are more than 10,000 scrap collection centers in Kerala employing around 3.5 lakhs people. The quantum of waste recycled in Kerala is very low and recycling needs to be encouraged. This can be achieved by organizing and recognizing scrap collection centers. The materials recycled by scrap merchants include paper (book, magazine, newspaper) plastic (PET bottles, carry bags), cartons, metal (iron, steel, bronze, copper, tin & aluminum), glass, e-waste, battery waste, old fridge/washing machine, tyre/tube/flap, rubber items, PVC (poly vinyl chloride) etc. Materials that are rejected by scrap merchants include sandal (chappal), rexine bags, thermocol, fibre items, PU (polyurethane used in the chappal/sandal soles) etc.

As per rule 15 (b) of the Solid Waste Management Rules, 2016, the local bodies are required to establish a system to recognize organizations of waste pickers or informal waste collectors and promote and establish a system for integration of these authorized waste-pickers and waste collectors to facilitate their participation in solid waste management including door to door collection of waste.

All the scrap collection centers in Kerala shall be brought under the consent purview of the Board. A complete database of the scrap collection centers in Kerala

is to be created. Automobile scrapping centers are governed by the CPCB norms and are not covered in these guidelines. The minimum facility required for scrap collection centre is a fully enclosed building/shed with door opening for to and fro movement of the scrap.

While submitting application for the consent of the Board, the applicant shall report the quantum of waste that can be stored in the building/shed. Storing the scrap outside the building shall not be permitted and needs to be considered as a consent condition violation. Sufficient measures to prevent fire shall be provided. Machinery permitted in scrap collection centres are bailer machines (used for compressing scrap metal and waste material into dense block), shredding machines and hand cutter (for metal cutting). No other machinery is permitted. Facilities for neutralization of battery water with soak pit facilities shall be provided in all scrap collection centers receiving scrap battery. Facilities for recording the quantity of scrap received/scrap dispatched shall be provided in all centers. Separate records shall be maintained for battery, e waste and battery scrap. Usually, scrap collection centers are classified as retailers and wholesalers. Recording data shall be done at retailer level in order to avoid duplication of data. These details shall be prepared and compiled into an annual report. This data shall be shared with the local bodies and the Kerala State Pollution Control Board. Such data will be highly useful in the preparation of Annual Report under the Solid Waste Management Rules, 2016, Plastic Waste (Management & Handling Rules, e-waste Management Rules, 2016, Battery (Management and Handling) Rules 2001. It shall also be reported as to where each of the items are dispatched for processing.

2.1.4.i Interstate movement of solid waste

Local Self Governments (LSGs) are engaging Clean Kerala Company Limited (CKCL) and private agencies for the collection and movement of waste to recycling/disposal facilities from collection centres/dumpsites. There was no mechanism available to track and regulate the movement of vehicles which transport such wastes. The Hon'ble National Green Tribunal in OA No.100/2021 'Dumping of Garbage foiled near Annamalai, trucks seized', directed on 29-7-

2021 to create a mechanism for registering the vehicles which are entrusted with carrying waste to be disposed at designated dumpsites or treatment facilities, in order to supervise and to track the movement of such vehicles to find out whether the waste that is being entrusted to them is really reaching the designated treatment facility centers. Accordingly, LSGD issued Govt. Order G.O. (Rt.) No. 1673/2021/LSGD dated 06/09/2021 regarding guidelines for registering vehicles transporting waste.

Accordingly, recyclable non-biodegradable waste shall be sold to the recycling agencies or their aggregators at a price not less than the rate notified by the Clean Kerala Company Limited (CKCL). The non-recyclable waste is to be removed through Clean Kerala Company Limited (CKCL) on behalf of the Local Self Governments will be at the rate prescribed by the Government from time to time. The Local Self Governments may engage authorized agencies/ organizations for removal of non-recyclable waste provided they possess valid consent to operate from the KSPCB and valid agreement/MoU with the disposal facility such as Furnace based industries like cement kilns and secured landfill in the case of rejects.

The Local Self Governments and Clean Kerala Company Limited shall follow due process for identification of agencies/ organizations for removal of non-recyclable waste. The agencies/ organizations selected for removal and transportation of non-recyclable waste shall declare the destination where the waste is proposed to be disposed of and the hiring agencies (LSG/CKCL) shall verify and ensure whether the destination is suitable for safe disposal. All the vehicles which are entrusted with the transportation of waste to disposal/ recycling facilities shall be registered with the hiring agency from where waste is being collected. Clean Kerala Company and Local Self Governments shall keep a separate record of vehicles registered by them for this purpose. The Local Self Governments and CKCL shall incorporate specific conditions in the tender notification/ Empanelment notification and in the agreements with the transporting contractors to the effect that the transporting vehicle shall be fitted with GPS instrument and tracking systems arranged in the respective Offices. An Officer of the LSG/ CKCL shall be

designated for tracking the GPS while there is movement of waste and shall ensure that it reaches the right destination. For transporting waste from source to location of treatment/disposal, a detailed manifest has to be maintained by the agencies engaged. After the transportation of the waste is completed, the copy the manifest duly signed by the receiver (treatment/disposal facility) shall be produced to the hiring agency within 7 days. The waste carried in the vehicle shall be properly covered during transportation. The LSG/CKCL shall impose a fine and terminate the agreement with the transporting contractor and forfeit the amount payable to him in case of any violations. Monitoring and implementation guidelines for registering and tracking vehicles for transporting waste and institutional mechanism to identify and take action against defaulters was issued vide G.O. (Rt) No. 2485/2021/LSGD dated 6/12/2021. Action has been initiated by the CKCL for the compliance of the order.

2.1.5 Extended Producer Responsibility

Rule 17(1) of SWM Rules, 2016 establishes that the producers and brand owners have a financial responsibility to support the State in establishing waste management systems. However, even though the Rules came into force years back, the manufacturers or brand owners have not undertaken any significant effort for giving financial support though the Government spent a lot of funding for collection mechanisms namely material collection facility, resource recovery facility, Haritha Karma Sena for door to door collection. In this context, a proposal was prepared and the same is under processing. As per Kerala State Extended Producer Responsibility (KSEPR) proposal the brand owners must pay a fixed amount as fee in proportion to the FMCG products sold in the State.

2.1.6. Buffer zone

As per rule 11(l) of SWM Rules, 2016 it is the responsibility of the Secretary, Urban development to notify buffer zone for the solid waste processing and disposal facilities of more than five tons per day in consultation with the State Pollution Control Board. Kerala State Pollution Control Board published guideline

for providing buffer zone for solid waste disposal facility on 09/09/2021 vide document number PCB/HO/SEE2/MODEL CITY/KOZHICODE CORPORATION/2019. Buffer zone is a zone of no development to be maintained around solid waste processing and disposal facility. Buffer zone area is between the facility and the neighboring properties which can help temporarily mitigate nuisance impacts until further control measures can be implemented. Buffer zone is not applicable for solid waste processing and disposal facility with installed capacity less than or equal to 5TPD (tones per day). The plot for setting up of solid waste processing and disposal facility shall clearly be demarcated into three distinctive areas, namely, the core activity area, utility area and green belt area. A processing facility typically requires space for receiving waste, storing waste, segregation of waste and treating the waste. All these activities are to be contained in space earmarked as the core activity area. The space earmarked as utility area can be utilized for parking of vehicles, setting up of office and laboratory, weigh bridge etc. Green belt area is the outermost space of the plot where thick plantation which can serve as a barrier for masking odour and for containing unexpected air pollution problems. The hon'ble National Green Tribunal has ordered (dated 22/12/2016) that 20m buffer zone is sufficient and also green belt should be made mandatory. As per the existing guidelines of this Board, the minimum buffer distance (from the outer boundary of the core activity area to the sensitive receptor) is 130 m. However, this distance can be relaxed subject to the conditions on control measures.

Based on the availability of land the projects can be categorized as follows:

- a)feasible b)partially feasible and c)not feasible

Feasible means adequate land is available for the project. It can be an existing or under construction or proposed projects. For feasible conditions, the buffer distance shall be as given in the Table 8.

Table 8 Buffer distance for Waste processing/Disposal facilities

Capacity of waste processing/disposal facility(Tonnes/day)	Buffer zone indicating minimum distance of the core activity to the outer boundary wall of the facility(in
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	metres)
>5-50	30
>50-100	60
>100 & above	100

Of the above mentioned buffer distance, 20m shall be the minimum width of the green belt around the unit. The minimum distance from the outer boundary of the core activity to the nearest residential building shall be 100m for projects with capacity 50 TPD or lower and 130m for plants with capacity more than 50TPD. The interface land use area is dispensed with.

For partially feasible conditions (in case the land availability is less compared to feasible), the buffer distance shall be as follows.

Table 9 Buffer distance for Waste processing/Disposal facilities of partially feasible facilities

Capacity of waste processing/disposal facility(Tonnes/day)	Buffer zone indicating minimum distance of the core activity to the outer boundary wall of the facility(in meters)
>5-50	20
>50-100	20
>100 & above	20

(Ref: <https://cpcb.nic.in/>)

2.1.7. Earmarking Space in Special Economic Zone, Industrial park, Industrial Estate

As per Rule 11(i) of SWM Rules, 2016 it is the responsibility of the Secretary, Urban Development to direct the developers of Special Economic Zone, Industrial Estate, Industrial Park to earmark at least five percent of the total area of the plot or minimum five plots or sheds for recovery and recycling facility.

2.1.8. Future Plans

State action plan for the compliance of the Solid Waste Management Rules,

2016 is as follows:

Table 10 State action plan for the compliance of the solid waste management

No.	Subject	Existing Gap	Activities	Implementing agency	Funding Agency	Timeline
1	Waste to Energy plant-	Kozhikode- To be started	Construction of WtE	KSIDC	PPP	2 years
		Kollam, Palakkad and Kannur-DPR completed	Construction of WtE	KSIDC	PPP	2 years
		Ernakulam	Construction of WtE	KSIDC	PPP	2 years
		Munnar	Construction of WtE	Munnar GP	PPP	
		Thiruvananthapuram, Malappuram and Thrissur	Identification of land	District Collector	PPP	3 years
2	Co- incineration in cement plant	DPR being prepared	Modification and commissioning	Malabar Cements		1 year
3	100 % Door to Door collection for households and establishments	More than 70%by authorised waste collectors like Haritha Karma Sena by households and 64% from establishments	100% Door to Door is to be achieved	LSGIs	LSGIs	Immediately
4	Material Collection Facility(MCF)/Resource Recovery Facility (RRF)	Thiruvananthapuram -72 MCF, RRF-4 Kollam – MCF-72 RRF-4 Pathanamthitta - 7 MCF, RRF-4 Alappuzha- MCF-20, RRF-6 Alappuzha -MCF existing- 37 no.s; RRF existing- 6 no.s MCF gap-23 no.s RRF gap- 11 no.s Idukki - 2 MRF Kottayam – MCF-6		LSGIs	LSGIs	Immediately

		<p>RRF-5 Ernakulam- MCF- 73 RRF- 8</p> <p>Thrissur- MCF- 52, RRF-11 MCF existing- 247 no.s MCF gap-613 no.s RRF existing- 31 no.s RRF gap- 3 no.s MRF existing- 1 no.</p> <p>Palakkad- MCF-30, RRF-4 MCF existing- 100 no.s MCF gap- 54 no.s MRF existing- 2 no.s RRF existing- 2 no.s RRF gap- 4 no.s</p> <p>Malappuram- MCF existing- 122 no.s RRF existing- 20 no.s RRF gap-3 no.s</p> <p>Kozhikodu- MCF existing-55 no.s MCF gap- 16 no.s MRF- 5 no.s</p> <p>Wayanad- MCF-3 RRF-1</p> <p>Kannur- MCF -13 RRF-8</p> <p>Kasargod- 3 MCF and 2 RRF</p>				
5	Decentralised treatment units	Community level- 869 (aerobin, biobins) Household level- 4,11,009 no		LSGIs	SBM/ Plan/ Finance fund	
6	Rendering plants	Rendering plants- 22 no.s		LSGIs		
7	Modern Slaughter houses	Slaughter house large-22 no.s Small- 61 no.s		LSGIs		
8	Sanitary napkin, diaper	Action is being taken at the Government level for the collection of sanitary napkin and diaper and transporting it to common biomedical		LSGIs		

		waste treatment facility				
9	Scap collection	Collection of data on quantity of scap collected License Registration from Local Bodies		LSGIs		
10	Interstate movement of waste	Tracking of Vehecle collection waste to Cement Plant		Clean Kerala Company Limited		
11	Bio mining of dumpsites	Start biomining at Njalianmprambu dumpsite 70% progress of workfor Kureepuzha project at Kollam Tendering stage at Kottayam, Brahmapuram and Chelora.		LSGIs		
12	Secured landfill under SWM Rules	For Rgional Sanitary Landfill, land (25 acre) has been indentified at site of FACT at Ambalamedu, Ernakulam and action is being taken		LSGIs, Suchitwa Mission		
13	Authorisation under SEM Rules is to be obtained by local bodies	24 authorized 22 submittted 47 not applied				
14	Auunal report under SWM Rules is to be submitted to KSPCB	Latest annual report to be submitted on 12/11/2021		KSPCB		Already Submitted
15	Extended produced responsibility as per Rule 17 of SWM Rules	Financial assistance is to be obtained for collection	Implementatio n of EPR	LSGD KSPCB		

2.2 Plastic Waste Management Plan

The benefits of plastic are undeniable. The material is cheap, lightweight and easy to make. These qualities have led to a boom in the production of plastic over the past century. But now it is resulting in one of our planet's greatest environmental challenges. Our oceans have been used as a dumping ground, choking marine life and transforming some marine areas into a plastic soup. In cities around the world, plastic waste clogs drain, causing floods and breeding disease. Consumed by livestock, it also

finds its way into the food chain. Tackling one of the biggest environmental scourges of our time will require governments to regulate, businesses to innovate and individuals to act.

2.2.1 Statutes on Plastic Waste Management

As per Plastic Waste Management Rules, 2016, recyclable plastic is to be collected and handed over to registered recyclers for recycling. Non-recyclable plastic waste is to be handed over for road tarring or co-incineration in cement plants. Extended Producer Responsibility is also envisaged in Plastic Waste Management Rules, 2016.

2.2.2 Status on plastic waste management

The State is taking steps for the implementation of Plastic Waste Management rules in the State. Plastic Waste generation is around 1, 31,400 tonnes in 2021-22 in the State (Annual Report 2021-22). This includes both soft and hard plastic. Hard plastic and some quantities of soft plastic are recyclable and are taken by scrap merchants through their field workers. More than 70% D2D collection of dry waste is achieved for households in 84 urban local bodies and for establishments in 70 urban local bodies as in May, 2022. Haritha Karma Sena is working in 92 urban local bodies and 923 Grama panchayaths for collection of dry waste[7]. For wet wastes disposal decentralized treatment methods such as aero bins, pipe compost, compost pits, kitchen bins, biogas plants etc. are followed. Dry wastes are collected, segregated and disposed through recyclers. In Kerala there are 147 plastic recycling units, 21 Steel mills, and 7 kraft paper units. Non-recyclable plastic waste is shredded in the RRFs and is used for the tarring of PWD and LSGD roads. During the period 2016-2021, Clean kerala Company LiMITED (CKCL) has produced 2399.13 T of shredded plastics and given to various agencies (NHAI-12-18 T, PWD-947.76 T, LSGI-1151.2 T). The total length of polymerized road constructed during this period using shredded plastic is 3838.04km[7]. 1039 MCFs and 183 Resource recovery facilities have been provided in LSGIs (Status as on April 2022) [7]. . Bailing machine and shredding machines are provided in the Resource recovery facilities and 144 numbers of registered plastic

recycling units in Kerala. Majority of units are in Perumbavoor.

2.2.3 Extended Producer Responsibility

The proposal for the implementation of EPR under Solid Waste Management Rules, 2016 is under the consideration of the Government. The financial assistance by brand owners / producers / manufacturers / importers can be remitted in the EPR fund and this fund can be utilized for meeting to the extent possible cost of door-to-door collection. Fee model has been adopted. Brand owners who obtain EPR registration under the Solid Waste Management Rules, 2016 will be automatically complying with their compliance under the Plastic Waste Management Rules, 2016 in the State.

2.2.4 Ban on Single use plastic

The Government of Kerala issued order for the complete ban on single use plastic including plastic carry bags irrespective of thickness in the State with effect from 01.01.2020 vide G.O.(MS) No.6/2019/Env. dated 27/11/2019. The ban includes:

Table 11 Banned items of plastics

Sl. No	Banned items in the state as per the orders of the State Govt:	Recommended non-plastic substitutes
1	Garbage bags (plastic)(Except for Bio-medical wastes(BMW))	
2	Non-wovenbags,plasticflags,plastic bunting	Cloth& paper-bags, flags and bunting

3	PET/PETE bottles of drinking water of Capacities less than 500ml.	Banned,nosubstitute
4	Plastic carry bags irrespective of thickness	Cloth,paper bags(free from plastic coating); Compostable plastic carry bags
5	Plastic coated-items like paper cups,plates, bowl, paper carrybags	For paper cups with PLA-Coating,certified by CPCB and IS:17088 complied
6	Plastic/plasticcoated leavesused asplates	
7	Plastic packets (use of plastic packets in retail outlets, including street vendors/hawkers, for packing fruits and vegetables)	Paper and cloth bags
8	Plastic sapling bags	Substituted with non-plastic materials. For grow bags, compostable materials can be used.
9	Plastic sheets(sheet used as table spread)	Paper spread
10	Plastic water pouches,non Branded plastic juice packets	Banned,no substitute Branded plastic juice packets will come under EPR regulations
11	Plates,cupsand Decorative materials made of thermocol/Styrofoam	Glass,ceramic,steel-cups, plates, paper andplant-baseddecorations
12	PVCflex materials, plastic coated cloth like polyester/nylon/Korean cloth	onlycloth(plasticfree)or paper (plastic free) orpolyethylenematerial
13	Singleuseplasticutensils likecups,plates,dishes,spoons, fork, straw,stirrer,madeofplastic	Glass,ceramic,steel, woodencups,plates,dishes, spoons, fork, straw, stirrer(all product attached straws,and other such items part of branded product packaging exempted from ban and came under EPR)

It is also to be noted that plastic carry bags and other single use plastic products used for the following purposes shall be exempted:

- a) Plastic products manufactured exclusively for the purpose of Export against any export order in a plastic industry
- b) Plastic products used for medical purposes and medical equipment

As per the notification of Government of India on 12-8-2021, the additional Single-Use Plastics which need to be banned w.e.f. July 1, 2022 are:

1. Candy sticks,
2. Ear buds with plastic sticks,
3. Ice-cream sticks,
4. Plastic sticks for balloons,
5. Wrapping or packing films around sweet boxes, invitation cards, and cigarette packets.

Action plan for the single use plastic has been prepared and submitted to the Government for approval.

2.2.5 Future Plan for Plastic waste management

Table 12 Future Plan for Plastic waste management

No.	Subject	Existing	Activities	Implementing agency and partners	Funding Agency	Timeline
1	Institutional Mechanism and policy framework for plastic waste management	State level task force on plastics has already been constituted under the chairmanship of Hon. Chief Secretary.	Formation of task force and action cells at ULB, district and state levels and providing technical assistance and adequate capacity building	State level DoE, LSGD, UDD, RDD LSGIs, GIZ		6 months
			Policy and Regulatory Framework for elimination of single-use plastics, development of End-of-Life waste management infrastructure, enforcement of PWMR through byelaws of local bodies etc.	KSPCB, GIZ, LSGD, UDD, RDD, SM, HKM, Kerala State Consumer Affairs Department,, Dept. of Finance		6 months to 1 year
		Board officers along with the officials of departments conducted inspections for the strict implementation of SUP ban in the State. Out of the 465 inspections conducted as on October 2020, 153 violations were observed. An amount of Rs. 13, 05,000/- was imposed as fine to the violators and collected Rs.3, 35,000/-	Enforcement of Ban imposed on the use of identified Single-Use Plastic Items at District / ULB /GP level (Enforcement actions against violations; Identification and closure of manufacturing facilities of prohibited SUP items)	KSPCB, UDD, RDD, LSGD, with the support of Police department		Continuous process on enforcement of ban

No.	Subject	Existing	Activities	Implementing agency and partners	Funding Agency	Timeline
		as fine. Confiscation of banned items was also done for the strict implementation of ban in the State.				
		Green protocol has been strictly enforced at the government institutions.	Action taken for reducing / elimination of SUP items in State/UT Govt. offices, attached / subordinate offices, PSUs/ organizations	KSPCB, LSGD, SM, HKM, Industries department		6 months
2	Tracking, monitoring and reporting system for the management of litter (including SUPs)		Baseline assessment and Plastic waste Inventorisation at the state level	KSPCB, LSGD, ULBs, HKM, SM, GIZ, NCSCM,		6 months to 1 year
			Management of Littered Single-Use Plastic Items	ULBs, GPs, SM, HKM, GIZs, GPs, KSPCB, KILA, LSGD		6 months to 1 year
			Systems of check on cross boundary movement of plastic and plastic wastes	KSPCB, GIZ, LSGD, ULBs, Police department, District collector		6 months to 1 year
			Development of digital tools and guidelines for tracking, monitoring and reporting of litter	KSPCB, GIZ, SM, HKM, CED		6 months to 1 year
3	Technological solutions to manage plastics by adopting circular economy principles		Technological solutions to reduce, reuse and/or recycle plastics (demonstration project with producers and recyclers)	KSPCB, GIZ, Producers, Industries department		6 months to 1 year
			Dissemination of best practices for technological solutions	KSPCB GIZ, Producers, LSGI, CED, Producers		6 months to 1 year
			Strengthening the plastic waste management	LSGD, SM, HKM, RDD		6 months to 1 year

No.	Subject	Existing	Activities	Implementing agency and partners	Funding Agency	Timeline
			systems (including infrastructure, leveraging of funds, strengthening the ULB network, development of EPR plan of the state and operational structure)	KSPCB, GIZ, Producers		
			Plans for scientific disposal and management of Plastic Waste (Development of database of plastic waste processors, strategy for the development of recycling infrastructure, Strategy for End-of-Life Management options of the alternative materials, Development of industrial composting facilities for compostable plastics etc.)	LSGD, SM, HKM, KSPCB, GIZ, Industries department, Department of Finance		6 months to 1 year
4	Strengthening Plastic waste management and extended producer responsibility system		Knowledge products (e.g. policy briefs, guidance paper) are considered in the decision-making process	GIZ, KSPCB		6 months to 1 year
5	Identifying and promoting alternatives to plastics		Development and Promotion of Alternatives to Prohibited Single-Use Plastic Items and promoting product eco-design innovation	KSPCB, HKM, SM, GIZ, Industries department		6 months to 1 year
6	Awareness generation and capacity building		Formulation of IEC Activities (Targeted awareness raising activities at State, District and ULB/GP level, Promotion of alternate materials, Competitions and hackathons organized for school	KSPCB, LSGD, HKM, SM, GIZ, KSCSTE, KSUM		6 months to 1 year

No.	Subject	Existing	Activities	Implementing agency and partners	Funding Agency	Timeline
			and college students)			
			Strategies for capacity building (This will also include Capacity building for repurposing and promoting reuse of plastic packaging, adopting alternate materials etc.)	SM, HKM, LSGD, UDD, RDD, KSPCB, GIZ		6 months to 1 year

*GIZ- German Development Agency, *DoE- Department of Environment, *KSPCB- Kerala State Pollution Control Board, *UDD- Urban Development Department, * SM-Suchitwa Mission, * HKM-Haritha Keralam Mission, *KILA- Kerala Institute of Local Administration, *LSGD- Local Self Government Department, *KSUM- Kerala Startup Mission, *KSCSTE- Kerala State Council for Science, Technology and Environment, *RDD- Rural Development Department

** The detailed plan on action on plastics is attached as Annexure 3.

2.3 Construction and Demolition Waste Management Plan

2.3.1 Statutory requirement

Construction and demolition wastes are to be handled as per Construction and Demolition Waste Management Rules, 2016. The policy document is to be prepared by the Secretary in charge of development.

2.3.2 State policy on solid waste management

Government has published the State Policy of Solid Waste Management wherein the provisions for handling C&D have been specified. The State has published Integrated SWM Strategy in which the strategy on management of C&D Waste is mentioned.

2.3.3 Amendments made in Kerala Municipality Building Rules and Kerala Panchayat Raj Building Rules:

Rule 79A: Management of Construction and Demolition Waste—

(1) Every permit holder for construction of a building and for demolition of an existing building or concrete structure shall be responsible for safe disposal of waste generated during the process of such construction and demolition in accordance with the Construction and Demolition Waste Management Rules, 2016.

(2) The Government shall from time to time fix the Waste disposal charges for municipalities or a group of municipality's payable by applicants at the time of submitting applications seeking permits. It shall be competent for the Government to fix differential charges depending on load and distance factor.

(3) The Government shall in consideration of the provisions of the said Rules by notification provide for mechanisms for transportation, utilization, processing and downstream uses of the finished and intermediary products for construction and other purposes including their mandatory usage in specific types of infrastructure.

(4) Municipalities shall establish or cause to establish waste processing facilities for such wastes on Public Private Partnership mode or outsourced model or lease franchise model or on any structure utilizing the funds accrued from the charges and other receipts with them including plan fund.

(5) The Government shall provide technical and financial support to Municipalities

for the above purposes

2.3.4 Action taken for recycling facilities

In addition to the above, the Government has issued direction to earmark 5% area for recycling and recovery in industrial parks. Town and country planning department is in the process of incorporating sites for waste management in the approved master plan.

2.3.5 Future Plan

So far the State has no C&D waste processing facility. With the financial aid of the World Bank, the state is going to implement the Kerala Solid Waste Management Project in which regional facilities for C&D waste in PPP mode are planned to be set up. Also, through Suchitwa Mission, Government has earmarked Rs.50 Lakhs under Suchitwa Kerala (Urban) scheme for setting up C&D Plants through PPP mode in 2020-21. Once the facilities are set up, the Government shall issue guidelines for usage of C&D waste in public works.

Table 13 Future plan for C&D Waste Management

Sl. No.	Subject	Existing & Gap	Activities	Implementing agency	Funding agency	Time line
1.	Arrangement for separate collection of C&D waste to C&D waste Deposition point.	Check gaps w.r.t: - Separate collection point of C&D Waste - Identification of common C&D waste deposition points	Identification of common C&D waste deposition points by the Districts. 1. Identification of bulk generators shall be carried out in the district. 2. Prepare detailed Inventorisation for C&D waste generated, disposed 5. 3. Establishment of designated C & D waste collection points shall be established in each taluk. 4. Taluk wise C&D storage Centresshould be implemented 5. Designated deposition points for C & D waste shall be established in	ULB LSGDs KSPCB District administration & Revenue Department Suchitwa Mission		

			the District head quarters		
			6. Make arrangements and place appropriate containers for collection of waste and shall remove at regular intervals or when they are filled, either through own resources or by appointing private operators		
			7. Approval of Waste Management Plan submitted by Waste Generators before Construction starts records shall be maintained by ULBs.		
			8. The waste management plan of the generators is to be examined and sanctioned within a period of one month or from the date of approval of building plan, whichever is earlier from the date of its submission		
			9. Ensure other waste (such as solid waste) does not get mixed with this waste and is stored and disposed separately.		
			10. Proper collection, transportation, processing and disposal of C&D waste shall be ensured in the district. They shall get the collected waste transported to appropriate sites for processing and disposal either through own resources or by appointing private operators.		
			11. Appropriate incentives are to be given to generator for salvaging, processing and or recycling preferably in-situ.		
			12. Keep track of the generation of construction and demolition waste within its jurisdiction and establish a data base and update once in a year		
			13. Device appropriate measures in consultation with expert institutions for management of construction and demolition waste generated including processing facility and for using the recycled products in the best possible manner		
			14. Make provision for giving incentives for use of material made out of construction and demolition waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads		
			15. Adequate Air pollution control measures shall be taken as per the CPCB guidelines.		
			16. Obtaining authorisation from KSPCB for processing facility		

			<p>17. State Pollution Control Board is to monitor the implementation of these rules by the concerned local bodies and the competent authorities.</p> <p>18. PCB is to prepare annual report with special emphasis on the implementation status of compliance of these rules and forward report to Central Pollution Control Board before the 31st July for each financial year.</p> <p>19. The Town and Country planning Department shall incorporate the site in the approved land use plan so that there is no disturbance to the processing facility on a long term basis.</p>			
17.	Whether local authority have fixed user fee on C&D waste and Introduced permission system for bulk waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month?		<p>Common by-laws may be implemented in District. Local C&D waste management plans can be integrated to develop common collection and recycling facilities</p> <p>1. Fix rates to be paid by Waste generators for collection, storage & transportation of Waste shall be incorporated in the building approval plan.</p> <p>2. Public notices shall be issued that construction and demolition waste should only be disposed at pre-identified/notified sites and must be displayed in newspaper notification and same must be informed in the approval of plan to hand over the C &D waste.</p> <p>3. Chalk out stages, methodology and equipment, material involved in the overall activity and final clean up after completion of the construction and demolition.</p> <p>4. Seek assistance from concerned authorities for safe disposal of construction and demolition waste contaminated with industrial hazardous or toxic material or nuclear waste if any.</p>	ULB LSGDs		
22.	Setting up of C&D recycling Facility in all Districts	Check whether district has any C&D waste recycling facility	<p>Plan should ensure viable operation of C&D plant including assured market for C&D products.</p> <p>1. Land identification for setting up of common C&D waste recycling facility.</p> <p>2. Installation of required infrastructure facility.</p>	ULB LSGDs KSPCB District administration Suchitwa Mission Town planning department		

			3. Adequate green belt development in the common C & D waste recycling plant.	nt		
			4. As per the guidelines of CPCB compliance needs to be done			
27.	Usage of recycled C&D waste in non structural concrete, paving blocks, lower layers of road pavements, colony and rural roads	Is there any policy on usage or promotion on usage of C&D waste?	Local authority may give appropriate incentives on usage of C & D waste. A % of usage in public works may be specified/ any other scheme.	ULB LSGDs PWD District Administration		
			1. District administration shall frame a Policy for management of C&D waste.			
			2. Provisions for using materials made by C&D waste in construction activity like paving blocks, lower layers of road pavements, colony and rural roads etc by executing an agreement with PWD and industries engaged in manufacturing of cement blocks			
			3. Who generate more than 20 tonnes or more in one day or 300 tonnes per project in a month shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar and shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work and keep the concerned authorities informed regarding the relevant activities from the planning stage to the implementation stage and this should be on project to project basis.			
31.	ICE on C&D waste management	Is there any sustained system of creating awareness created among local communities.	Action plan for awareness and education	ULB LSGDs KSPCB District administration		
			1. Training program's shall be organized through KSPCB to ULBs once in months.			
			2. Intensive mass awareness to public by local means viz., making hand outs/ Newspaper notifications/ through media advertisement and announcements through loudspeakers			

2.4 Bio-medical Waste Management Plan

The renotified notification on Biomedical Waste Management Rules, 2016 is being implemented in the State.

2.4.1 Inventory of Health Care Facilities

Kerala State Pollution Control Board has conducted inventory of the health care facilities in the State. As per the Annual report prepared for 2020 under Biomedical Waste Management Rules, 2016, the total number of health care facilities identified is 17122 and total number of beds is 1,19,762. The split up of units are furnished below:

Table 14 Total no. of Health Care Facilities/ Occupiers

Total no. of Health Care Facilities/	17.122
Bedded Hospitals and Nursing Homes (bedded)	2027
Clinics, Dispensaries	9255
Veterinary Institutions	585
Animal houses	31
Pathological Laboratories	2602
Blood Banks	23
Clinical establishment	1366
Research Institutions	5
AYUSH	1228
Total no. of beds	1.19.762

2.4.2. Authorization status of Health Care Facilities

The consent /authorization status of the above units are furnished below.

Authorization has been issued to 13,348 Health Care Facilities

Table 15 Authorization status of Health Care Facilities

Total no. of occupiers applied for authorization	13736
Total no. of occupiers granted authorization	13348
Total no. of application under consideration	79
Total no. of application rejected	322
Total no. of occupiers in operation	2471

2471 health care units functioning in the State without obtaining authorization as on December 2020. Almost all units under private sector had obtained authorization from the Kerala State Pollution Control Board. Some Community Health Center/Public Health Center under govt. sector has not obtained authorization of the Board. The majority of the veterinary institutions are yet to obtain the authorization under Bio-Medical Waste Management Rule 2016.

The total quantity of BMW generated and disposed in the State in the year 2020 is 40.4 TPD (including both COVID and non COVID BMW). 19 hospitals have installed captive incinerators. HCFs provided disinfection system for bio medical liquid waste. STPs are provided only in major bedded hospitals and other health care facilities provided septic and soak pit system.

2.4.3. Common Bio medical Waste Treatment and Disposal Facility

The Common Bio medical Waste Treatment and Disposal Facilities (CBWTF) functioning in the State presently and its capacity are shown below:

- Indian Medical Association Goes Ecofriendly (IMAGE) had set up a facility in Palakkad district in 2004 which is now functioning with a capacity of 55.8 TPD.
- The second CBWTF of 16 TPD capacity by M/s KEIL has started functioning since April 2021.
- KSIDC allotted land to Malabar Enviro Vision at Kinaloor, Kozhikkodu district and the Board issued Consent to establish in 04.04.2014 and further renewed on 20.05.2017. Malabar Enviro Vision obtained EC from SEIAA on 27.02.2016.
- Public hearing conducted for a common facility at Peringamala Panchayath in Thiruvananthapuram by IMAGE on 22.12.2017 and 03.01.2018. Environment clearance was not issued by SEIAA for the project.
- KINFRA allotted 5 acre land in Adoor Industrial Development Area to IMAGE on 23.10.2019 and the Board recommended the Govt. to permit IMAGE to set up plant there.
- IMAGE submitted application for consent to establish for their proposed second CBWTF plant at Brahmapuram on 20.10.2020 and the application is pending for want of additional documents in proof of ownership.

Before April 2021, the entire BMW generated in the State was being managed through IMAGE facility at Palakkad along with a few number of captive facilities such

as autoclave/microwave/ incineration / deep burial. Consent to operate was issued to IMAGE initially for 3 TPD and further the Board permitted to operate with a capacity of 37 TPD as there could not implemented additional region wise facilities even though the State has earnestly worked on the matter. IMAGE faced difficult situations to manage the waste catering the entire district and stopped giving affiliation to new units. During the pandemic situation the Board has permitted to operate the IMAGE plant to 55.8 TPD as they informed the Board that they could not manage the increased quantity further.

The two CBWTFs, IMAGE and KEIL are meeting the new emission standards of CPCB. ETPs are provided by both facilities. The incineration ash and ETP sludge are being disposed through the CTSDF run by KEIL.

The district wise details of health care facilities as on March 2022 is given in Table 16.

Table 16 District wise details of Health Care Facilities (HCFs) as on March 2022

Districts	Govt-HCFs					Private HCFs					TOTAL HCFs	TOTAL BEDS	Total Quantity of BMW (TPD)	Veterinary
	GOVT-Bedded		GOVT-NON Bedded			Private-Bedded		Private –Non Bedded						
	No of HCFs	No.of beds	Nof health care facilities (HCFs)	Nof of beds	Qty of BMW	No of HCFs	No of beds	Nof of health care facilities (HCFs)	No of beds	Qty of BMW	Number	Number of beds		
Trivandrum	55	3634	137	137	1.886	190	8586	1958	1958	5.272	2340	14315	7.158	20
Kollam	37	2787	359	359	1.573	159	6094	995	995	3.545	1550	10235	5.118	99
Pathanamthitta	20	1491	44	44	0.768	70	5934	717	717	3.326	851	8186	4.093	61
Alappuzha	37	976	94	94	0.535	85	2783	947	947	1.865	1163	4800	2.4	85
Kottayam	34	4468	42	42	2.255	93	4224	998	998	2.611	1167	9732	4.866	2
Idukki	45	90	15	15	0.053	178		397	397	0.199	635	502	0.251	61
Ernakulam DO 1	42	3731	134	134	1.933	195	11066	2382	2382	6.724	2753	17313	8	92
Ernakulam DO 2														
ESC Eloor														
Thrissur	47	5838	115	115	2.977	136	5824	1673	1673	3.749	1971	13450	6.725	118
Palakkad	30	1647	87	87	0.867	101	3998	1072	1072	2.535	1290	6804	3.402	65
Malappuram	37	6486	105	105	3.296	152	6721	1889	1889	4.305	2183	15201	6.9	60
Wayand	21	1122	16	16	0.569	43	1800	347	347	1.074	427	3285	1.643	3
Kozhikode	35	2760	78	78	1.419	122	6685	1765	1765	4.225	2000	11288	4.128	1
Kannur	54	1834	131	131	0.983	99	6198	859	859	3.529	1143	9022	4.417	90
Kasargod	22	594	49	49	0.322	63	1649	372	372	1.011	506	2664	1.332	12
TOTAL	516	37458	1406	1406	19.43	1686	71562	16371	16371	43.97	19979	1E+05	60.43	769

* 1 clinic (Non bedded) is considered as 1 bed. * The enhanced quantity during pandemic situation is also considered. * Quantity of BMW calculated by assuming 0.5 kg/bed.

* The value may vary as the calculation of BMW generation is based on an average basis.

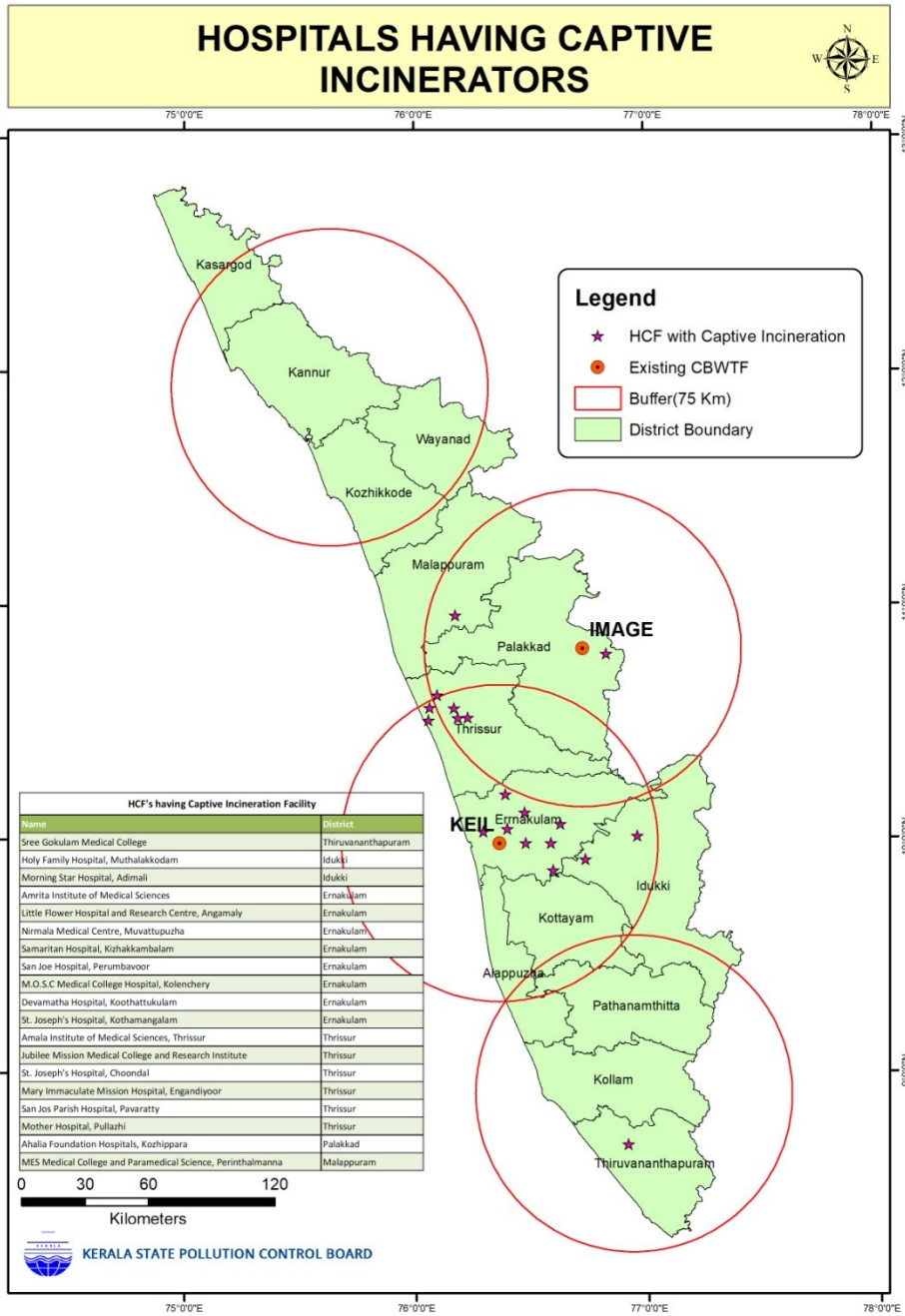


Fig. 3 Hospitals having Capital Incinerators

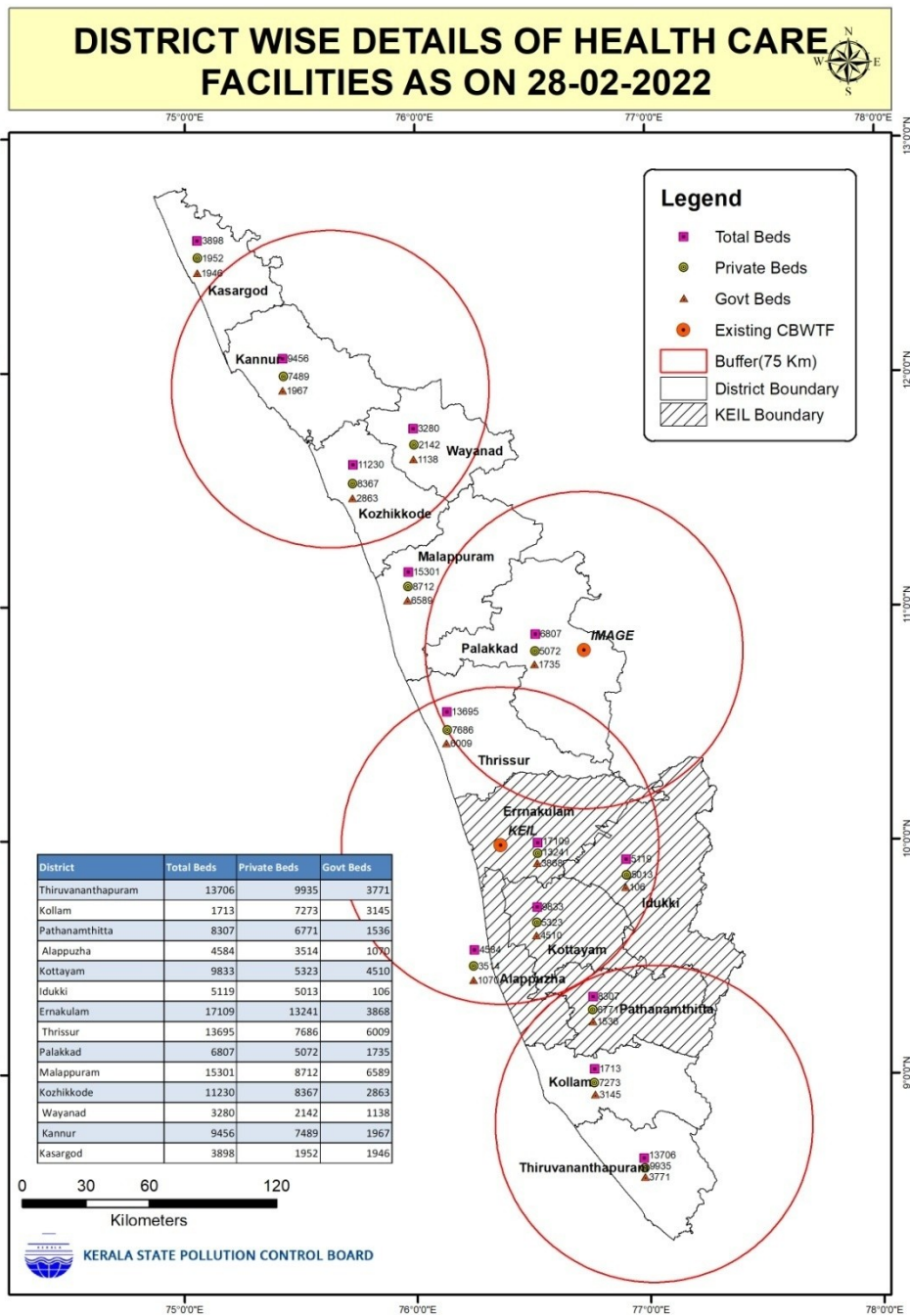


Fig. 4 Districtwise details of Health Care Facilities

2.4.5 Status of implementation of Biomedical Waste Management Rules by Government hospitals –Health Department

2.4.5.a Biomedical wastes management

- i. The State of Kerala, right from the year 1998 onwards has initiated action for implementing the Biomedical Waste (Management and handling) Rules, 1998. The Government owned health care institutions in Kerala had taken necessary action at that time itself for implementing the said Rules. The Government hospitals have provided with sufficient facilities for source storage of waste in colour coded containers / bags as specified in the above mentioned Rules.
- ii. The Government hospitals had joined the Common Treatment and Disposal Facility (CTDF) own and operated by Indian Medical Association (IMA) at Palakkad (IMAGE) for managing biomedical waste generated in the health care institutions. The operator of the common facility is providing colour coded containers / bags to all health care institutions right from PHC, CHC, and FHC to the level of Medical Colleges on chargeable basics. The common operator is collecting biomedical waste from the door step of all hospitals regularly and treating and disposing the waste in their Common Treatment and disposal Facility operating at Palakkad, Kerala. The State Government is supporting and motivating the Government owned Health Care Institutions for compiling with provisions of the Rules and for providing proper waste management facilities as per the BMW Rules. The common facility of IMAGE, Palakkad is having a treatment capacity of about 55.80 TPD of biomedical waste. The common treatment facility is having all statutory required facilities such as Incinerator, Autoclave, Shredder, Waste water treatment Plant and Storage facility for plastics, metals and glass for material

recovery. They are also using bar coded bags for waste storage and transportation vehicles are fitted with GPS as stipulated in the Rules.

- iii. Government Hospitals are also joined in the second Common Biomedical Waste Treatment Facility owned and operated by Kerala Enviro Infrastructure Ltd (KEIL) with a treatment capacity of 16 TPD ,started operation from April 2021 at Ambalamedu, Ernakulum district. This facility is filling the gap in biomedical treatment facility available as common treatment and disposal facility in the State.
- iv. Now as per the provisions of Biomedical Waste Management Rule 2016, the operator of the common facility is issuing bar coded bags as specified in the Rule to all Government owned Health Care Institutions after charging a cost for that. The vehicles used for transportation of Biomedical waste is operating with covered, labelled and fitted with Global Positioning System (GPS) as specified in the BMW Rules, 2016.

2.4.5.b Status of implementation of General Waste in health care facilities

- i. The major lacking component was the facility for proper management of General Waste generated in Government hospitals. Now, focus is given for scientific management of biodegradable and non-degradable waste generated from Government owned Health Care Institutions. Present status of waste management facilities in major Government hospitals has been collected and compiled. Gap in the waste management has been identified. The status of waste management in 127 District/ General / Taluk/ W & C hospitals in the area of has been given for providing source level treatment of General Waste generated in the Hospitals at different Tiers depending upon the space, quantity and nature of waste generated. General waste which constitute about 85% of the total waste generated in health care institutions, are non-bio medical waste. The health care institutions in the State are provided

with sufficient facilities for source level storage of General Waste and it is also submitted that as per Schedule III, (Rules 6 and 9(3) of BMW Rules 2016), the Urban and Rural Local Bodies are responsible for collecting solid waste other than bio medical waste from health Care Institutions as per Solid Waste Management Rule 2016. But due to public protest / lack of treatment facilities for collection, treatment and disposal of Solid Waste, the local bodies in the State are not collecting General Waste from most of the health care institutions. The problem has been noted by the Occupiers of the health care institutions and they are managing general waste to the extent possible by establishing onsite biogas plants and appropriate compost units.

- ii. Treatment facilities for general waste from Government Hospitals are established / planning to provide onsite aerobic compost facilities (Thumboormuzhi) which is found to be technically viable and feasible in the State for managing not easily biodegradable part of the waste to the extent possible. The facility is expected to manage plantain leaf-Sweeping waste especially tree leaf, bushes etc.
- iii. It is the statutory responsibility of rural and urban local bodies in the State to collect and manage general waste from all health care institutions. But considering the present situation in the State for the management of Municipal Solid Waste, hospitals themselves are taking actions for managing easily degradable part of general waste (food waste and vegetable waste) at the compound of hospitals to the extent possible and action has already been taken establishing onsite Biogas plants. It is also proposing to utilise bio gas generated for hot water generation and for utilisation of that resource in the hospital.
- iv. Non-Biodegradable waste generated in the Government health care institutions are managed / planning to establish Material Collection Facility (MCF) for collecting and storage of non-biodegradable waste such as plastics, metals, glass, e-waste and other discarded material including packaging waste. The MCF is functioning in some Hospitals

and it is proposed to be established in all the Taluk/ District and Medical College Hospitals. Materials collected from the MCF especially plastics are bailed for reducing volume and it is proposed to handover to recyclers /common facility established by group of Municipalities/ Grama Panchayats. The ultimate aim is to recover resource from the materials and to avoid open burning of general waste at the Government Hospitals.

- v. It is submitted that there are some good model Waste Management Facilities in some of the Government hospitals in the State.

Table 17 Status of Management of General waste in 127 major Health Care Institutions 14 Districts (DH/GH/THQH/TH & W&C HOSPITALS)

Waste Type	Available Treatment Units	Number of Available Units	Gap / Facilities not Available	Work in Progress
General waste	Segregated Storage facility 50 litre capacity with lid- 5 units	80	47	0
	Wheel Barrows with two containers and lid (Green and white)-3 sets	40	87	0
	Biogas Plant for treating 100 kg/day caapcaity with fixed dome type for biodegradable waste	27	98	2
	Aerobic Compost unit of 6 cubicle for not easily biodegradable	13	114	0
	Bailing and storage ofw STE (500 sq ft)	45	81	1

2.4.5.c Other Activities / Initiatives Undertakenby the Health department

- i. As part of sensitisation of requirement of establishing sufficient facilities for General waste management facilities in Government Hospitals, the Principal Secretary, Health and Family Welfare Department ,Government of Kerala, with the support of experts from State Pollution Control Board and WMC formed, had organised one day online Workshop on 28-03-2019, utilising the Smart Class Room set up

by the Department of Rural Development at Swaraj Bhavan, Nanthancode, Thiruvananthapuram for the concerned officers right from Health Inspectors up to the level of Head of health care institutions, by inviting them to attend the Workshop at two or three centres in each districts. In the Workshop , the Principal Secretary explained about the necessity on implementation of orders of Hon'ble NGT related to management of General Waste in the Government owned health care institutions and offered all support from the Government side for implementing the provisions of the said Rules .Thereafter experts from State Pollution Control Board presented about technical and viable options for managing different types of waste generated in health care institutions including general waste. The last session was an interactive session led by the Principal Secretary, Health and Family Welfare Department and the experts with participants stationed at all districts and cleared their doubts.

- ii. The concerned officers and staffs are thereby made aware of the orders of the Hon'ble NGT and made them responsible for implementation of Bio medical Waste Management Rules 2016 and directed them to take action for implementation General Waste Management activities as per the Rules. A format was provided to all health care institutions containing in all three tiers of PHC/ CHC / FHC, General Hospital/District Hospital / W&C Hospitals and Medical Colleges for collecting present status of waste management activities in the Government owned Hospitals.
- iii. Subsequently, the State Government has constituted a Waste Management Cell (WMC) in the Government Secretariat / NHM for co-ordinating and supporting the waste management activities and the cell is headed with an expert who had experience in the field and served as Senior Environmental Engineer of State Pollution Control Board and Former Director and Executive Director of Suchitwa Mission, Government of Kerala. The WMC is has formulated an Action Plan for implementing waste management activities in all health care institutions

- in the State and they will provide technical support for preparation of proposal and implementation of Solid and Liquid waste management projects in the Government owned health care institutions functioning at primary, secondary and tertiary level.
- iv. The Waste Management Cell formed at the Government Secretariat / NHM will support the Government owned health care institutions for implementing the solid and liquid waste management activities in compliance with the legislations and to initiate actions for implementing the projects in a time bound manner.
 - v. A State Level Monitoring / Advisory Committee (SLAC) has been constituted by the Government under the Chairmanship of Principal Secretary, Health and Family Welfare Department in which heads of all wings under Health department, Chairman of State pollution Control Board, representative of IMA, LSGD and other departments. First meeting of the SLAC was convened on 3.9.2019 and had detailed discussions on present status waste management in Government Health Care institutions and decided policy / approach for managing different types of waste. It was also decided to implement the waste management projects in a time bound manner.
 - vi. The Waste Management Cell (WMC) constituted at NHM under the Chairmanship of State Programme Manager, NHM vide order dated 1.7.2019 and modified order issued vide order dated 14.10.2019 from the Director of NHM. The WMC was met on 30.9.2019 and discussed in details about implementation strategy on waste management and decided to proceed further for supporting various waste management activities including General Waste.
 - vi. As decided in the WMC meeting, a Project Formulation Workshop was organised for the Superintends of District Hospital, General Hospital, Taluk Hospital and W & C Hospitals at PWD Rest House Thycaud, Thriruvananthapuram on 17.10.2019. Dr Rajan N Khobragade IAS, Principal Secretary, Health and Family Welfare Department inaugurated

the Workshop and Sri. Kesavedrakumar IAS , Director NHM Chaired the Workshop. The Workshop had evaluated the present status of waste management, legal responsibility on waste management and the action for filling up the gap in the above mentioned sector of Hospitals. It was decided to move forwards for preparing DPR for the solid and liquid waste management activities in the State.

Another one workshop for Medical College Hospitals was organised at the Conference hall of Directorate of Medical Education on 25. 10 2019. Dr Rajan N Khobragade IAS, Principal Secretary, Health and Family Welfare Department inaugurated the Workshop. Director of Medical Education Department Chaired the meeting. Superintend of all Medical Colleges in the State was attended and the Workshop evaluated the present status of waste management in all Medical colleges and decided the further course of actions in the waste management sector.

- viii. The above mentioned two workshop for the Health Care Institutions and formulated strategies for preparing proposal with technical support of experts and will implement the proposal in a time bound manner. An action Plan for short term and long term activities in this regard is prepared for ensuring time bound implementation of the Waste Management Facilities in Government owned health Care institutions. Ultimate aim of this activity is to motivate and support the Occupier of Government Hospitals to implement the Biomedical Waste Management Rules and connected Rules in a sustainable manner within three years.
- ix. The Workshop discussed the inability of one single Common Biomedical Waste Treatment and Disposal Facility operated by IMA at Palakkad and decided to initiate action for establishing Stand Alone Biomedical and General Waste Treatment Units in three Medical College Hospital Compound in the State situated at Kottayam, Thrissur and Kannur. It was also decided to proceed further for establishing waste management facilities by selecting competitive agencies following procurement procedures for design, establishment, operation and maintenance of the

facility for a period of 5 years. It is also propose to concentrate the requirement for the respective Medical College and the facility utilised by nearby Government hospitals. Ultimate aim is to provide more Biomedical Treatment facilities in the State in the context of inability of establishing more Common Treatment and Disposal Facilities.

- x. It was also decided to fill up the gaps in general waste and liquid waste management activities in all Government hospitals in a time bound manner. Adequacy of existing Treatment facilities will be evaluated and the gap/ up-gradation requirement will be filled up in a time bound manner. The principal secretary, Health and Family Welfare Department offered all help from Government side in this regard.
- xi. The activities are continuing and some delay occurred due to COVID 19 and continuing the effort further. The IMAGE has provided separate “Temporary Affiliations” to all the COVID-Care-Centres (even though they are already affiliated with IMAGE for their Regular BMW management) for systematic management of their COVID 19 BMW separately, by the end of November 2021; IMAGE has given Temporary Affiliations to 837 COVID-Care-Centres (Government COVID Centres- 517, private COVID Centres- 320).

2.4.5.d Proposed Action for Establishing Common Biomedical Waste Treatment and Disposal Facility

- i. The Common Treatment and Disposal Facility available for biomedical waste treatment in the State is inadequate to meet the full requirements of the State. Hence, action has been initiated to examine, whether it is possible to establish a modern Captive Type Biomedical Waste Treatment Facility in northern part of Kerala, preferably in a Medical College for catering needs of the government hospitals working in the nearby areas. The effort taken is to examine the possibility of establishing on-site captive type biomedical treatment facility consisting of thermal treatment

facility of Plasma Pyrolysis Unit, Autoclave, Shredder and Waste Water Treatment Plant etc.. If possible biomedical waste from nearby Government Hospitals shall also be treated in the proposed facility as the common facilities operated in the central part of Kerala is overloaded and not succeeded to establish more common facilities in the State. It has been identified Trissur and Kannur Medical Colleges for proceeding further for establishing Common Biomedical Treatment Facility. Selection of SPV has been done and selection of modern treatment technology for the purpose and DPR preparation is proceeding further.

- ii. Action is being taken to explore the possibility of using Plasma Pyrolysis technology developed by BARC, Department of Atomic Energy instead of the conventional Incineration technology. Main objective is to choose a clean, pollution free thermal technology for the treatment of anatomical part of biomedical waste segregated in yellow coloured bag. Discussions were held with BARC authorities and a team from the H& FD conducted a filed visit in February, 2022 to examine viability of choosing the technology for the Common Facility propose to be established at Pariyaram, Kannur Medical College Hospital Compound. The proposal is under examination

2.4.6 Future plan

In the inventorisation of all health care facilities, some more hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, ayush hospitals, clinical establishments, research or educational institutions, health camps, medical or surgical camps, vaccination camps, blood donation camps first aid rooms of schools, forensic laboratories and research labs, are to be included. The authorities namely Director, Directorate of Health Services; Directorate of Ayurveda Medical Education; Directorate of Medical Education; Directorate of Animal Husbandry; Indian System of Medicine; Directorate of Homeopathy; and Govt. Homeopathic Medical College, have to ensure that all health care institutions under their purview have obtained authorization under BMW Rules.

Table 18 Future plan for Biomedical Waste Management

Sl. No.	Subject	Existing & Gap	Activities	Implementing agency	Funding agency	Timeline
1	Inventory and Identification of Healthcare Facilities	Check whether all HCFs generating BMW are authorised	Inventory available only of HCFs under the purview of SPCB. Defaulters identified and notices issued. The inventory shall be updated with all HCFs including clinics, hospitals, Veterinary hospitals, Ayush hospitals, animal houses, etc generating biomedical waste. LSGD ensure that all HCFs obtained SPCB Consent/authorization before issuing license which helps to bring all HCFs under the SPCB purview.	Local bodies, DMO, Veterinary Department KSPCB Individual HCFs LSGD		
2	Adequacy of facilities to treat biomedical waste	Check if there is any gap between Quantity of Biomedical Waste generated per day and quantity of Biomedical waste treated and disposed in the District? In case of no access to CBWTFs, adequacy of existing disposal of BMW	Action plan for setting-up CBWTF or providing access to CBWTF with 75 Km from places waste generation. Action plan for management of BMW through captive facilities in case of no access to CBWTF: Healthcare facilities shall be mandated to execute agreement with common biomedical waste treatment facilities Biomedical waste generated in the HCFs were collected, treated by KEIL or IMAGE and disposed through CBWTF of IMAGE. Deep burial	ULBs DMOs Veterinary Department KSPCB Health department Animal husbandry		

			pits are to be stopped completely. Captive incinerators to follow new emission standard by CPCB through modernisation or otherwise to stop functioning of incineration and join CBWTFs.			
3	Tracking of BMW	Check whether barcode system is implemented by all HCFs and CBWTFs?	Check whether Barcode is provided by the CBWTFs and the transporting vehicles are provided with GPS.	DMOs CBMWTF HCFs KSPCB IMAGE KEIL Local bodies Health department Animal husbandry		
4	Awareness and education of health care staff	Whether training has been organized for all stakeholders? Trainings are conducted by KSPCB and CBWTFs to all stakeholders periodically.	Trainings are conducted periodically	Health department KSPCB IMAGE CBMWTF KEIL		
5	Adequacy of funds	Whether adequate funds are allocated to Government healthcare facilities for biomedical waste management by State Govt?	Allocate adequate funds to Government health care facilities for biomedical waste management by State Govt.	LSGD DMO HCFs Individual Private HCFs State Government Health department		
6	Compliance to Rules by HCFs and CBWTFs	Is there any district level mechanism to monitor compliance by Hospitals / HCFs?	Inspections and monitoring are to be done periodically to verify the compliance with the rules	DHO KSPCB District administration Health department Veterinary officer Local bodies DMO LSGD IMA		

7.	Establish CBWTFs concentrating on southern and northern most districts in the State			LSGD Health Department		
8	District Level Monitoring Committee	Check whether District Level Monitoring Committee has been constituted and meetings are being organized?	Meetings are to be conducted regularly	DMLC Members KSPCB Health department		
9	Ensure pretreatment of solid biomedical waste and liquid biomedical waste by all HCFs	Check if HCFs are required to install ETPs for waste water generated–	This is to be included in inventory. Action plan for installation of ETPs by HCFs where applicable	DHO KSPCB District administration Health department Veterinary officer Local bodies DMO LSGD IMA		
10.	Sewage treatment plant	Check whether STP provided. Evaluation of existing systems & upgradation if needed	This is to be included in inventory. Action plan for installation of STPs by HCFs where applicable	DHO KSPCB District administration Health department Veterinary officer Local bodies DMO LSGD IMA Private hospitals		

2.5 Anti Microbial Resistance Containment

Antimicrobial Resistance (AMR) is a global public health problem. Even though there are many drivers of antibiotic resistance, the most dangerous trends contributing

to rising AMR apart from the inappropriate use of antibiotics in humans include antibiotic use for growth promotion and disease prevention in animals, horticulture, and fisheries. The use of animal manure in soil and inadequate treatment of effluents containing antibiotic residues from the pharmaceutical industry, healthcare facilities, and farms also contributes to the problem of increasing AMR. The Government of Kerala is committed to take suitable action to address antimicrobial resistance in the State by involving all stakeholders to develop and implement a State Action Plan on AMR, which will be in alignment with the National Action Plan on Antimicrobial Resistance (NAP-AMR) and the Global Action Plan on Antimicrobial Resistance (GAP-AMR). Inter-sectoral collaboration and a One Health Approach are crucial and hence integrated in the government's approach. Creating awareness on AMR among cross-sectoral stakeholders is important for AMR containment. The Hon'ble National Green Tribunal in OA 801/2018 directed on 6-4-2022 to strengthen the monitoring of Active Pharmaceutical ingredients and to control its discharge to rivers, ground water, if required with the support of institutions for monitoring the degree of pollution.

2.5.1 Proposed activities in Kerala Antimicrobial Resistance Strategic Action Plan (KARSAP) – (<https://ncdc.gov.in/showfile.php?lid=441>)

Kerala Antimicrobial Resistance Strategic Action Plan (KARSAP) has been drawn up with the following 6 strategic priorities: (1) Awareness & Understanding (2) Knowledge & evidence (3) Infection prevention & Control (4) Optimizing use of antibiotics (5) Research and innovation (6) Collaborations.

The proposed activities include:

1. Develop and implement standards for antibiotic residues in waste (2.14)
2. Strengthen the state antibiotic residue control plan in environment done by Kerala State Pollution Control Board (2.19)
3. Establish separate AMR database for human, animal, food and environment (2.21)
4. Strengthen resources for surveillance of AMR and antibiotics / residues in all sectors - human, veterinary, agriculture, crop, food, fisheries, and environment (2.22).

5. Identify environmental sources of infection(Kerala State Pollution Control Board, LSG) (3.12)
6. Strengthen facility infrastructure including environment controls and sewage treatment plant (Kerala State Pollution Control Board, health institutions) (3.15)
7. Identify sources of AMR (Kerala State Pollution Control Board, LSG) (3.22)
8. Collect baseline data (Kerala State Pollution Control Board, LSG) (3.23)
9. Ensure routine monitoring and surveillance (3.24)
10. Trace sources of inflection in the environment to prevent contamination of environment (3.25)
11. Develop standard operating procedures (SoPs) (3.27)
12. Develop policy on registration and licensing of farms, factories, slaughterhouses, fish/meat/dairy processing units, animal feed manufacturing units, health care facilities and veterinary units (3.28).
13. Develop appropriate bio security guidelines and standard operating procedures (sops) on waste management for farms , feed manufactures, slaughterhouses, food processing units, health and veterinary care facilities, sewage treatment plants and good manufacturing practices (GMPS) for fish / meat / dairy processing units (3.29).
14. Adopt less risky litter/ manure management approaches such as biogas generation (In-house plants or common plants), proper composting for treatment of care facilities under supervision (3.30).
15. Identify sources of AMR in hospitals, and in environment especially in water bodies, and conduct operational research on best options for contaminated measures / system (RGCB, Kerala State Pollution Control Board, CIFT, CSE) (5.7).

2.5.2 Strengthening of laboratory

Strengthening laboratory capacity for AMR surveillance and collating the data on AMR is essential for assessing baseline AMR burden and providing evidence-based information for action. In the State, Kerala State Pollution Control Board is establishing

a State-level Anti Microbial Residue Monitoring Laboratory in the Board's Central Laboratory, Ernakulam.

2.5.3 Project under Plan Scheme 2021-22

The project namely, "AMR database creation, assessment of antibiotic residue and antimicrobial resistance in the environment and development of SoPs and guidelines as per Kerala Antimicrobial Resistance Strategic Action Plan" has been sanctioned under Plan Scheme 2021-22 for an amount of Rs. 50 lakhs. The objective is to conduct antimicrobial resistance surveillance of the environment in three districts namely Thiruvananthapuram, Ernakulam, Kozhikode as per the frame work and to establish separate AMR database, standard operating procedures and to develop separate bio security guidelines for the different sources. The methodology includes:

- 1) Quarterly effluent samples are to be collected from the following sources in Thiruvananthapuram, Ernakulam, and Kozhikode districts
- 2) The samples are to be taken from the sources, Muttathara sewage farm (3 Nos), STPs in five high rise buildings, hospitals one each of general hospital, medical college, corporate hospitals, veterinary hospitals, polyclinic, slaughter house (2 Nos); biomedical waste treatment facility at Palakkad; farms (poultry, dairy, aquaculture) and of soil and water samples from municipal solid waste dump sites (8 Nos). Both antimicrobial resistance and antibiotic residue are to be measured.
- 3) Regarding non-point sources in environment, seasonal samples are to be collected from rivers and lakes (15 samples per district); ground water from open wells (10 samples per district), water samples from estuaries (five samples per district) and sea water samples (five samples per district). Effluent samples may also be collected from pharmaceutical unit.
- 4) Inventorization of the various sources in the three district, Thiruvananthapuram, Ernakulam, and Kozhikode districts is to be prepared and separate AMR database is to be developed.
- 5) Standard operating procedure is to be developed for surveillance of antimicrobial resistance and antibiotic residue in environment.
- 6) Separate bio security guidelines siting guidelines and standard operating procedure

(SoPs) on waste management for farms, feed manufacturers, slaughter house, food processing units, pharmaceuticals units, health and veterinary care facilities, sewage treatment plants and good manufacturing practices (GMPs) for fish/meat / dairy processing units.

- 7) Three capacity building workshops are to be conducted at Thiruvananthapuram, Kochi and Kozhikode. Brochure shall be prepared.

2.5.4 Projects under Non Plan

There are two projects on AMR funded by the Board under non plan scheme. The main initiatives are as follows:

- 1) Kerala State Pollution Control Board is funding a project, Study on antimicrobial resistance in waste water by College of Engineering, Thiruvananthapuram at a total cost of Rs. 13,09,000. The objectives of the study are to conduct isolation and characterization of Antimicrobial resistance from selected hospital effluents, sewage treatment plants, natural water bodies like canals, rivers etc., to identify antibiotic resistance gene from the isolated bacterial isolates by the RNA sequencing techniques and to study the efficiency of existing waste water treatment facilities in the removal of AMR.

- 2) Kerala State Pollution Control Board is funding another project, Surveillance of antimicrobial resistance in selected surface bodies of Thiruvananthapuram district by Department of Environmental Sciences, University of Kerala at a cost of Rs. 10,53,000/-.The objectives of the study are for surveillance of antimicrobial resistance in Karamana, Killiyar, and T.S. Canal along their course at selected stations (100 stations) from rivers, dug wells/hospital waste disposal sites, isolation of bacteria from water and identification and testing of resistance to selected antibiotics and to do DNA amplification of specific microbial culture (resistant) by PCR and identification of microbes.

2.5.5 Future Plan on Antimicrobial Resistance Containment

Future plan on Antimicrobial Resistance containment is given in Table

Table 19 ACTION PLAN FOR PREVENTION OF AMR AND AR IN ENVIRONMENT									
No.	Activities	2022-23	2023-24	2024-25	2025-26	2026-27	Implementing agency	Funding agency	
A. MONITORING									
A1	Monitoring of effluent from pharmaceutical units, and half yearly monitoring of water bodies, ground water if any within 500m radius of pharmaceutical units, effluent from CETP, CSTP as per CPCB guidelines	Half yearly	Half yearly	Half yearly	Half yearly	Half yearly	KSPCB		
A2.	Monitoring of point sources-effluent -AMR, AR <ul style="list-style-type: none"> • 1 common STP • 5 STPs of residential flats • 5 Hospitals(Medical College, General Hospital, Corporate hospital, Veterinary hospital, polyclinic • 2 Slaughter houses • Common biomedical waste treatment facility(2 Nos) • Farms (poultry, dairy, aquaculture)(5-10% of farms selected for surveillance in livestock and fisheries) • 2 Municipal solid waste dumpsites 	Districts of Thiruvananthapuram Ernakulam Kozhikode	Districts of Alappuzha, Kollam, Pathanamthitta, Kottayam, Thrissur Malappuram Kannur	Districts of Palakkad Kasargod Idukki Wayanad			KSPCB		
A3.	Monitoring of non point sources in environment-AMR,AR <ul style="list-style-type: none"> • 5 rivers/lakes • 10 open wells • 5 Estuaries • 5 Coast line 	Districts of Thiruvananthapuram Ernakulam Kozhikode	Districts of Alappuzha, Kollam, Pathanamthitta, Kottayam, Thrissur Malappuram	Districts of Palakkad Kasargod Idukki Wayanad			KSPCB		

Table 19 ACTION PLAN FOR PREVENTION OF AMR AND AR IN ENVIRONMENT								
No.	Activities	2022-23	2023-24	2024-25	2025-26	2026-27	Implementing agency	Funding agency
			Kannur					
A4.	<p>Study on antimicrobial resistance in waste water by Dr. Swarnalatha K., Associate Professor, College of Engineering, Thiruvananthapuram at a total cost of Rs. 13,09,000.</p> <ul style="list-style-type: none"> To conduct isolation and characterization of Antimicrobial resistance from selected hospital effluents, sewage treatment plants, natural water bodies like canals, rivers etc., To identify antibiotic resistance gene from the isolated bacterial isolates by the RNA sequencing techniques To study the efficiency of existing waste water treatment facilities in the removal of AMR. 	Thiruvananthapuram district					KSPCB College of Engineering, Trivandrum	KSPCB
A5	<p>Surveillance of antimicrobial resistance in selected surface bodies of Thiruvananthapuram district by Dr. Salom Gnana Thanga V., Professor, Department of Environmental Sciences, University of Kerala at a cost of Rs. 10,53,000/-. Objectives:</p> <ul style="list-style-type: none"> For surveillance of antimicrobial resistance in Karamana, Killiyar, and T.S. Canal along their course at selected stations (100 stations) from rivers, dug wells/hospital waste 	Thiruvananthapuram district					KSPCB University of Kerala	KSPCB

Table 19 ACTION PLAN FOR PREVENTION OF AMR AND AR IN ENVIRONMENT									
No.	Activities	2022-23	2023-24	2024-25	2025-26	2026-27	Implementing agency	Funding agency	
	<p>disposal sites, isolation of bacteria from water and identification and testing of resistance to selected antibiotics</p> <ul style="list-style-type: none"> DNA amplification of specific microbial culture (resistant) by PCR and identification of microbes. Preliminary works were done in the study area. 								
B. ACTION PLAN BASED ON MONITORING RESULTS									
B1.	Identification of hot spots and preparation of action plan based on reports	Districts of Thiruvananthapuram Ernakulam Kozhikode	Districts of Thiruvananthapuram Ernakulam Kozhikode Alappuzha, Kollam, Pathanamthitta, Kottayam, Thrissur Malappuram Kannur	Districts of Thiruvananthapuram Ernakulam Kozhikode Alappuzha, Kollam, Pathanamthitta, Kottayam, Thrissur Malappuram Kannur Palakkad Kasargod Idukki Wayanad			KSPCB Health department		
B2.	Implementation of action plan for prevention of AMR and antibiotic residue	-	Districts of Thiruvananthapuram Ernakulam	Districts of Thiruvananthapuram, Ernakulam, Kozhikode,	Districts of Thiruvananthapuram, Ernakulam, Kozhikode,	Districts of Thiruvananthapuram, Ernakulam, Kozhikode,	KSPCB Health department		

Table 19 ACTION PLAN FOR PREVENTION OF AMR AND AR IN ENVIRONMENT									
No.	Activities		2022-23	2023-24	2024-25	2025-26	2026-27	Implementing agency	Funding agency
	in environment		Kozhikode	Alappuzha, Kollam, Pathanamthitta, Kottayam, Thrissur Malappuram Kannur	Alappuzha, Kollam, Pathanamthitta, Kottayam, Thrissur Malappuram Kannur Palakkad Kasargod Idukki Wayanad	Alappuzha, Kollam, Pathanamthitta, Kottayam, Thrissur Malappuram Kannur Palakkad Kasargod Idukki Wayanad			
B3	Collection of expired medicines and disposing it to Common biomedical waste treatment facility by Drugs Controller and Association of Chemists	Thiruvananthapuram district	Other districts	Other districts	Other districts	Other districts		KSPCB Health department Drugs controller	
C. PREPARATION OF INVENTORIZATION, BIOSECURITY GUIDELINES AND SOPS									
C1.	Inventorization of various sources of AMR and development of AMR database	Preparation of reports	Preparation of reports	Preparation of reports	Updation of reports	Updation of reports		KSPCB	
C2.	Development of Standard operating procedure for	Preparation of reports	Updation of reports based on susceptibility tests	Updation of reports based on susceptibility tests	Updation of reports based on susceptibility tests	Updation of reports based on susceptibility tests		KSPCB University of Kerala	

Table 19 ACTION PLAN FOR PREVENTION OF AMR AND AR IN ENVIRONMENT									
No.	Activities		2022-23	2023-24	2024-25	2025-26	2026-27	Implementing agency	Funding agency
	surveillance of antimicrobial resistance and antibiotic residue in environment							College of Engineering Trivandrum Health department	
C3.	Separate biosecurity guidelines and standard operating procedure on waste management of farms, feed manufacturers, slaughter houses, food processing units, pharmaceutical units, health and veterinary care facilities, sewage treatment plants and good manufacturing practices (GMPs) for fish/meat/dairy processing units	Preparation of reports	Updation of reports based on susceptibility tests	Updation of reports based on susceptibility tests	Updation of reports based on susceptibility tests	Updation of reports based on susceptibility tests	Updation of reports based on susceptibility tests	KSPCB University of Kerala College of Engineering Trivandrum Health department	
D. AMR LABORATORY FOR ENVIRONMENT								E.	F.
D1	Functioning of AMR laboratory at Central laboratory, Ernakulam	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	KSPCB	
D2	Strengthen the laboratory to monitor	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	Functioning of AMR laboratory	KSPCB	

Table 19 ACTION PLAN FOR PREVENTION OF AMR AND AR IN ENVIRONMENT									
No.	Activities	2022-23	2023-24	2024-25	2025-26	2026-27	Implementing agency	Funding agency	
	the AMR in human, animal, food and environment sectors	and coordination with PCB	and coordination with PCB	and coordination with PCB	and coordination with PCB	and coordination with PCB			
G. AWARENESS PROGRAMMES AND CAPACITY BUILDING								H.	I.
E1	Awareness programmes for PCB officers and government officials	Once in a month	Once in a month	Once in a month	Once in a month	Once in a month	KSPCB		
E2	Communication, IEC materials – to raise awareness amongst all stakeholders, including policy makers, general public including students and researchers	Once in a month	Once in a month	Once in a month	Once in a month	Once in a month	KSPCB		
	Stakeholders – including civil society organizations, trade and industry bodies, employee organizations, media – should help to promote public awareness and understanding of infection prevention and use of	Annually	Annually	Annually	Annually	Annually	KSPCB		

Table 19 ACTION PLAN FOR PREVENTION OF AMR AND AR IN ENVIRONMENT									
No.	Activities	2022-23	2023-24	2024-25	2025-26	2026-27	Implementing agency	Funding agency	
	antimicrobial medicines across all sector								

2.6 Hazardous Waste Management Plan

2.6.1 Statutory requirements

Hazardous and Other Waste (Management and Transboundary) Management Rules, 2016 are notified to ensure safe handling, generation, collection, storage, packaging, transportation, use, treatment, processing, recycling, recovery, pre-processing, co-processing, utilization, offering for sale, transfer or disposal of hazardous and other wastes, which is mentioned in the schedules therein. The responsibilities of Industries department in the State government (Rule 5(1)) and that of Department of Labour (Rule 5(2)) for environmentally sound management of hazardous and other wastes are given in Rule 5 of the HWM Rules. Department of Industries is to ensure earmarking or allocation of industrial space or shed for recycling, pre-processing and other utilization of hazardous or other wastes in the existing and upcoming industrial park, estate and industrial clusters. Industrial units generating hazardous wastes are to obtain authorization from the State Pollution Control Board for the management of hazardous and other wastes. The storage, transportation, utilisation, treatment, and disposal of hazardous wastes shall be as per HW Rules. The import and export of hazardous and other wastes shall be as per Rule 11 of the HWM Rules.

In compliance with the directions of the Hon'ble National Green Tribunal in the matter O.A 804/2017 an empowered Monitoring Committee under the Chairmanship of Secretary, Department of Environment has been constituted for effective implementation of the provisions of Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.

2.6.2 Directions of the orders of the Hon'ble NGT in OA 804/2017 and its Compliance

The Hon'ble NGT issued the following directions on 26-8-2019 to be complied in the State:

Table 20 Present status of Hazardous Waste Management in the directions of Hon'ble NGT in OA 804/2017

Sl. No.	Proposed actions	Responsible agency and timeline	Present status
1.	For effective implementation of the remediation plan at state level, Empowered Monitoring Committee chaired by Principal Secretary, Environment having representatives from department of Industries, SPCB, Ground water development agency etc shall be constituted.	State Government, 4 months	Empowered committee constituted in the State
2.	SPCB is to ensure that the compliance of the directions of the Hon'ble NGT on regular basis rather than a onetime compliance		Compliance is being regularly monitored
3.	The verification of the updation of display board should be an integral part of any inspection carried out by CPCB/SPCB without exception. In case of noncompliance the concerned officer should be subjected to departmental action.	CPCB/SPCB: Immediate	Compliance is being regularly monitored
4.	SPCB shall enforce provisions of HWOM Rules for grant of authorization and manifest submissions at such waste reception facilities as well as port operations. SPCB shall ensure that HW handled at such facilities and ports should be covered in the Annual report to be prepared as per HOWM rules, 2016	SPCB and Port authority: immediate effect	Compliance is being regularly monitored.
5.	<p>i) Financial arrangements between central-state governments for the proposed remediation projects shall be resolved immediately so that the remediation works as proposed in DPRs can be under taken on priority. These DPRs (2017-18 and 2018-19) may need to be revisited if no action is taken in a reasonable time for execution of remediation works.</p> <p>ii) Government should take up on priority not only remediation projects at the sites, where DPRs have been prepared but also the assessment of about 195 sites, beside any new addition of potentially contaminated sites.</p> <p>CPCB/SPCB to ensure that the hazardous waste accumulated at all such identified sites shall be disposed of either through treatment, storage and disposal facilities or onsite secured landfilling on priority to stop further contamination</p> <p>Assessment of probable contaminated sites and new additional sites recommended by CPCB/SPCB shall be completed within one year after publication of such guidance document by CPCB</p>	<p>MoEF, State Government 6 months</p> <p>CPCB/SPCB -6 months</p> <p>CPCB/SPCB: 1 year</p>	Plans to be revisited
6.	In case of the contaminated sites where the polluter is not identified, the State Government would be required to finance remediation of such sites to safe guard the people living in contaminated areas from adverse health effects, in terms of their constitutional responsibility to protect and improve the environment	State Government and SPCB	No such sites identified

7.	Implementation of Rule 5(2) of the HOWM Rules, 2016: Chief Secretaries of State are to ensure effective and urgent implementation of the provisions of the rules under Rule 5(2) by the Department of Labour	Department of Labour, Respective State Immediate	Directions issued to the Labour department Awareness programmes are being arranged
8.	Institution reforms: Capacity building in SPCB and other agencies namely trained adequate manpower, laboratory, budget etc) shall be expedited as recommended in the orders of the Hon'ble NGT dated 12-4-2019 SPCB and CPCB need capacity building in terms of qualified and experienced manpower and also tools and techniques for effective governance. There is need to sensitize State Government about duties required to be performed by the concerned departments under Rule 5(1), (2), (3) and Schedule VII of the HOWM rules Biannually compliance report is to be submitted by Chief Secretary to CPCB from the State Government department stipulated under Rule 5(1), 5(2), 5(3) and Schedule VII of the HOWM Rules.	SPCB, MoEF, and State Government Chief Secretary-Biannually	Action has been taken to appoint permanent hands through PSC. Funding provision is there for purchase/repair of equipments
9.	CPCB/SPCBs shall take effort similar to that of the State of Gujarat where a separate institution named Gujarat Cleaner Production Centre (GCPC) which conducts such action research supported by adequate information dissemination program and advocacy programs for promoting cleaner technology.	CPCB and SPCB	
10.	CPCB/SPCB shall proactively engage in research and development activities by supporting research in clean technology and cleaner production and also, awareness program for the purpose.	CPCB and SPCB	
11.	Networking of Academic and Research Institutes MoEF/CPCB/SPCB shall undertake action research and also promote academic courses on the subject in association with academic and research institutions	MoEF/CPCB/SPCB	Instructions given to Technical university
12.	The Hon'ble NGT orders dated 30-7-2018 with regards to setting up of TSDF and taking initiate action against erring units be strictly complied with by concerned State	State Government/SPCB	Common HW TSD facility exists in the State at Ernakulam
13.	Clearance of waste oil/sludge from ships Used/ waste oil generated from ships collected by the reception facilities of various ports shall be covered under the authorization by SPCB for its designated disposal and tracking of waste under HOWM Rules	Port authorities/SPCB Immediate	Directions issued to Ports
14.	Ensure that all the solvent recovery industries in the State have mandatory authorization for the same in compliance with SOP and check list of CPCB within one month		Action taken
15.	Urgent updation of concerned websites of SPCB with respect to enforcement of all actions along with details of action taken.	SPCB/CPCB- immediate	Action is being taken- continuous process

16.	Enforcement framework for effective enforcement of Rules based on principle of proportionality and also precautionary principle is to be evolved. Such framework will remove ambiguity in regulatory actions and bring transparency, predictability and consistency in enforcement for actions	SPCB-within six months	Enforcement framework was prepared
17.	SPCB need to take cognizance of these aspects (i.e HW resulting from enforcement of other regulations) while enforcing the relevant rules and also preparation of HW inventory and other interventions	SPCB and CPCB	Action is being taken- continuous process
18.	Other waste is presently missing from all the regulatory actions, including inventory. It is necessary to bring such waste in regulatory domain	SPCB-inventory 2018-19 onwards	Action is being taken- continuous process
19.	SPCB needs to take steps to ensure closing of the manifests received and reconcile the HW handling data. This work is humungous and need support in terms of software and online submissions	SPCB	Action is being taken- continuous process
20.	The pre-processing and recycling/utilization facilities need to be treated as critical environmental infrastructure facilities for sound environmental management of hazardous waste so as to ensure enhanced level and frequency of enforcement and environmental monitoring. Elaborate protocols are needed to be developed	SPCB-continuous activity	Action is being taken- continuous process
21.	According to the rules, the identification and quantification of the hazardous waste generation is to be done at the authorization stage itself and therefore, it is necessary that SPCBs shall adopt the scientific principles as enumerated for such identification and quantification of HW	SPCB: Immediate	Action is being taken- continuous process
22.	Uniform format for visits and inspections of HW handling facilities is necessary to ensure comprehensive inspections as per the provisions of the rules	SPCB: Immediate	Uniform format for inspection was prepared
23.	The authorization document should clearly stipulate respective mode of management (such as common or captive incineration/secured land filling or pre-processing or recycling or utilization of export or captive storage, as applicable for each category of HW being generated	SPCB: Immediate	Action is being taken- continuous process
24.	SPCB shall verify and scientifically validate the HW data and facilities before grant or renewal of authorisation	SPCB-inventory 2018-19 onwards	Action is being taken- continuous process
25.	There is an emergent need to develop sectoral process based reasonable HW generation range to have uniformity in assessing the HW generation from industries and bench marking the same with its peers, rather than solely depending on industry data.	SPCB: Immediate	Action is being taken to do it with the assistance of external agency
26.	All occupiers who have authorization shall submit the annual report and in case of non compliance action needs to be taken by SPCB.	SPCB: Immediate	Action is being taken- continuous process
27.	SPCB shall invoke the powers conferred under clause 23(1) and (2) of the rules, related to all damages caused to the environment or third party due to improper handling and management of the hazardous and other wastes, and non-compliance respectively.	SPCB: Immediate	Action is being taken-continuous process
28.	The habitual and serious defaulters shall be prosecuted under provisions of the Environment and Protection Act, 1986. Other alternative regulatory actions including	SPCB: Immediate	Action is being taken- continuous process

	refusal and revocation of authorization can also be explored		
29.	Non compliance to be documented while processing authorization for renewal or inspections in order to invoke powers of refusal or revocation of authorization	SPCB: Immediate	Action is being taken- continuous process
30.	Inventory data needs to be verified and validated before accepting the same	SPCB: Immediate	Action is being taken- continuous process
31.	There is emergent need of consistent approach in recycle and utilization of hazardous waste in terms of waste management hierarchy mandated in the rules across all states in order to ensure the level of playing field for the industry. This can be achieved by advocacy programmes, circular economy, and documentation of the success stories along with regulatory interventions wherever required.	SPCB	Action is being taken to do it with the assistance of external agency
32.	Develop certain bench marks/guidelines for the possibilities for HW recycle/utilization on case to case basis. The concept of environmental bench marking among similar industries generating HW can be useful to ensure consistency and uniformity		Action is being taken to do it with the assistance of external agency
33.	The practice of returning the HW consignment needs to be immediately stopped and the consignment needs to be stored within the TSDF with information to the waste generator and also concerned SPCB. The TSDF shall take appropriate measures to dispose this waste at the risk and cost of the waste generator under due information to the SPCB immediately on priority.	SPCB: Immediate	Action is being taken- continuous process
34.	SPCB shall conduct environmental audit including the site selection criteria, design and layout for the TSDF in the next one year. They can engage expert institutes for the purpose and see the CPCB's technical advice on the ToR of the study	SPCB- one year	Action is being taken to do it with the assistance of external agency. E-tenders were invited. Technical evaluation of tenders done. Financial evaluation is to be carried out.
35.	All common Secured Land Fill shall disclose the mandatory amount deposited in Escrow amount annually to SPCB, CPCB and display on their website. SPCB is to take action in case of non compliance	SPCB: Immediate	Action taken
36.	Each of SPCB/Custom/TSDF needs to have at least one laboratory where all HW parameters as required under the rules can be analyzed.	SPCB-six months	Action is being taken to upgrade the Board's Central Laboratory at Ernakulam.

2.6.3 Status of hazardous and other wastes in the State

The Hazardous Waste generating units in the State mainly include petroleum refining; fertilizer and pesticide units; chemical industrial units re-processing of used oil or recycling of waste oil; industrial operations using mineral or synthetic oil as lubricant in hydraulic systems; metal surface treatment units; common effluent treatment plant; service stations, cleaning, emptying and maintenance of petroleum oil storage tanks including ships etc. The hazardous wastes generated from these units are mainly used/waste oil, oil sludge, acid from used batteries, other hazardous sludge, etc.

As per Hazardous Annual Inventory 2020-21 prepared by the Kerala State Pollution Control Board, as on 23.10.2021 sent to CPCB there are 1838 hazardous waste generating units in the State, of which 731 units have submitted annual returns. As per the inventory submitted by Kerala State Pollution Control Board, about 57863.065MT hazardous waste has been generated against the authorized capacity of 83,817.82 MT. Of this 57863.065 MT hazardous waste generated, 47,779.68 MT is landfillable, 6.935MT incinerable (disposed through Captive Incinerator), 7,362.1 MT recyclable and 2,714.39 MT utilizable (utilized captively) per annum.

As per Annual Inventory 2020-21, total number of HW generating industries is 1,838 and the number of authorized industries under Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 is 1,796 i.e nearly 98% of the hazardous generating units are having Board's authorization.

Some gaps have been identified in the Annual Inventory 2020-21 and action is being taken to rectify the same.

2.6.4 Common Hazardous Waste Treatment, Storage and Disposal facility

There is one common Hazardous Waste Treatment, Storage and Disposal Facility at Ambalamedu, Ernakulam. It was established on the directive of the Supreme Court Monitoring Committee on hazardous waste for treatment and disposal of hazardous waste generated from industries in the State of Kerala. Govt. of Kerala appointed Kerala State Industrial Development Corporation (KSIDC) as nodal agency for setting up a Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF) for management of hazardous waste in the State of Kerala. KSIDC established KEIL as a Special Purpose Vehicle with participation of 85 industries in the State.

The Company is functioning at the 50 acres of land purchased in the name of Govt. of Kerala from FACT-Cochin Division, and leased to KEIL for 50 years. The company disposes hazardous waste generated in various industries in Kerala State in engineered landfills.

The common TSDF was setup and operated as per the norms and guidelines laid down by the Ministry of Environment, Forest and Climate Change, Government of India and Central Pollution Control Board / Kerala State Pollution Control Board.

Facilities at KEIL include:

- Secured landfill constructed as per CPCB guidelines with double composite liner.
- Well equipped Laboratory,
- Weigh Bridge & security
- Common storage and Physical treatment area having 1800 M² with impervious lined floor for temporary storage of the hazardous waste
- Dedicated vehicles for transportation of hazardous waste complying with environmental regulations,
- Administrative office
- Multiple effect evaporation(MEE) plant & Reverse Osmosis (RO) plants for leachate treatment.
- E-waste collection Centre and dismantling facility.

As per Hazardous Waste Annual Inventory 2020-21, 33,310.504 T of Hazardous Waste was disposed through common secured Landfill. The Kerala Enviro

Infrastructure Ltd., the operator of the facility for disposing hazardous waste in the State is maintaining an ESCROW Account based on the direction of CPCB & MoEF.

2.6.5 Used oil/ Waste oil re-processing/ recycling units

There are six authorized re-processor/recycler of used oil/waste oil in Kerala. The details of the units are as follows:

Table 21 Reprocessor/Recycler Waste oil in Kerala

Sl.No.	Address	Authorized for	Authorized recycling/utilization/processing capacity in tonnes per annum	Validity of consent
1.	K. J. Lubes, Mannuthy, Thrissur	Used oil	1278	30-6-2023
2.	APJ Refineries Private Limited, NIDA, Kanjikode, Palakkad, Kerala	Used oil	14600	30-11-2022
		Waste oil	8760	
3.	Swaraj Biofuel Energy, Palakkad	Used Oil Waste oil	13.6 6	29-2-2024
4.	Petroliv Petroleum, Erikkulam, Madikkai, Nileswram, Kasargod	Used oil	3600KL	31-8-2023
		Waste oil	3600 KL	
5.	Cee Jee Lubricants, Edayar	Used oil	7200	30/6/2023
		Waste oil	5475	
6.	Essel Petrochemical, Industrial Development Area	Waste oil	1200	30/6/2023

90.764 T of hazardous waste from other state was recycled/utilised in Kerala in the year 2020-21. Authorization was issued to send used oil of 500 KL/year to Karnataka for recycling.

2.6.6 Implementation of Rule 5(1) by Industries Department

As per Rule 5(1) in Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2016 for environmentally sound management of hazardous and other wastes Department of Industries in the State or any other government agency authorised in this regard by the State Government has to ensure earmarking or allocation of industrial space or shed for recycling, pre-processing and other utilisation of hazardous or other waste in the existing and upcoming industrial park, estate and industrial clusters. Following industrial estates have earmarked space for recycling, pre processing and other utilization of hazardous waste:

Table 22 Details of Industrial Estate for recycling, pre processing and other utilization of hazardous waste

Sl. No.	Name of District	Area Earmarked	Name of Industrial Estate
1	Thiruvananthapuram	1 Acre	DA Veli
2.	Alappuzha	20 cents	DP Punnapra
3.	Thrissur	50 cents	DP Varavoor
4.	Pathanamthitta	50 cents	DP Kunnankula
5.	Ernakulam	1 Acre	DA Edayar
6.	Kasargode	1 Acre	DA Ananthapuram

Strict instructions have been given to the respective General Managers, District Industries Centers of other districts also for reserving the plots for this purpose.

2.6.7 Implementation of Rule 5(2) by Labour Department

As per Rule 5(2) in Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2016 for environmentally sound management of hazardous and other wastes Department of Labour in the State or any other government agency authorised in this regard by the State Government shall ensure

recognition and registration of workers involved in recycling, pre-processing and other utilisation activities, assist formation of groups of such workers to facilitate setting up such facilities, undertake industrial skill development activities for the workers involved in recycling, pre-processing and other utilisation and undertake annual monitoring and to ensure safety and health of workers involved in recycling, pre-processing and other utilisation.

Registering of labourers, forming of groups, induction and training of workers involved in recycling, preprocessing and other utilization of hazardous wastes, etc. are entrusted with Labour and Skills Department/Commissionerate. Training program and handbook were prepared in association with Occupational Safety and Health Training Institute, Kakkanad coming under the Department of Factories and Boilers. List of employees were collected and about 200 labourers have been identified for the training and it is proposed to impart training through Kerala Institute of Labour and Employment (KILE) which is an autonomous body constituted by the Government of Kerala for the purpose of training, research and publications in labour and allied subjects.

2.6.8 Contaminated Sites/ Probable Contaminated Sites

The CPCB had identified 13 contaminated/ probable contaminated sites in the state and the same were inspected by KSPCB officials. Later 4 sites were delisted by CPCB, although the Board had requested to delist 9 sites. So the Board had again requested CPCB to delist the remaining 5 probable contaminated sites also.

In Kerala, there are four contaminated sites namely KuzhikandomThodu site (Ernakulam), Edayattuchal(Ernakulam), Chakkarachal(Ernakulam) and Vadavathoor(Kottayam) sites.

The Central Pollution Control Board was requested to delist the municipal solid waste dumping site at Vadavathoor, Kottayam from contaminated sites. With regard

to Vadavathoor(Kottayam)Kottayam municipality has proposed a project of Rs.23.20 Crores with the financial aid of World Bank to the Suchithwa Mission and the same is pending for approval.

With regard to execution of remediation works Kuzhikandomthodu, Technical sanction has to be issued to carry out tendering process and the issual of Technical sanction is pending due to non-transfer of land of HIL, Ernakulam which was identified for establishing temporary ETP and for the remaining funding. Action has been initiated to facilitate remediation work at the earliest.

With regard to Edayattuchal (Ernakulam) and Chakkarachal (Ernakulam) M/s.Binani Zinc Ltd (now M/s.Edayar Zinc Ltd) has submitted a counter affidavit before the Hon'ble Tribunal in OA 143 of 2021(an application filed by Sri. Muhammad Iqbal) stating that there are other factors also which need urgent attention so that they may be exempted from the entire responsibility for the pollution occurred at Edayattuchal and Chakkarachal paddy field.Also, the Hon'ble NGT has constituted a joint committee for the above purpose in which CPCB, SPCB, Soil Conservation Dept, and Agricultural University are members. Two meetings of the joint committee were over. In the first meeting of the committee detailed deliberations were done about the case and its pendency. Further follow up action is being taken for the physical meeting and site inspection of the committee constituted by the tribunal in O.A. No. 143/2021 and presentation of the ERM (India) Pvt. Ltd are pending.

2.6.9. Future Plans

Table 23 Future plan for Hazardous Waste Management

No.	Subject	Existing & Gap	Activities	Implementing agency	Funding Agency	Timeline
1.	Compliance of direction in OA 804/2017		Action is being taken	Industries dept; Labour dept; Port authorities		Action is being taken-continuous process
2.	Third party inventorization of hazardous waste	Inventorization 2017-18 prepared by Board	KSPCB intends to do the same with the help of third party. Proposal of NIIST is requested.	KSPCB		-
3.	Closing on line manifest system for online tracking of hazardous waste movement		KSPCB introduced a new software in which online submission of manifest is also introduced.	KSPCB		Online submission of manifest is also introduced.
4.	Environmental auditing of hazardous waste treatment storage disposal facility, captive secured landfill and captive incinerator	Tendering done	The Board invited tenders. Technical evaluation is over. Financial evaluation is proposed to be done shortly.	KSPCB		6 months
5.	Earmarking of land for recycling in the industrial estate/cluster		Action is being done.	Industries department		Action is being done.
6.	Training to labourers in consultation with the Occupational Safety and Health training institution		Action is being initiated.	Labour department		Action is being done.
7.	Transfer of land for ETP for and land Kuzhikandom project from HIL	Funding for and land	Tendering process is under progress. Technical sanction is pending due to the non-transfer of land identified for establish ETP.		State Government SPCB FACT IRE HIL Merchem	Action is being done.
8.	Remediation Eayattuchal	Funding required	Action is being initiated. The case is pending and the Hon'ble NGT vide order letter dated 13/04/2021 directed to			Action is being done.

			constitute a committee to study the issue. The constitution of committee and its first meeting are over		
9.	Vadavathoor, Kottayam		Kottayam municipality has proposed a project of Rs. 23.20 crore with financial aid of World Bank to the Suchitwa Mission and the same is pending for the approval.	23.2	

2.7. E waste Management Plan

The Central Government has notified the E-Waste (Management) Rules, 2016 on 1-10-2016 (the EWM Rules, 2016) which supersede the E-Waste (Management and Handling) Rules, 2011. It applies to every manufacturer, producer, consumer, bulk consumer, collection centres, dealers, e-retailer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of E-Waste or electrical and electronic equipment. EWM Rules cover e-waste generated from the manufacture, use, repair and refurbishment of all kinds of electrical and electronic equipment, including 'information technology and telecommunication equipment' and 'consumer electrical and electronics', specifically listed in Schedule I of the Rules. E-waste is to be collected and channelized to registered dismantlers/recyclers.

The concept of Extended Producer Responsibility (EPR) has been introduced in the EWM Rules, 2016. The producers of electrical and electronic equipment have to implement the EPR to ensure that the e-waste is properly channelized to authorised recyclers or dismantlers and to achieve environmentally sound management of the e-waste. The manufacturers, dealers, e-retailers, and refurbishers have been brought under the ambit of these rules to ensure that the e-waste is effectively channelized and disposed of. The urban local bodies have been assigned the responsibility of collecting back the e-waste arising from the orphan products and channelizing it to authorized dismantler or recycler.

The action plan incorporating the activities of concerned departments for the implementation of the E waste Management Rule in the State has been prepared and submitted to CPCB and CPCB is monitoring the status through the quarterly reports being submitted by the State PCBs. The activities involved and the status are Identification of Producers who has not obtained EPR Authorization, Physical verification of E-waste dismantler/ recycler, Verification of systems provided by producers for collection and channelization of e-waste (Verification of collection

centers/points), Improvisation/Strengthening of E-Waste Management. DLMC chaired by the District Administration has been entrusted to overlook the implementation. Quarterly report in this regard is submitting to CPCB by the PCB.

2.7.1. Inventory preparation

The Kerala Board entrusted National Institute for Interdisciplinary Science and Technology (NIIST) to prepare the inventory and they prepared the draft inventory which was prepared in consultation with GST. NIIST have submitted the draft report.

2.7.2. EPR authorized producers and collection centers

There are 13 number of EPR authorized producers in the State and ... number of collection centers established by these producers in various districts of the State. The Board had done random verification of these collection centers. But majority of these collection centers are not meeting the specifications as per the CPCB guidelines. The Board reported the matter to CPCB and the EPR registration was revoked and later re-instated upon rectifying the defects. Verification of all collection centers are to be done.

The EPR authorized producers in the State are listed below:

Table 24 EPR authorized producers in Kerala

1	Meezan Electronic Scales Private Limited, Ground floor, 8/308 A, Braight Building, Calicut Road, Majeri, Malappuram, Kerala-676121
2	Kadco systems, 9/539/13, Kadavyenclave, Sree Lakshmi Narayana Palace Casino Complex, Casino Hotel, Kokkalai, Thrissur-680021
3	Arif Kayyalakkath, UPC World, 15/182, C, D, E, F Sivapuram, Kannur
4	Mango Agro Products, 16/256, Ponganamkadu, Therambam Road P.O, Kurichikkara, Thrissur, Kerala-680028
5	Chilton Refrigeration Industries, 62/3820/21/22/23, Chilton Refrigeratin Industries, C L Anand Lane MG Road, Ernakulam, Cochin, Kerala- 682011
6	Launmark India Pvt Ltd, 8/12-B, Ulavaipu P.O Poochakkal, Cherthala, Alappuzha 688526
7	SCSOFT Technologies Pvt Ltd, Ground Floor, Leela Infopark

	Building, Technopark, Kariyavattom, Trivandrum-695581
8	Gulliver Productions, TPXI/556, PanambraThenhipalam, Malappuram, Kerala- 673 636
9	Asianet digital Network Pvt Ltd, 2A, Second floor, Carnival Techno Park, (Leela Infopark), Kazhakuttom, Karyavattom P.O, Trivandrum -695 581
10	Ceetron Technologies, 15/283, Vrindavan Building, UP Hill, PostujtQ6, Middle Hill, Malappuram, Middle Hill, Malappuram, Kerala - 676505
11	Care Centre Private Limited, 13/1036, MR Light Tower, Near Railway overbridge, Pattammed, Palakkad, Kerala - 679303
12	Campu World, CDE, 20/786, Mekkamannil Tower, Ring road, Manjeri Kerala- 676121
13	KIXcLOUS it Pvt Ltd. Door No. XXIV 103, CN-10, Church Nagar, Angamaly P.O Ernakulam, Kerala-683572

Collection Centres

Clean Kerala Company is the only collection agency approved by the State. But the entire waste cannot be collected by this one facility and there are 33 number of collection centers and some of these are having consent/authorization of the Board and having agreement with Producers/PROs/Clean Kerala Company. Some of these are collecting waste without having agreement with PROs. Verification on such collection centers is progressing. The list of collection centers is furnished below.

Table 25 List of Collection centre for E-Waste

SI. No.	Name of the unit
1	Al Ameen Industries IDA, Vazhakkulam South, Vazhakkulam P.O., Ernakulam - 683105
2	Al-Jazeera Furniture & scrap Dealer, TC-20/1434, Pallivilakam, Kunjalimoodu, Karamana P.O., Thiruvananthapuram- 695 012
3	Aspire Greens Kandanthara, Allapra P.O, Perumbavoor, Ernakulam - 683553
4	Bismillah enterprises, Ponjassery P.O, Perumbavoor, Ernakulam - 683547
5	Bright Care, 1st Floor, Fashion Tower, Kannur
7	Clean Kerala Company, TC-29/1732, State Municipal House, Vazhuthacaud, Thiruvananthapuram
7	Eco Friendly Solutions, 2/680/E, Kadaplackal Building, Vadakkekara, Erattupeta, Kottayam, Ph: 9447778525
8	Earth Sense Recyclers Private Limited, 8/194, K. Pudur, Kanjikode, Palakkad - 678621
9	E-Planet, NorthKottenchery, Kanhangad, Kasaragod -671 315
10	Golden Key Trading, Vattiyode, Kudappanakunnu, Trivandrum- 05
11	Green Worms Eco Solutions LLP, Ernakulam
12	Hassan Traders, Mudickal Po, Nedumthodu, Ernakulam
13	Karo Sambhav Collection centre address in Calicut - 12/36 (New) 34/179M, Soorya Gayathri, Thadambattu, Thazham, Kozhikode- 673 010
14	Karo Sambhav Collection centre address in Thiruvananthapuram- New TC No. 79/2152, Old TC 42/921, located Near Muttathara Co-operative Bank, Muttathara, Vallakadavu, Thiruvananthapuram - 695 008
15	Kasargod Power House, Kasargod
16	Kerala Enviro Infrastructure Ltd TSDF Project, FACT (CD) campus, Ambalamedu, Kochi - 682303
17	Malabar Communication, KMCV.1-878, 879, Golden Arcade Building, New Bus Stand, Kasargod - 671121
18	Microage Networks & Solutions, Kochi
19	Microhard Systems 9365724
20	Plan at Earth, Building No. VII/91A, Near Vayalkara, Juma Masjid, Kunnukara, Ernakulam - 683 578
21	Progressiv-E recycling and Trading, Thrissur
22	S AND S POLYMERS, Mudickal P O, Perumbavoor, 683547
23	Sithara Traders, North Palakuzha, Karimpara P.O - 686662
24	Smartex, Golden Arcade Building, new Bus stand, Kasaragod - 671 121
25	Speed Digital System, Kasargod
26	SR Communication, HB Arcade, LIC Junction, Payyannur, Kannur
27	Suvarna traders (E-waste storage & Trading) Mavinchuvadu, A.M. Road, Mudical P.O, Perumbavoor
28	The Green, Mudickal Po, Nedumthodu, Ernakulam
29	UPC World, 15/182/ Sivapuram, Kannur
30	Venad Steel Corporation, TC-52/1888, Near Merry Land Studio, Vellayani Junction, Nemom, Thiruvananthapuram
31	Vrindavanam, Main Complex, Main Road, Kanhangad

Quantification of E-waste collected as per Annual report

The quantity of E-Waste collected in the State as per the previous Annual Reports is furnished below:

Table 26 Waste Quantity of E-Waste

Year	E	Waste quantity (Tonnes Per Annum)
2014-15		254.6
2016-17		308.96
2017-18		1029.5
2018-19		351.56
2019-20		1289
2020-21		1494

2. 7.5. Dismantling facility

- M/s KEIL is having valid consent/authorization of the for the dismantling of electronic and computer items, aluminum and copper wire after cable stripping depopulated PCBs and components, plastic and metal scraps, with a capacity of 4 TPD. They are disposing the e waste through registered recyclers. During the year 2020-21 KEIL collected 16.16 T of tube light/CFLs collected.
- Action is progressing to have one dismantling unit at Kuttipuram, Malappuram by Clean Kerala Company, Government undertaking. The selection of agents for the set up of dismantling facility is progressing.
- Consent to establish issued to Sahya Solutions Group of waste management to set up e waste dismantling of 10 Tonnes /day capacity at Idukki district.

2.7.6 Recycler

There are no recyclers of electronic waste in the State.

2.7.7. Future plans

Table 27 Future plan for E-Waste Management

SI. No.	Subject	Existing & Gap	Activities	Implementing agency	Funding agency	Timeline
1.	Inventory / Generation of E-Waste / Bulk-waste generators	Check whether SPCB/PCC has completed inventory of E-Waste in the District. Inventory of bulk waste generators	Completion of inventory	KSPCB LSGD District Administration DLMC members		
			i. Detailed inventory shall be prepared of all the types waste generators/bulk consumers/producers etc as per the e-waste rules 2016.			
			ii. KSPCB had entrusted the project for the inventorization of E-waste outsourced to NIIST, Pappanamcode, Thiruvananthapuram and the work initiated.			
			iii. Checking of informal trading dismantling and recycling. PCB in coordination with District Administration has to carry out quarterly drive for checking of this activity. The DLMC constituted as per OA 606/2018, has been entrusted to overlook the matter on E-waste Rule			
			iv. Facilitate collection and disposal of e-waste			
			v. Strengthen system of enforcement			
vi. Identify hot spots dumped with e waste and make them under formal sector						
2.	E-Waste collection points	Availability of E-Waste collection points / call centres / kiosks in villages - Blocks / /towns / cities	Identification / registering E- Waste /collection centres in association with Producers - their PROs or Recyclers	KSPCB LSGD Revenue Department		
			1. The LSGDs shall set up collection centres and join with authorized collection centres/recycler approved by SPCB for disposal of the e-wastes			
			2. LSGD shall ensure that the units obtain KSPCB authorization/consent before issuing license All			

			collection centers to follow guidelines			
			Eco park for collecting formal and informal collection in a single park			
			Buy back system with declared appreciable price for e-waste items to be introduced in national level			
			Steps to be taken through brand owners to operate more number of e-waste collection centers			
3.	Linkage among Stakeholders to channelize E-Waste	Check whether District administration has information on collection centres established by Producers / PROs? Administration should also identify authorised E-waste recyclers in the district or in State to channelize	<p>Action plan to establish linkages between ULBs / Collection Centres of Producers and PROs / SPCBs / Bulk waste generators / Recyclers / SPCBs / District Administration / Public</p> <p>i. Identification of authorized E-waste recyclers/Dismantlers in the state to channelize the E-waste collected in the District by executing MOU with recyclers/dismantler</p> <p>ii. To link Local bodies with e-waste dismantlers/recyclers for channelization of waste collected in District</p>	KSPCB LSGD District Administration		
			Enable citizens to deposit e-waste through toll free numbers in each district			
4.	Regulation of Illegal E- Waste recycling / dismantling	Prevalence of informal trading, dismantling, and recycling of E-waste is in District	<p>Action plan in coordination with SPCBs/PCCs and District Administration to check this activity.</p> <p>1. ULB's is required to hand over the e- waste collected in their jurisdiction to the KSPCB authorized e-waste recycler or dismantlers by executing an MOU with the recycler/ dismantlers in the nearby District.</p> <p>2. Inventorisation of trading activity/ recycling/dismantling in the district shall be carried out by ULB's</p>	KSPCB LSGD Police Industries Department District Administration		

			3.KSPCB in coordination with District Administration has to carry out quarterly drive for checking of this activity			
5.	Integration of informal sector	Whether mechanism exists for bringing informal sector into main stream in collection and recycling of E-Waste	Evolve mechanism by involving producers/PROs 1. Inventorization of informal sectors engaged in collection and recycling activity of e-waste in the district to bring these units under consented purview to ensure that the units being operated complying rules	LSGD KSPCB Industries Department		
6.	Awareness and Education	Are there any programs at district level for awareness about E- waste management?	Plan special workshops and awareness campaigns through Producers / PROs Conduct meetings/ awareness programs on the management of e-wastes	LSGD KSPCB Industries Department		
7.	Submission of annual report as per E-waste Management rules					

III. WATER QUALITY MANAGEMENT PLAN

3.1 Status of Water quality in 2020

There are 44 major rivers in the State of which 41 are west flowing and 3 east flowing. Apart from this the State is endowed with a large number of lakes and backwaters which crisscross the State making it water rich. Also the State has 590 km long coastal line.

Kerala state Pollution Control Board organises water quality monitoring across the State under different programmes. The National Water Quality Monitoring Programmes (NWMP) which covers almost all the medium and minor rivers flowing through the state, lakes, major canals, reservoirs and ground water. In addition to this, state level monitoring of water bodies under State Water Quality Monitoring Programme (SWMP), Ambient water quality monitoring of well water of public institutions, tap water and pond as well as monitoring of rural water supply schemes functioning in Panchayath level are also performing on a monthly basis. With all these monitoring network across the state, Kerala State Pollution Control Board becomes one among the major organisations in the Government which conducts water quality monitoring effectively. The whole work covers monitoring of all rivers major to minor ones, rivulets, lakes, canals, ponds and selected ground water locations on a monthly frequency throughout the year.

Under the NWMP at present a total of 128 monitoring stations which include 65 stations in 42 Rivers, seven in Rivulets/Tributaries, 6 in Reservoirs, 3 in Fresh water lakes, 8 in Estuarine lakes, 3 canals, two ponds, 34 ground water locations and 2 NRCP samples in Pamba river are monitoring. Under the State Water Quality Monitoring Programme, 130 stations in rivers and lakes are monitoring. The frequency of the monitoring schedule is monthly.

Based on the Physico-chemical data generated in the year 2020 classification of surface waters has been done as per the primary water quality criteria prescribed by the CPCB for Designated Best Use (DBU). During the year 2020 monthly monitoring and analysis of the water quality characteristics were performed, and use based classification of the river stretches into A, B, C D, E or below E were done. Among the water bodies monitored Pookode Lake in Wayanad is the only one satisfying the class "A' criteria.

As per the analytical data it is inferred that the major problem associated with pollution of surface water bodies is organic and bacteriological. It is a striking fact that almost all locations are reported to have coliform bacteria-both total coli forms and faecal coliforms. Thus the presence of coli form bacteria turns a major determining factor while classifying the riverine stretches on DBU basis. On classification of the sampling stretches as per the water quality criteria of CPCB (Table 28), it is observed that 46.4% of sampling stations are classified as “B”, 35.3% as “C”, 14.3% as class “BelowE”, 1.8% as class “A”, 0.9% as class “D” and 1.3 % as class “E”. The total percentage of water bodies among the monitoring locations from Class A to Class C amounts to 83% (from class “A” to Class “C”) (Tables 29, 30). The river stretches which fall below “C” class are either due salinity intrusion or increased BOD or low Dissolved oxygen content or very high Coliform counts. The quality of well is given in Table 31.

Table 28 Use based classification of surface waters

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	1. Total Coliforms Organism MPN/100ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organised)	B	1. Total Coliforms Organism MPN/100ml shall be 500 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/100ml shall be 5000 or less 2. pH between 6 to 9 3. Dissolved Oxygen 4mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	1. pH between 6.5 to 8.5 2. Dissolved Oxygen 4mg/l or more 3. Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	1. pH between 6.0 to 8.5 2. Electrical Conductivity at 25oC micro mhos/cm Max.2250 3. Sodium absorption Ratio Max. 26 4. Boron Max. 2mg/l

Table 29 District-wise Sampling Locations under NWMP/SWMP

Sl.No.	Name of District	Monitoring Water Bodies	Name of Project	No. of Locations	Frequency of Monitoring
1	Thiruvananthapuram	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	12	Monthly
			SWMP	9	Monthly
2	Kollam	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	15	Monthly
			SWMP	20	Monthly
3	Pathanamthitta	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP/ NRCP	5	Monthly
			SWMP	10	Monthly
4	Alappuzha	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	7	Monthly
			SWMP	8	Monthly
5	Kottayam	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	7	Monthly
			SWMP	16	Monthly
6	Idukki	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	0	Monthly
			SWMP	10	Monthly
7	Ernakulam	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	24	Monthly
			SWMP	0	Monthly
8	Thrissur	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	6	Monthly
			SWMP	11	Monthly
9	Palakkad	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	7	Monthly
			SWMP	10	Monthly
10	Malappuram	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	5	Monthly
			SWMP	10	Monthly
11	Kozhikode	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	12	Monthly
			SWMP	7	Monthly
12	Wayanad	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	4	Monthly
			SWMP	11	Monthly
13	Kannur	Rivers/Rivulets or Tributaries/ Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	NWMP	17	Monthly
			SWMP	3	Monthly
14	Kasaragod	Rivers/Rivulets or Tributaries/	NWMP	9	Monthly

		Fresh water lakes/Estuarine lakes/Reservoirs/Canals/Ponds/ Ground water	SWMP	5	Monthly
TOTAL NWMP STATIONS				130	
TOTAL SWMP STATIONS				130	

Table 30 Status of Surface Water Quality based on annual average in 2020 under NWMP and SWMP programmes

Sl. No.	Name of Water Body	Name of District	Monitoring Station	Project Name	PARAMETERS (Annual Average)						Class Assigned
					pH	EC	DO	BOD	TC	FC	
1	Neyyar	Thiruvananthapuram	Amaravila	NWMP	6.7	75	6.4	1.2	505	125	C
			Thiruvananthapuram	Aruvippuram	NWMP	6.7	78	6.2	1.1	427	133
2	Mamom	Thiruvananthapuram	Mamom Bridge	NWMP	6.7	104	6.6	1.4	632	212	C
3	Ayroor	Thiruvananthapuram	Ayroor Bridge	NWMP	6.7	96	6.3	1.5	532	168	C
4	Karamana	Thiruvananthapuram	Peppara	SWMP	6.8	56	6.6	1.0	250	100	B
			Thiruvananthapuram	Aruvikkara	NWMP	6.9	63	6.4	1.1	458	108
		Thiruvananthapuram	Mangattukadavu	SWMP	6.7	82	4.7	2.5	1225	583	C
		Thiruvananthapuram	Pallathukadavu	SWMP	6.8	108	2.8	5.2	1442	517	Below E
		Thiruvananthapuram	Thiruvallom	SWMP	7.0	312	2.6	8.2	4117	900	Below E
		Thiruvananthapuram	Moonnattumukku	NWMP	6.6	370	1.1	8.1	13333	4650	Below E
5	Ithikkara	Kollam	Kottuvamukku	SWMP	7.3	198	6.4	1.7	332	106	B
			Kollam	Ayoor	NWMP	7.5	158	7.0	1.6	245	87
		Kollam	Vellinalloor	SWMP	7.4	212	6.3	1.6	306	102	B
		Kollam	Ithikkara	NWMP	7.6	9837	6.6	1.7	294	118	E
		Kollam	Uppukadavu	SWMP	7.3	271	6.5	1.8	245	116	B
6	Vamanapuram	Thiruvananthapuram	Vamanapuram	NWMP	6.8	80	6.5	1.7	417	108	B
7	Pallickal	Pathanamthitta	Nellimugal	NWMP	7.5	178	6.6	1.9	304	109	B
			Kollam	Adoor	SWMP	7.3	156	6.5	1.7	253	94
		Kollam	Thodiyoor	SWMP	7.4	171	6.0	2.0	254	100	B
8	Achenkivil	Kollam	Aruvappulam	SWMP	7.3	143	6.3	1.9	315	88	B
			Kollam	Konni	SWMP	7.3	132	6.6	1.8	301	95
		Kollam	Kumbazha	SWMP	7.4	139	6.5	1.8	338	139	B
		Pathanamthitta	Kallarakadavu	NWMP	7.5	164	6.9	1.9	298	113	B
		Pathanamthitta	Thumpamon	NWMP	7.6	145	6.7	1.9	376	134	B
		Pathanamthitta	Pandalam	NWMP	7.5	160	6.9	2.1	447	125	B
		Kollam	Pallippadu	SWMP	7.4	141	6.5	1.7	333	131	B
		Alappuzha	Chennithala	NWMP	7.4	163	6.5	1.9	298	117	B
9	Kallada	Kollam	Urukunnu	SWMP	7.4	128	6.3	1.6	313	103	B
			Kollam	Punallur	SWMP	7.3	127	6.3	1.6	370	111
		Kollam	Perumthottamkadavu	NWMP	7.5	157	7.0	1.6	262	104	B
		Kollam	Pathanapuram	SWMP	7.4	119	6.2	1.8	346	133	B
		Kollam	Enathu	SWMP	7.3	118	6.4	1.6	289	98	B
		Kollam	Kannamkottukadavu	SWMP	7.2	177	6.3	1.9	329	118	B
10	Pamba	Pathanamthitta	Kochupampa	SWMP	7.2	38	7.3	0.5	1361	587	C
			Pathanamthitta	Kakkiyar	SWMP	6.8	117	6.8	0.8	1915	848
		Pathanamthitta	Triveni Upstream	SWMP	7.3	54	7.5	0.6	1230	658	C
		Pathanamthitta	Njunagar	SWMP	6.7	239	6.5	1.2	8418	3963	D

		Alappuzha	Parumala (Pamba Down)	NWMP	6.5	58	9.3	1.5	393	160	B
		Pathanamthitta	Vadasserikkara	SWMP	7.0	55	6.9	0.7	508	234	C
		Pathanamthitta	Athikkayam	SWMP	7.0	116	6.9	0.7	533	231	C
		Pathanamthitta	Ranni	SWMP	6.9	53	7.0	0.7	608	308	C
		Pathanamthitta	Kozhancheri	SWMP	7.0	45	6.9	0.7	510	231	C
		Alappuzha	Chengannur	NWMP	6.8	50	7.0	0.5	480	148	B
		Pathanamthitta	Edatua	SWMP	6.8	56	5.7	1.0	716	403	C
		Alappuzha	Thakazhi	NWMP	6.5	74	5.4	1.2	305	104	B
		Pathanamthitta	Pulinkunnu	SWMP	6.9	98	6.5	0.6	649	357	C
11	Meenachil	Kottayam	Theekoy	SWMP	7.2	47	7.5	0.4	1619	821	C
		Kottayam	Bharanganam	SWMP	7.3	51	7.4	0.4	1850	1033	C
		Kottayam	Kadappattoor	SWMP	7.4	56	7.5	0.5	2179	1146	C
		Kottayam	At Kidangoor	NWMP	7.4	59	7.2	0.5	1799	950	C
		Kottayam	Punnathara	SWMP	7.3	59	7.1	0.5	1854	954	C
		Kottayam	Thazhathangadi	SWMP	7.5	519	6.2	0.4	2804	1404	C
		Kottayam	Kumarakam	SWMP	7.4	1400	3.9	0.5	2996	1433	C
12	Manimala	Pathanamthitta	Kalloopara	NWMP	6.9	204	7.2	2.3	607	316	C
		Pathanamthitta	Thondra	NWMP	6.9	205	7.0	1.9	788	435	C
		Alappuzha	Yendhayar	SWMP	7.0	34	6.6	1.5	433	258	B
		Alappuzha	Kottikkal	SWMP	7.0	35	7.2	1.5	817	425	C
		Alappuzha	Erumeli	SWMP	7.0	50	7.1	2.5	1300	692	C
		Alappuzha	Pazhazhyidam	SWMP	6.9	49	6.7	1.7	825	442	C
		Alappuzha	Valakkayam	SWMP	7.0	50	7.0	2.4	1175	650	C
		Alappuzha	Manimala	SWMP	7.0	54	7.5	2.3	1092	592	C
		Alappuzha	Mallappally	SWMP	7.0	49	7.3	2.1	708	367	C
		Alappuzha	Thottabagam	SWMP	6.9	53	6.7	2.0	1500	583	C
13	Periyar	Ernakulam	Kalady	NWMP	6.8	39	7.8	0.9	2814	1057	C
		Ernakulam	KWA Aluva	NWMP	6.8	43	7.8	1.2	887	321	C
		Ernakulam	SDP Aluva	NWMP	6.6	49	7.7	1.3	7975	4668	E
		Ernakulam	Muppathadam	NWMP	6.8	61	7.3	1.1	1793	726	C
		Ernakulam	Eloor	NWMP	7.3	9836	5.9	1.8	4053	1626	Below E
		Ernakulam	Pathalam	NWMP	6.9	9465	7.5	0.9	9743	7217	Below E
		Ernakulam	Purappillikadavu	NWMP	7.1	2773	7.4	1.4	1403	478	Below E
		Ernakulam	Kalamassery	NWMP	6.7	70	6.5	1.1	2858	1422	C
14	Muvattupuzha	Kottayam	Malankara Dam	SWMP	7.2	49	7.5	0.3	1333	671	C
		Kottayam	Muvattupuzha	SWMP	7.3	55	7.6	0.4	2329	1238	C
		Kottayam	Peruvammoozhy	SWMP	7.4	55	7.5	0.3	1704	942	C
		Kottayam	Ramamangalam	SWMP	7.5	57	7.1	0.5	1813	925	C
		Kottayam	Piravom	SWMP	7.4	57	7.2	0.4	1888	933	C
		Kottayam	Vettikkattumukku	NWMP	7.5	58	7.2	0.6	2395	1265	C
		Kottayam	Murinjapuzha	SWMP	7.5	4215	6.6	0.5	3113	1404	Below E
15	Chalakudy	Thrissur	Peringal Bridge	SWMP	6.7	46	8.3	1.6	373	155	B
		Thrissur	Vetilappara	SWMP	6.6	47	8.5	1.4	445	200	B
		Thrissur	Kanjirapilly	SWMP	6.5	49	8.3	1.7	282	130	B
		Thrissur	Chalakkudy Bridge	SWMP	6.6	53	8.3	1.9	309	140	B
		Thrissur	Pulikkakadavu	SWMP	6.5	95	8.3	1.6	436	174	B
		Thrissur	Pulickakadavu	NWMP	6.7	88	7.7	0.8	1165	555	C
		Thrissur	Palapuzhakadavu	SWMP	6.5	99	7.8	1.6	491	209	B
16	Karuvannur	Thrissur	Kainoor	SWMP	6.5	119	7.6	1.4	555	236	C
		Thrissur	Mupliyam Bridge	SWMP	6.4	63	7.8	1.5	445	209	B

		Thrissur	Palakkadavu	SWMP	6.5	80	6.8	1.7	473	214	B	
		Thrissur	Karuvannur at Karuvannur Bridge	NWMP	6.5	79	6.7	1.5	618	227	C	
		Thrissur	Kottenkode	SWMP	6.2	100	6.2	1.7	536	250	C	
		Thrissur	Karanchira	SWMP	6.4	176	6.9	1.9	455	173	B	
17	Puzhakkal	Thrissur	Puzhakkal at Puzhakkal Bridge	NWMP	6.4	127	5.9	1.5	323	125	B	
18	Keecheri	Thrissur	Keechery at Vadakkancherry	NWMP	6.6	124	6.7	1.7	464	174	B	
19	Bharathapuzha	Palakkad	Naragampilly	SWMP	7.6	807	6.2	1.9	388	204	B	
		Palakkad	Arangottukulumb	SWMP	7.7	844	6.2	2.0	259	71	B	
		Palakkad	Parali	SWMP	7.5	302	6.5	1.7	373	148	B	
		Palakkad	Tripalur	SWMP	7.4	312	6.6	1.5	506	240	C	
		Palakkad	Mangalam	SWMP	7.4	124	6.5	1.8	423	186	B	
		Palakkad	Lakkidi	SWMP	7.5	331	6.6	1.7	323	108	B	
		Palakkad	Shornur	SWMP	7.4	251	6.6	1.5	447	202	B	
		Palakkad	Bharathapuzha at Pattambi	NWMP	7.4	246	6.9	1.5	687	274	C	
		Palakkad	Thootha	SWMP	7.5	92	7.0	1.2	497	270	B	
		Malappuram	Bharathapuzha at Kuttipuram	NWMP	7.6	163	7.1	1.3	962	567	C	
		Malappuram	Thavannoor	SWMP	7.5	254	6.5	2.1	79	49	B	
		Malappuram	Nariparamba	SWMP	7.5	233	6.7	2.4	84	42	B	
20	Kadalundi	Malappuram	Oravamburum	SWMP	7.1	63	7.4	2.0	119	58	B	
		Malappuram	Anakkayam	SWMP	7.0	72	6.7	1.5	92	55	B	
		Malappuram	Hajiyarappilly	NWMP	7.0	109	7.1	2.0	90	43	B	
		Malappuram	Manikuth	SWMP	7.0	81	7.1	1.9	88	48	B	
		Malappuram	Kooriyadu	SWMP	7.0	114	7.3	1.9	95	51	B	
		Malappuram	Thiroorangady	NWMP	7.0	111	6.9	2.5	79	38	B	
21	Tirur	Malappuram	Kooloopalam	SWMP	6.7	2619	4.6	1.3	97	54	Below E	
		Malappuram	Ezhur	SWMP	7.2	2293	5.0	1.7	78	42	Below E	
		Malappuram	Thazhepalam	SWMP	6.3	7554	5.2	1.7	103	52	Below E	
		Malappuram	Tirur at Thalakkadathur	NWMP	6.1	7004	4.5	1.4	98	44	Below E	
		Malappuram	Mangattiri	SWMP	6.2	9591	5.1	1.5	95	52	Below E	
22	Chaliyar	Malappuram	At Nilambur	NWMP	7.3	70	7.8	0.5	3426	2447	C	
		Kozhikode	Kuruvanpuzha	SWMP	6.7	33	8.0	0.4	3396	2386	C	
		Kozhikode	Vadapuram	SWMP	6.8	62	7.7	0.9	4447	2982	C	
		Kozhikode	Mundayamthodu	SWMP	6.6	44	7.3	0.6	3694	2282	C	
		Kozhikode	Areacode	SWMP	7.1	74	7.8	0.6	3031	2095	C	
		Kozhikode	At Koolimadu	NWMP	6.9	64	7.6	0.4	2899	1987	C	
		Kozhikode	At Chungappilly	NWMP	7.1	6432	7.7	0.4	2842	2182	Below E	
		Kozhikode	Feroke	SWMP	7.2	12527	7.4	0.6	2665	2053	Below E	
23	Kabani	Wayanad	At Muthankara	NWMP	7.1	84	6.4	0.6	91	30	B	
		Wayanad	U/S of Panamaram	SWMP	7.0	83	6.3	0.7	102	28	B	
		Wayanad	D/S of Panamaram	SWMP	7.0	95	6.4	0.8	92	25	B	
		Wayanad	DTPC	SWMP	7.0	90	6.7	0.8	80	25	B	
		Wayanad	Forest Kadavu	SWMP	SAMPLING WAS NOT CONDUCTED AT FOREST KADAVU-K86							
		Wayanad	Thonnikkadavu	SWMP	7.0	97	7.1	1.0	82	27	B	
		Wayanad	U/S of Mananthavadi	SWMP	6.9	100	6.2	0.6	69	21	B	
		Wayanad	D/S of Mananthavadi	SWMP	6.9	60	6.7	0.8	86	24	B	
24	Bhavani	Palakkad	Thavalam	SWMP	7.7	76	7.1	0.9	356	194	B	
		Palakkad	Kottathara	SWMP	7.7	153	7.2	1.0	240	95	B	

		Palakkad	Bhavani at Elachivazhi	NWMP	7.6	174	7.3	1.0	462	273	B
25	Kuttiyadi	Kozhikode	At Kuttiyadi Estate	NWMP	7.0	30	13.9	0.5	1426	739	C
26	Mahe	Kozhikode	At Valayam	NWMP	6.9	47	7.5	3.0	4418	2867	C
27	Kallai	Kozhikode	At Kallai Bridge	NWMP	7.2	21536	3.8	1.4	19725	14263	Below E
28	Korapuzha	Kozhikode	At Kanayankode	NWMP	7.2	16114	6.5	0.5	2014	1523	Below E
		Kozhikode	Purakkattiri	SWMP	7.2	15380	6.4	0.5	3193	2290	Below E
		Kozhikode	Anapparakkadavu/Vengalam	SWMP	7.5	23541	7.0	1.0	5000	3754	Below E
29	Kuppam	Kannur	At Rayoram	NWMP	7.1	59	7.3	1.0	247	72	B
		Kannur	At Thaliparamba	NWMP	7.1	14398	6.6	0.9	343	85.58	Below E
30	Thalassery	Kannur	At Pathipalam	NWMP	6.7	69	6.6	0.7	285	64	B
31	Ancharakkandy	Kannur	At Meruvamba	NWMP	6.9	63	6.7	0.8	276	80	B
		Kannur	At Ancharakkandy	NWMP	7.0	69	7.1	0.8	298	68	B
32	Ramapuram	Kannur	At Ramapuram Bridge	NWMP	6.9	12802	5.1	1.0	332	84	Below E
33	Kavai	Kannur	At Kuttiyolpalam	NWMP	6.7	62	6.4	1.0	353	98	B
34	Valapattanam	Kannur	Pazhassi Reservoir	NWMP	7.1	55	7.3	0.8	273	65	B
		Kannur	Irikkoor	SWMP	7.1	72	7.2	0.7	243	51	B
		Kannur	Chengalayi	SWMP	7.1	6803	7.0	0.9	260	67	Below E
		Kannur	At Parassinikadavu	NWMP	7.3	19456	7.0	1.3	320	81	Below E
		Kannur	Valapattanam	SWMP	7.2	26127	6.5	1.3	319	77	Below E
35	Neeleswaram	Kasaragod	At Nambiarckal	NWMP	6.9	819	6.9	1.9	285	71	B
		Kasaragod	At Hosdurg	NWMP	7.0	18251	6.9	2.1	359	97	Below E
36	Kariangode	Kasaragod	At Kakkadavu	NWMP	7.0	84	7.9	1.2	169	43	B
37	Chandragiri	Kasaragod	At Padiyathadka	NWMP	7.2	69	7.6	1.1	305	66	B
38	Mogral	Kasaragod	At Mogral Bridge	NWMP	6.9	24390	5.9	1.6	276	77	E
39	Shiriyia	Kasaragod	Yethadka	SWMP	7.0	80	8.3	1.2	126	27	B
		Kasaragod	Bakkilapadavu	SWMP	7.1	78	8.6	1.9	119	27	B
		Kasaragod	Swargathodu	SWMP	6.7	60	7.9	0.7	130	30	B
		Kasaragod	Vani Nagar	SWMP	6.7	66	8.3	0.9	141	36	B
		Kasaragod	Sulliapadavu	SWMP	6.7	85	7.8	1.0	101	25	B
		Kasaragod	At Angadimogaru	NWMP	7.0	71	7.7	1.8	280	60	E
40	Uppala	Kasaragod	At Uppala Bridge	NWMP	7.2	22134	7.2	2.0	246	73	Below E
41	Manjeswaram	Kasaragod	At Bajarkkara Bridge	NWMP	7.0	104	7.6	1.3	211	53	B
42	Peruvamba	Kannur	At Chandappura	NWMP	6.9	63	6.7	1.0	305	78	B
43	Thodupuzha	Idukki	Near Malankara Dam	SWMP	6.7	60	7.2	1.6	3291	1664	C
		Idukki	Near Mooppilakkadavu Bridge	SWMP	6.7	59	7.3	1.7	4118	2173	C
		Idukki	Near Pappootty Bar & Restaurant	SWMP	6.8	55	6.8	1.7	3627	2082	C
		Idukki	Near Vengalloor Bridge	SWMP	6.7	58	7.3	1.6	3773	1918	C
		Idukki	Thoockupalam Near Chittoor	SWMP	6.7	57	7.1	1.5	3782	1627	C
44	Munnar	Idukki	Pambar	SWMP	7.0	65	7.2	1.8	3864	2018	C
		Idukki	Nallathanni	SWMP	7.1	52	6.9	1.8	4218	2518	C
		Idukki	Kundala	SWMP	7.0	64	7.1	1.7	4264	2355	C
		Idukki	Muthirapuzha	SWMP	7.0	62	7.1	1.8	3782	1909	C
		Idukki	Near KSEB Dam	SWMP	7.0	63	6.8	1.7	3782	2164	C
RIVULETS/TRIBUTARIES											
1	Kadambrayar	Ernakulam	Manakkakadavu	NWMP	6.6	110	3.5	2.3	2782	1621	C
		Ernakulam	Brahmapuram	NWMP	6.6	619	3.1	2.5	2991	1624	C

2	Chithrapuzha	Ernakulam	Irumpanam	NWMP	6.5	784	3.3	2.4	4091	2225	C
3	Korayar	Palakkad	Korayar at Kanjikode	NWMP	7.3	779	6.2	1.9	559	267	C
4	Pullur	Kasaragod	At Pullur Bridge	NWMP	6.8	66	7.2	1.4	234	57	B
5	Kalpathypuzha	Palakkad	Kalpathipuzha at Kalpathi	NWMP	7.3	380	6.3	2.0	885	438	C
6	Maniyankodepuzha	Wayanad	Maniyankode Bridge	NWMP	6.9	104	6.2	0.7	85	26	B

FRESH WATER LAKE STATIONS

1	Vellayani Lake	Thiruvananthapuram	Vandithadam	NWMP	6.7	122	5.6	3.4	685	217	C
		Thiruvananthapuram	Kakkamoola Left	SWMP	6.8	104	6.1	2.6	817	283	C
		Thiruvananthapuram	Kakkamoola Right	SWMP	6.9	94	6.0	2.2	692	217	C
		Thiruvananthapuram	Vavamoola Left	SWMP	6.9	100	6.5	3.5	1117	542	C
		Thiruvananthapuram	Vavamoola Right	SWMP	6.7	104	6.5	3.2	992	433	C
		Thiruvananthapuram	Agriculture College	SWMP	6.8	94	6.3	1.8	517	167	C
2	Sasthamkotta Lake	Kollam	Sasthamkotta Lake	NWMP	7.3	154	7.1	1.5	229	85	B
		Kollam	Ambalakkadavu	SWMP	7.3	129	6.9	1.4	227	72	B
		Kollam	KWA Pump House	SWMP	7.3	125	6.9	1.4	233	72	B
		Kollam	Kottakkuzhi	SWMP	7.3	132	6.8	1.3	218	80	B
		Kollam	Villanthra	SWMP	7.3	134	6.8	1.4	197	63	B
		Kollam	Pottakkannamukku	SWMP	7.3	132	6.8	1.5	201	88	B
		Kollam	Vattolikkadavu	SWMP	7.3	125	6.8	1.3	210	68	B
3	Pookode Lake	Wayanad	Boat Jetty	SWMP	7.3	29	6.9	0.9	76	20	B
		Wayanad	Deepest Point	SWMP	7.5	26	7.0	0.7	49	12	A
		Wayanad	Silt Depositing Zone	SWMP	7.4	26	7.3	1.0	43	14	A
		Wayanad	Pookode Lake	NWMP	7.1	27	7.1	1.1	48	31	A
		Wayanad	Second Deepest Point	SWMP	7.2	26	7.0	0.7	41	12	A

ESTUARINE LAKE STATIONS

1	Akkulam	Thiruvananthapuram	Oruvathilkotta	NWMP	6.8	338	1.8	6.9	1964	636	C
2	Ashtamudi Lake	Kollam	Astamudi Lake	NWMP	7.5	18649	4.4	3.4	365	136	Below E
3	Paravur Lake	Kollam	Paravur Lake	NWMP	7.3	13817	6.6	1.8	370	113	Below E
4	Punnamada Lake	Alappuzha	Punnamada lake	NWMP	7.4	878	6.1	2.6	1138	629	C
5	Vembanadu Lake	Alappuzha	Pathiramanal	NWMP	7.1	1391	6.5	2.3	314	140	B
		Ernakulam	Oil Tanker Jetty	NWMP	7.2	25209	5.2	2.0	11618	7389	Below E
6	Kodungallur Lake	Ernakulam	Kodungallur Lake	NWMP	7.2	14932	7.2	1.8	1389	553	Below E
7	Kayamkulam Lake	Alappuzha	Kayamkulam lake	NWMP	7.6	5433	4.3	4.2	977	497	Below E

RESERVOIRS, PONDS & CANAL STATIONS

1	Pazhassi RSVR	Kannur	Pazhassi Reservoir	NWMP	7.1	55	7.3	0.8	273	65	B
2	Edamalayar RSVR	Ernakulam	Edamalayar Reservoir	NWMP	7.0	22	8.0	0.8	72	27	B
3	Bhoothathankettu RSVR	Ernakulam	Bhoothathankettu Reservoir	NWMP	6.8	31	8.1	0.8	2322	727	C
4	Malampuzha RSVR	Palakkad	Reservoir at Malampuzha	NWMP	7.4	107	7.4	0.9	349	132	B
5	Periyar(Thekkady Lake)	Kottayam	Canal Shutter	SWMP	7.4	47	7.1	0.6	496	204	B
		Kottayam	Boat Landing	SWMP	7.6	45	7.3	0.5	338	200	B
		Idukki	Thekkady Lake	NWMP	7.5	44	7.5	0.4	194	121	B
		Kottayam	Padikkayam	SWMP	7.6	46	7.6	0.4	142	67	B
		Kottayam	Thannikudy	SWMP	7.5	48	7.4	0.4	179	92	B
6	Karapuzha RSVR	Wayanad	Karapuzha Dam at Wayanad	NWMP	6.9	111	6.7	1.0	67	23	B

7	Mananchira Pond	Malappuram	At Kozhikode	NWMP	7.5	62	7.6	0.6	334	194	B
8	Padmatheertham Pond	Thiruvananthapuram	Padmatheertham	NWMP	7.6	310	3.7	12	2292	773	C
9	Canoli Canal	Kozhikode	At Eranjikkal	NWMP	7.1	20035	4.8	1.0	3580	2613	Below E
10	Palakkattuthazhamthodu	Ernakulam	Palakkattuthazhamthodu at Perumbavoor	NWMP	6.6	115	5.2	2.0	12325	8158	D
11	Unthithode Canal	Ernakulam	Unthithode canal at Eloor	NWMP	6.8	8086	2.9	2.8	18875	12868	E

Table 31 Status of Ground Water Quality based on annual average in 2020 under NWMP programme

Sl. No.	Name of District	Monitoring Station	Project Name	PARAMETERS (Annual Average)				
				pH	EC	BOD	TC	FC
1	Thiruvananthapuram	Well at Pappanamcode	NWMP	6	179	2.3	310	100
		Well at Nedumangadu	NWMP	6.5	162	4.9	650	200
2	Kollam	Well at Punalur	NWMP	6.6	157	1.1	96	20
		Well at Kundara	NWMP	6.8	169	1.3	93	26
		Well at Chavara	NWMP	7.4	243	1.4	105	49
		Well at Kureepuzha	NWMP	7.1	186	1.4	115	55
3	Alappuzha	Well at Sarvodayapuram	NWMP	7.3	352	1.5	0	0
		Well at Cherthala	NWMP	7.1	355	2.0	0	0
4	Kottayam	Well at Fathimapuram	NWMP	7.6	209	0.5	645	300
		Well at Karoor	NWMP	6.8	72	0.8	550	300
		Well at Vaikom	NWMP	7.6	252	0.5	200	75
		Well at Karoor	NWMP	6.8	144	0.8	2675	1375
5	Ernakulam	Well at Vyttila	NWMP	7.4	375	1.7	1995	485
		Well at Edayar	NWMP	6.1	295	2.1	6650	3400
		Well at Kalamassery	NWMP	6.2	270	2.4	152	57
		Well at Eloor	NWMP	5.7	154	1.8	2150	565
		Well at Brahmapuram	NWMP	6.4	188	0.8	1120	215
		Ambalamughal Borewell	NWMP	5.3	85	0.4	20	12
6	Thrissur	Well at Laloor	NWMP	6.2	298	0.7	0	0
		Well at Ollur	NWMP	6.6	146	1.0	0	0
		Well at Punkunnam	NWMP	6.1	236	0.65	580	100
7	Palakkad	Well at Karukamani	NWMP	7.4	881	1.5	100	0
8	Malappuram	Well at Malappuram	NWMP	6.8	366	3.1	125	78
		Well at Manjeri	NWMP	6.2	237	1.0	64	28
9	Kozhikode	Well at Chungappilly	NWMP	6.4	94	0.4	74	48

		Well at Mavoor	NWMP	6.7	83	0.4	315	220
		Well at Velliparamba	NWMP	6.3	96	1.2	2135	1805
10	Kannur	Well at Kannur	NWMP	5.3	111	0.8	165	36
		Well at PavvannurJanatha Mill	NWMP	7.2	225	1.5	190	52
		Well at Punnolpettipalam	NWMP	6.6	294	1.8	155	28
		Well at Chelora Trenching Ground	NWMP	5.7	73	1.7	220	52
		Well at Parassinikadavu Temple	NWMP	7.5	7551	0.8	110	25
		Well at Payyannur (Murukoil)	NWMP	6.7	118	1.1	125	30
		Well at Karimbam	NWMP	5.2	152	0.9	210	60

IV. LIQUID WASTE MANAGEMENT

4.1 Status of Non industrial/Industrial units having Board's consent

4.1 .1 Non industrial units (Sewage and sullage generating units)

A total of 68.175 MLD of sewage and sullage is generated from 1000 units mainly of high rised buildings under large and medium scale. 56.4 MLD is disposed into soak

pit after treatment. Table 32 shows the number of consented units in each urban local body. District wise details of the units are given in Table 33.

Table 32 Sewage and sullage discharge and mode of disposal for the Consenteds units*

No.	District	Total number units	Total quantity of treated sewage and sullage	Quantity of effluent disposed to soak pit for percolation (MLD)	Quantity of treated effluent disposed to river, drains (MLD)	Quantity of water disposed to estuary/sea (MLD)	Quantity of water reused (MLD)	Capacity of STP units
1	Thiruvananthapuram	125	7.129	7.12				7.428
2	Kollam	43	2.8994	2.649			0.250592	3.4344
3	Alappuzha	11	0.50824	0.50824				0.847
4	Pathanamthitta	52	8.1186	8.1186				8.55211
5	Kottayam	93	5.290256	3.88	0.1		1.30788	4.956
6	Idukki	16	0.81837	0.818			1.27	0.716
7	Ernakulam	211	14.331	15.931				12.69
8	Thrissur	122	4.5685	4.303			0.2656	6.0547
9	Palakkad	40	2.114	1.084			1.0553	2.297
10	Malappuram	41	3.546	1.758			1.788	4.438
11	Kozhikode	157	11.55387	6.4303	0.95		4.1697	11.36381
12	Wayanad	35	2.31543	1.765			0.5504	1.4175
13	Kannur	38	4.21112	1.264			2.9464	4.7134
14	Kasargod	16	0.771	0.771				0.8602
	Total	1000	68.175	56.4	1.05	0	13.6	69.768

* Data collected for the preparation of Dossier

Table 33 Total consented units (large and medium scale) discharging treated effluent and treated sewage

No	District	Consented Treated effluent discharging units			Consented Treated sewage/sullage discharging units			Grand Total number of units
		Total	Urban	Panchayth	Total	Urban	Panchayath	
1	Thiruvananthapuram	21	TVPM city-11 Attingal-1	9	124	TVPM City-91 Nedumangad-1 Neyyattinkara	29	145

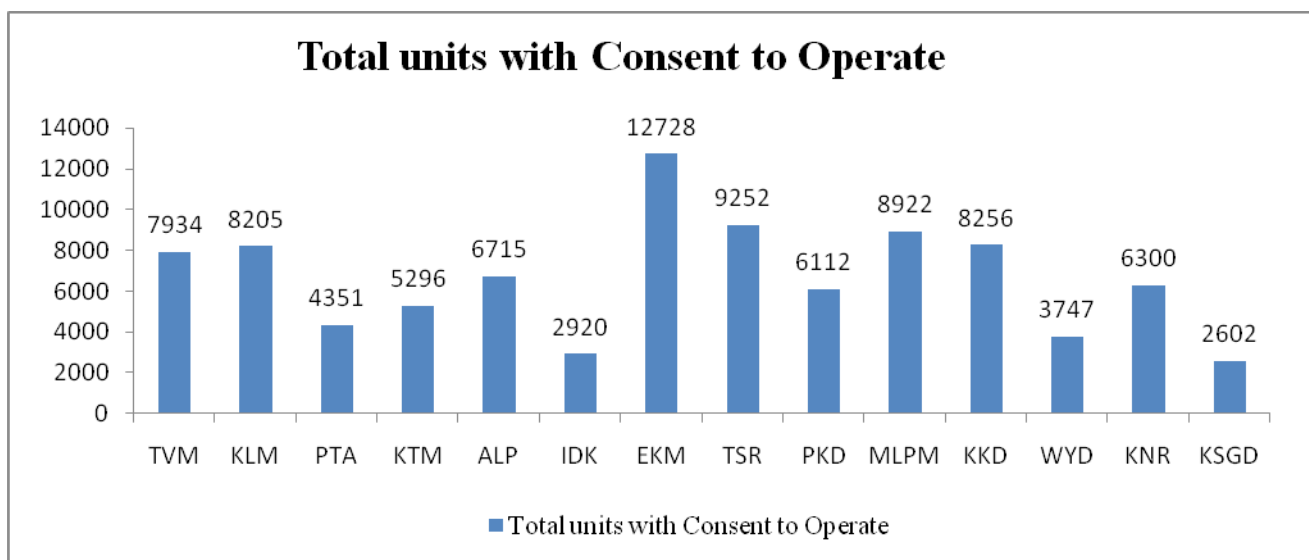
No	District	Consented Treated effluent discharging units			Consented Treated sewage/sullage discharging units			Grand Total number of units
		Total	Urban	Panchayth	Total	Urban	Panchayath	
						-1 Varkala-2		
2	Kollam	13	Kollam City-5	8	43	Kollam City-22 Paravur-1 Karunagapally-3 Punalur-1 Kottarakara-3	13	56
3	Alappuzha	14	-	14	11	Kayamkulam-1 Mavelikkara-1 Changanuur-1 Haripad-1	7	25
4	Pathanamthitta	29	-	29	52	Pathanamthitta-4 Thiruvall-23 Pandalam-2	23	81
5	Kottayam	42	Kottayam-7 Palai-1 Ettumanoor-3	31	92	Changanaserry-3 Kottayam-44 Palai-1 Ettumanoor-6	38	134
6	Idukki	3	Thodupuzha-1	2	16	Thodupuzha-5	11	19
7	Ernakulam	81			210			291
8	Thrissur	12	Thrissur City-3 Irinjalakuda-1	8	118	Thrissur City-81 Guruvayoor-15 Chalakkudy-3 Irinjalakuda-3 Chavakkad-1 Kodungallor-1	14	130
9	Palakkad	25	Palakkad-1	24	40	Palakkad-10 Ottapalam-4 Pattambi-1 Cherpulasery-1	24	65
10	Malappuram	10	Malappuram-3 Perinthalmanna-1	6	40	Malappuram-2 Manjeri-4 Tirur-5 Perinthalmanna-5 Kottakal-5 Nilambur-1 Kondotty-3 Parappangadi-1	14	50

No	District	Consented Treated effluent discharging units			Consented Treated sewage/sullage discharging units			Grand Total number of units
		Total	Urban	Panchayth	Total	Urban	Panchayath	
11	Kozhikode	17	Kozhikode City-7 Feroke-2	8	157	Kozhikode City-114 Vatakara-7 Ramanattukara-2 Payyoli-1 Mukkam-1	28	174
12	Wayanad	Nil			35	Kalpetta-7 Mananthavadi-1 Sulthan bathery-8	19	35
13	Kannur	7	Kannur City-2 Sreekanthapuram-1	4	38	Kannur City-18 Thalassery-6 Payyannur-1 Koothuparambu-3 Anthoor-2	8	45
14	Kasargod	9		9	16	Kanhangad-4 Kasargod-5 Nileshwaram-2	5	25
		283			992			1275

4.1.2 Consented Industrial units (Effluent discharge)

Kerala State Pollution Control Board issued Consent to operate for 93340 units in the State for making discharge/ emission and for disposing hazardous/biomedical waste. Consent is issued/renewed through online system. Fig. 5 is the graph showing the number of units having Consent to Operate

from the Board. Fig. 6 is showing classification of consented units based on pollution potential. District wise details of the units are given in Table 33. The details of consent issued for industrial units in different districts are given in Table 34.



* Data collected for the preparation of Dossier

Fig. 5 Graph showing the number of units having Consent to Operate from the Board

Ernakulam district is having the highest number of consented units (12728 units) in the State followed by 9252 units in the Thrissur district, Malappuram (8922), Kozhikode (8256), Kollam (8205), Thiruvananthapuram (7934) and Alappuzha (6715 units).

Table 34 Units having Board’s Consent to Operate in different districts

District	Total units with consent to operate	Total Red	Total Orange	Total Green	Total White
Thiruvananthapuram	7934	290	2904	4132	608
Kollam	8205	356	3234	4185	430
Pathanamthitta	4351	659	1940	1711	41

District	Total units with consent to operate	Total Red	Total Orange	Total Green	Total White
Kottayam	5296	356	2581	2300	59
Alappuzha	6715	464	3120	2806	325
Idukki	2920	117	1287	1440	76
Ernakulam *	12728	1042	5463	5773	450
Thrissur	9252	471	2569	5122	1090
Palakkad	6112	385	2499	2776	452
Malappuram	8922	382	2169	5735	636
Kozhikode	8256	436	2720	4066	1034
Wayanad	3747	185	1601	1649	312
Kannur	6300	299	2485	2607	909
Kasargod	2602	151	937	1155	359
	93340	5593	35509	45457	6781

(Ref: OCMMS- Online Consent Management and Monitoring System of Kerala State Pollution Control Board)

a) Based on scale

The total number of units having consent to operate from the Board is 93,340. Of which 1533 units are in large category; 1405 units are in medium category and 90402 units are in small category (OCMMS-Online Consent Managent and Monitoring System of KSPCB)

b) Based on effluent/sewage and sullage generating units

The details of the consented units discharging effluent/sewage and sullage generating units are given in Table 35

Table 35 Effluent/sewage and sullage generating units

	Total (Effluent and sewage and sullage generating units)	Effluent generating units	Sewage and sullage generating units
Number of large and medium consented units	1298	298	1000
Number of small consented units *	13124	11253	918

*Quantity of effluent/sewage/sullage from water discharging units in small scale sector and large green category are also to be ascertained by DOs.

C) Based on water consumption

The details of units based on water consumption are given in Table 36.

Table 36 Units based on water consumption

Surce of water consumption	Total water consumption effluent and sewage and sullage generating units-1298 units in MLD)	W Water consumption for Effluent generating units- 298 units in MLD	Water consumption for Sewage and sullage generating units-1000 units in MLD
Ground water	195.2	120.5	74.7
Rivers	69.4	60.3	9.1
Others	29.1	15.9	13.2
Total water consumption	293.7	196.4	97

d) Based on disposal of effluent/sewage and sullage

The details of units based on mode of disposal of effluent/sewage and sullage are given in Table 37.

Table 37 Units based on mode of disposal of effluent/sewage

Mode of disposal of effluent	Total quantity of discharge from Effluent and sewage and sullage generating units-1298 units in MLD)	Quantity of discharge from Effluent generating units-298 units in MLD	Quantity of discharge from Sewage and sullage generating units-1000 units in MLD
Ground water	73.95	26.6	53
Rivers	62.5	61.6	1.05
Sea	9.8	9.4	-
Reuse	19.2	5.6	12.3
Total quantity	156.3	94.3	69

e) Based on quantity of effluent/sewage and sullage generation

The details of units based on quantity of effluent/sewage and sullage generation are given in Table 38.

Table 38 Units based on quantity of effluent/sewage and sullage generation

Mode of disposal of effluent	Sector	Effluent and sewage and sullage treatment units	Effluent generating units	Sewage and sullage generating units
Water consumption	Large and Medium	293.7	196.4	97
	Small	29.3	17.83	8.08
Effluent generation	Large and Medium	156.3	94.3	69
	Small	22.059	12.78	6.62
Total water consumption		323	214.23	105.08
Total Effluent generation		178.36	107.08	75.62

f) Based on type of unit

The details of units based on mode of disposal of effluent/sewage and sullage are given in Table 39.

Table 39 Units based on type of units

Type of units generating sewage and sullage/ effluent	Number of units
Flats and apartments	1235
Hotels	3158
Restaurants	2084
Resorts	1171
Kalyanamandapam and auditorium	766
Hospitals	2106
Service station	3988
Total	14508

g) Based on total number of units

The details of units based on mode of disposal of effluent/sewage and sullage are given in Table 40.

Table 40 Units based on type of units

Subject	Number of units
Total number of units having Consent to Operate from the Board	93,340
Number of units in large category	1,533

Number of units in medium category	1,405
Number of units in small category	90,402
Red category units	5,509
Orange category units	35,509
Green category units	45,457
White category units	6,781

4.1.2.b Effluent generating units under large and medium scale

The major quantity of effluent is generated from the large and medium category. Such units have been identified and the details collected. The study revealed that effluent generating units in this category are 298. There are altogether 75 units under large-red and 67 units in large-orange category and 34 units in medium red and 107 units in medium orange. The largest number of such units are in Ernakulam with 81 units followed by Kottayam (43 No.), Pathanamthitta (29 No.) and Palakkad (25No.) and Thiruvananthapuram(21 no.). The largest red category of units are the highest in Ernakulam followed by Palakkad (12 No.). 1964MLD of water consumed by the industrial units -in large and medium. Total quantity of discharge from the industrial units in large and medium categories (MLD) is 94.88TPD. 22 industrial units in large and medium categories are discharging effluent into river. The major units in which effluent are discharging effluent after treatment are given in Table 41. The major units discharging into sea after treatment are given in Table 42.

Table 41 Major consented units discharging into River

Sl No	Name of unit	Type of unit	Source of water consumption	Consumption of water in MLD	Effluent quantity in MLD	Mode of disposal
1	BPCL-Kochi Refinery	Oil refinery Large Red	Periyar	73	26.272	Chithrapuzha 0.3MLD for floor wash, fire fighting and green belt development
2	FACT Ltd., Udyogamandal Division, Eloor, Udyogamandal Eloor Municipality	Chemical Fertilizer Large Red	River	48	16.8	Periyar (downstream of pathalam bund)
3	FACT Ltd., Petrochemical Division, Eloor, Udyogamandal, Eloor Municipality	Petrochemical unit Large Red	River	13.97	5.04	Periyar (downstream of pathalam bund)
4	Fertilisers and Chemicals Travancore Limited, Cochin Division, Vadavucode-Puthencruzpanchayath	Fertilizer Large Red	Lake inside FACT campus	4.1	3.2	Chithrapuzha 240 KLD-For preparation of lime and dilution of phosphoric Acid
5	Nitta Gelatin India Limited Kathikudam Koratty Thrissur, Kadukuttypanchayath	Ossein Large Red	Chalakkudy river	3	2.735	River discharge
6	Nitta Gelatin India Limited, KINFRAG park, KakkannadThrikkakara Municipality	Gelatin, peptide Large Red	Borewell	2.5	2.2	Rain water collected
7	Hindustan Insecticides Ltd, Eloor, Udyogamandal P.O. Eloor Municipality	Insecticides Large Red	River	1.6	1.024	Periyar (downstream of pathalam bund)
8	Alappuzha Govt. Medical College	Hospital		1.5	1	Drains to Kaappithodu
9	Cochin Minerals and Rutile Ltd., Industrial Development Area, Edayar, Muppathadom P.O. Kadungallurpanchayath	Chemical Large Red	River	1.995	0.659	Periyar (downstream of Pathalam bund)
10	CSO Paper Mills Private Limited, Kothamangalam Municipality	Pulp & Paper Small Red	Well	0.765	0.645	Kothamangalam river 0.25MLD reused in the process
11	Govt Medical College , Kozhikode	Hospital Large Red	KWA	0.5	0.5	Drain

SI No	Name of unit	Type of unit	Source of water consumption	Consumption of water in MLD	Effluent quantity in MLD	Mode of disposal
12	ERCMPU, MILMA, Thrippunnithura, Thrippunnithura Municipality	Milk processing unit Large Red		0.57	0.45	Irrigation
13	Malabar Institute of Medical Science Mini Bypass Road, Govindapuram, Kozhikode Kozhikode Corporation	Hospital Large Red	KWA, well	0.51	0.45	Reuse /soak pit/drain
14	SudChemie India Private Limited Edayar Industrial Development Area Binanipuram P.O. Pin – 683 502	Chemical catalyst industry Large Red	River	0.45	0.45	Periyar (downstream of pathalam bund)
15	United Breweries Limited Pudussrypanchayath	Fermentation Industry Large Red	Reservoir	0.945	0.4	Reuse & excess to Korayar river 250000 litres used for
16	Indian Rare Earths Ltd, Eloor, Udyogamandal P.O. Eloor Municipality	Chemical Large Red	River	0.27	0.4	Periyar (downstream of pathalam bund)
17	Carnival Soft Private Limited, Thrikkakara Municipality	IT Complex Large Red	Municipal supply	0.387	0.355	
18	Thiruvananthapuram Dairy, Ambalathara, Poonthura PO, Thiruvananthapuram Thiruvananthapuram Corporation	Milk processing and dairy products Large Red	KWA	0.472	0.35	Irrigation and excess into a drain leading to River Karamana
19	ITI LIMITED, PudussryPanchayath	Metal surface treatment or process Large Red	Tube well	0.4	0.3	Korayar River
20	HLL Life Care Limited, Peroorkkda Thiruvananthapuram Corporation	Surgical and medical products Large Red	KWA	0.8	0.1	Drain
21	Travancore Cochin Chemicals Ltd. (TCC), Eloor, Udyogamandal	Chlor alkali Sodium Chlorate Plant Large Red	River	5.565	0.1	Reuse in process and irrigation
22	KSRTC Bus terminal complex Kozhikode Corporation	Bus terminal Medium Orange	KWA	0.08	0.08	Drain
23	Western India Plywood Limited, Kannur Valapattnamgramapanchayath	Plywood and furniture Large Orange	Ground water	0.81	0.05	Valapattanam river

SI No	Name of unit	Type of unit	Source of water consumption	Consumption of water in MLD	Effluent quantity in MLD	Mode of disposal
24	Kozhikode diesel project (No continuous working), Kozhikode Corporation	Power plant Large Red	Bore well	0.04	0.04	Drain
25	Edayar, Muppathadom P.O. Kadungallur Panchayath	Leather Red	River	0.1236	0.0332	Periyar (upstream side of pathalam bund)
26	Indigo Paints Pvt. Ltd., Kalamassery Municipality	Solvent & Water based paints Large	Municipal supply	0.02	0.01	
27	Canara Paper Mills Pvt. Ltd	Paper Industry	Backwater Canal	0.025	0.172	Soakpit
				155	62.5432	

Table 42 Major consented units discharging into Sea

No.	Name of unit	Type of unit	Red/ Orange/ Green	Large/ Medium/ Small	Local body	Products with capacity	Source of water consumption	Consumption of water in MLD	Effluent quantity in MLD	ETP units	Mode of disposal
1	Travancore Titanium Products Limited, Thiruvananthapuram	Pigments	Red	Large	Thiruvananthapuram Corporation	Titanium Dioxide Pigment -60MT	KWA and tube well	0.9482	4.32	ETP	Sea (As per consent order, 70 % reused and rest discharged into Lakshadweep Sea)
2	Kerala Minerals and Metals Limited, Kollam	Pigments and intermediates	Red	large	Panmana	Titanium Dioxide- 120 MTD	Tube well	6.934	4.8	Collection tank, caustic and lime addition, clarifier, ETP sludge tank	Sea
3	Indian Rare Earths Limited (Mineral Separation Plant), Kollam	Mining and ore beneficiation	Red	large	Chavara Gramapanchayat	Ilmenite-200000TPA, Monozite-1200 TPA, Rutile, Zircon	Tube wells (2 Nos), canal and lake	2.8396	0.243	Physico Chemical Treatment	Sea
4	Uniroyal marine exports limited, Vengal, Kozhikode	Marine	Orange	Large	Chemancherypanchayat	Marine	Well	0.036	0.036		Sea
5	Mopla Bay Fishing Harbour, Ayikkara, Kannur	Fishing harbour	Orange	Large	Kannur Corporation	Fish handling facility at Mopla Bay	Open well and KWA	0.032	0.0256	Biogas plant, septic tank, sand filter, treated water collection tank, Septic tank and soak pit, Bar screen, oil and grease trap, chemical addition tank, settling tank and soakpit	Sea

No.	Name of unit	Type of unit	Red/ Orange/ Green	Large/ Medium/ Small	Local body	Products with capacity	Source of water consumption	Consumption of water in MLD	Effluent quantity in MLD	ETP units	Mode of disposal
6	ISRO, Ammonium Perchlorate Experimental Unit, Eumathala, Ernakulam	Ammonium Perchlorate Experimental Plant Chlorates, perchlorates and peroxide.	Red	Large	KeezhmadPanchayath	Ammonium perchlorate unite	Kerala Water Authority, 52, APEP Well Water, 72	0.0105	0.0105	ETP	Sea
7	Kerala Minerals & Metals Ltd, Titanium Sponge Unit	Pigment	Red	large	Panmana, panchayath	Titanium Sponge -1550 MTD, Magnesium Chloride -6100 MTD	Tube well	0.03	0.009	Collection tank, caustic addition, clarifier, treated water tank, sludge drying bed	Sea
8	Nilambur traders, industrial estate westhill, kozhikode	Skim rubber	Red	Small	Calicut corporation	Serum rubber	Well	0.003	0.003	ETP	Sea
								10.833	9.447		

4.1.2.c Common Effluent Treatment plant in Industrial Estate

The details of common effluent treatment plant in industrial estate is given in Table 43.

Table 43 Common Effluent Treatment plant in Industrial Estate

**4.2
Domestic
Sewage**

No.	District	STP location	STP Installed capacity
1	Thiruvananthapuram	Kinfra Apparel Park, St. Xavier's College P.O, Thumba, Thiruvananthapuram	4.5MLD
2.	Alappuzha	Sea Food Park (India) Ltd., Aroor, Alappuzha	1.5 MLD
3.	Alappuzha	Aroor Industrial Area	3 MLD
4.	Ernakulam	SEZ, Kakkanad, Cochin Special Economic Zone Ernakulam	1.6MLD
5.	Ernakulam	Kinfra Small Industries Park Nellad, Mazhuvanoor, Ernakulam – 686 721	0.4MLD
6.	Ernakulam	Rubber Park India Private Limited, Common Effluent Treatment Plant, 2A, Kaudileeyam, Rubber Park, Valayanchirangara, Ernakulam – 683 556	-
7.	Malappuram	Kinfra Techno Industrial Park, Kakkanchery Chelambara P.O, Malappuram	0.675MLD
8.	Kannur	Kinfra Textile Centre, Nadukani, Pallivayal P.O, Thaliparambu, Kannur – 670 142	0.75MLD (Not Operational)
9.	Kannur	KSIDC, Valiyavelicham, Kuthuparamba Kannur	Not Operational

Management

4.2.1 Quantification in the Urban and Rural local bodies

The generation of sewage and sullage is based on population. In order to quantify generation from urban and rural local bodies, estimated population from 2020 derived from the population 2011 Census has been used. As per BIS standards, the quantity of water consumption is taken as 135 litre/ capita/ day for a population below 1 lakh and 180 litre/ capita/ day is taken for a population of 1 lakh and above. 80% of water consumption is taken as waste water generation. 30% of waste water generation is taken as sewage and 70% is taken as sullage.

Table 44 shows the quantity of sewage and sullage generated in urban and rural local bodies. In urban local bodies, 317.4 MLD of sewage is generated and 875 MLD of sewage is generated in rural local bodies. 1192 MLD of sewage and 2782 MLD of sullage are generated in the entire State. Thus the total quantity of

sewage and sullage generated is 3975MLD.

Table 44 Quantity of sewage and sullage generated in Urban and Rural local bodies

Type of local bodies	Urban local bodies (Six corporations and 87 Municipalities)	941 Panchayaths	Total (6 Corporations, 87 Municipalities and
Population	79,36,885	2,58,40,501	3,37,77,386
Forecasted Population (2020)	82,94,583	2,70,05,078	3,52,99,661
Water consumption (MLD)	1322	3646	4968
Sewage and sullage generation (MLD)	1058	2917	<u>3975</u>
Sewage generation (MLD)	317.4	875	1192
Sullage generation (MLD)	740.6	2042	2782

4.2.2 Liquid waste management policy of Suchitwa Mission (Draft to Govt)

The excerpts from draft Liquid Waste Management Policy prepared by Suchitwa Mission and was submitted to Government for approval.

Over the last Century, Kerala has consistently performed better than the rest of India in most development indicators especially those related to education, family welfare and public health. The progressive steps initiated in these domains from the early 20th Century, coupled with ensuing high literacy and public mobilisation for specific campaigns like literacy, people's planning, etc. have led to many early achievements in the area of sanitation.

Thus, the primary goal of sanitation (access to toilets) was achieved for a large number of households in the State fairly early – and significantly higher coverage achieved compared to the rest of India. During the last two decades during which urbanisation increased, and the consumptive nature of society became more apparent, the State has been challenged by the second generation of issues: significant increase in the generation of solid and liquid wastes, contamination of sub-surface water flows impacting groundwater stocks and shallow drinking water sources like wells, and the decreased assimilative capacity of water resource stocks and flows. Despite efforts made over a decade, Kerala’s success in managing liquid wastes has been a mixed one, and the uncontrolled disposal of untreated wastewater in open grounds, water bodies, etc. an unfortunate reality in many locations. The above paved way for a policy framework for comprehensive liquid waste management across the State, delineating roles and responsibilities, providing institutional and financial resources, mobilizing public participation and creating a public movement for Kerala to become a healthy, sanitized State that protects its water resources and environment.

IV.2.2.1 Present status of management of different components of liquid waste in Kerala

Sewage Management: Kerala declared its rural areas ODF on November 01, 2016. In urban areas, as of January 202¹, 84 of the 93 Local Self Governments (LSGs) or more than 90 percent including all the six Municipal Corporations, have been declared and certified ODF by third-party verifications. The floods of 2018 and repeat events of 2019 have caused some setbacks in terms of the number of households with access to latrines. The National Sample Survey Organisation (NSSO) survey of 2018 reports that 5.9 percent urban households use shared or community facilities, while the remaining enjoy exclusive access. In 2018, the NSSO reported 37.7 percent of the urban

¹septic tanks, periodic

households to have “septic tank” containment structures, 1.1 percent connected to sewers (in the two urban centres of Thiruvananthapuram and Kochi) and about 61 percent of the urban households connected to pit latrines.

Many of the community level Sewage Treatment plants (STPs) that are functional now are at present operated much below their designed capacities. For example, Thiruvananthapuram Corporation has a 107 MLD STP which is operated and maintained by the Kerala Water Authority (KWA) for the Corporation. It is now operated at 47% efficiency as the sewer lines cover only 30% area. Therefore, the facility is now being used for co-treatment of faecal sludge/septage.

Faecal Sludge/Septage: The state has a large number of households with their own toilets. With household access to toilets and most connected to emptying of septic tanks is essential. Since there are not enough post treatment units and since sewage treatment units exist only in the Municipal Corporations of Thiruvananthapuram and Kochi and cater to only a fraction of the resident population, the effluent from onsite systems often end up polluting the water bodies, either when they overflow the tanks or when the tanks are emptied (as a part of demand desludging) and the contents disposed of into open streams/rivers, paddy fields and other areas.

Greywater Management: Excluding a few numbers of sources, the greywater generated from almost all sources is being sent outside without proper treatment. In very few cases, which may include some houses and/or institutions, there exists either a soak pit system or an effluent treatment or sewage treatment plant where it gets treated along with effluent/sewage.

4.2.2.2 Strategy and approach specific to each component of Liquid waste

Sewage management

Untreated sewage shall not be allowed to be let out into the open. All

outlets that are currently connected either to the public drain or to a water body or let out into open land shall be identified and actions shall be initiated to seal such outlets.

A two-prong approach shall be adopted for setting up treatment units. Though emphasis shall be on decentralised or onsite treatment systems, centralised systems shall also be promoted wherever possible.

The gap that exists between the required sewage treatment capacity and that is expected to be available could be bridged by having institutional level STPs, targeting Government institutions like medical colleges, community health centres, college hostels, office complexes in district headquarters mini civil stations etc.

Onsite treatment systems

Current treatment systems like septic tank-soak pit systems, biodigesters etc shall continue to be promoted in individual households and small institutions with less than 100 users.

The per-capita cost of underground sewerage systems tends to reduce with increased housing and population density while that of on-site options remains roughly constant. On-site sanitation may therefore be feasible for low population density (<160 persons per hectare) areas.

Leach pit system users shall be encouraged to change to septic tank-soak pit system/Anaerobic Baffled Reactor-Anaerobic filter system/Biodigesters, or any other such system approved by Suchitwa Mission/Government.

All building complexes/ commercial centres/ healthcare establishments/ markets shall be encouraged to set up their own stand alone STPs.

All the sources that set up or have STPs in place shall be encouraged for maximum re-use of their treated water and all those sources that have enough land shall be encouraged to take up non-food crop cultivation using the water and sludge generated from the treatment of sewage, provided the treatment is based on a biological process. Treated water shall not be allowed to be let out unless it meets the required standards and regular monitoring of the water quality of nearby water

bodies have to be conducted to ensure that contamination is not occurring.

All Government hospitals, markets and other sources that come under LSGs shall be provided with technical and part financial support through Suchitwa Mission for setting up standalone STPs.

Though the selection of technology is kept open, preference shall be given for biological processes and technologies that are promoted/ approved by CPHEEO.

A different strategy needs to be framed for Tourist Spots, pilgrim centres, other areas with floating population and environmentally fragile areas. Technology adopted and STPs designed needs to be capable of handling variable organic (shock) loads. Appropriate technology tailor-made/customized and site-specific needs to be adopted.

Considering the climatic and hydro-geological conditions of site selection and technology selection needs to be done judiciously and Kerala specific models shall be developed/customized.

4.2.2.3 Common treatment systems

1. It shall be ensured that the existing common treatment units function in their maximum possible designed capacities
2. In addition to the facilities where co-treatment of fecal sludge/septage now exists, possibility of co-treatment in other common facilities shall also be explored
3. The treated water and the sludge generated in such facilities using biological processes shall be wisely put to use. The use of treated water for construction purposes, provided it is treated to the required limits, shall be encouraged. Agriculture department shall be persuaded to accept the sludge for use in their agricultural farms.
4. Community Land Pooling option for setting up STP combined with agriculture (cultivation of various crops based on the geographical and climatic conditions) could be adopted by making the land owners

stakeholders of the development.

5. Considering the climatic and hydro-geological conditions of site selection and technology selection needs to be done judiciously and Kerala specific models need to be developed/ customized.

6. Considering the population density, terrain conditions, land limitations, cost factor etc it is not feasible to establish centralized sewage treatment facilities all over the state. Therefore, the strategy would be for establishing decentralized sewerage networks wherever possible and STPs for all major institutions.

Grey water management

- i. Reduction of grey water generation shall be encouraged
 - ii. Letting out untreated grey water shall not be allowed.
 - iii. Management of generated grey water including its treatment and disposal shall be the responsibility of the generator/producer.
- 1) Sources that generate small quantities of grey water, like households and small Government institutions, shall be encouraged to take up treatment of grey water and re-use of the same, provided it is treated to the desired levels. Part financial support shall be provided through LSGs for setting up treatment units like soak pits.
 - 2) Building permits shall not be issued to applications that do not show provision for a treatment system (soak pit, magic pit etc) in their location sketch and completion certificate shall not be issued to projects that do not construct adequate treatment systems. Act/Rules shall be amended for this, if required.

Faecal sludge/Septage management

1. Though the state has a system for partial collection, transportation, treatment and disposal of faecal sludge/septage, it is very meagre compared to the quantity generated. So, in addition to improving the existing system, expansion of the system to bridge the gap shall also be taken up.

2. The state now has adopted a faecal sludge/ septage management involving a demand desludging strategy. All LSGs shall be encouraged to take up a scheduled desludging approach, which ensures desludging of septic tanks every 2-3 years.
3. User fee shall be levied for the desludging service provided and this shall be collected in parts along with the yearly building tax every year so that no amount needs to be collected at the time of desludging.
4. Though the LSGs may be allowed to have their own suction vehicles and systems for collection and transportation, private haulers shall be promoted by ensuring that they meet the conditions laid down by the LSGs/Government and follow the SOP in place, in their working.
5. The haulers shall not be allowed to empty the desludged materials into the open/water bodies and shall strictly be directed to empty it for treatment at the treatment facilities, through mandating the haulers to have GPS systems in their vehicles and by maintaining waste manifests.
6. More treatment plants shall be set up and operated through LSGs. But at the same time, private entrepreneurs shall also be encouraged to set up and operate plants if they plan to invest on their own.
7. The plants may be set up based on any technology. But preference shall be for technologies based on biological processes and technologies approved by CPHEEO.

4.3. Action Plan for Polluted River Stretches

As per various orders of the Hon'ble NGT in O.A. 673/18, the State had drawn up action plans for restoration of the Polluted River Stretches (PRS) in Kerala. Although the CPCB had identified 21PRS in Kerala, the State had moved the CPCB to delist 10 no. of river stretches from the PRS list as the quality of water in these are consistently achieving bathing water quality. Even then action plans had been prepared for the 21 stretches. Soft copies of the action plan are available in the website (www.ksrrc.in). Table 45 is showing the action plans in brief as well as the

progress achieved is given as **Annexure 4**

Table 45 Action Plan for Polluted River Stretches as per OA 673/2018

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status				
1.	Ensure 100% treatment of sewage at least insitu remediation	31.03.2021	<p>*The sewage generated in the state is treated by septic tank - soak pit system or STP. Individual septic tank - soak pit systems are provided for households and small establishments. Individual STPs are provided for establishments such as flats, hotels, hospitals, etc. There is no open defecation in the state.</p> <p>Details of existing STPs/Septage treatment plants in the State:</p>				
			Sl. No.	City Town	STP location	Status	STP installed Capacity
			1.	Thiruvananthapuram	Common sewage treatment plant, Muttathara, Trivandrum maintained by kerala water authority	Operational	107 MLD
					STP at Kumarichanda	Operational	0.01 MLD
					STP at Thiruvanthapuram Medical college- phase 1 and 2	Operational	5 MLD
			2.	Pathanamthitta	STP at Sannidhanam (5 MLD) maintained by travancopore dewasom board	Seasonally operated during festival season	5 MLD
					STP at pamba (3.5 MLD) maintained by Travancore Dewasom Board.	Seasonally operated during festival season	3.5 MLD
			3.	Kottayam	STP for house boat (0.09MLD) at Kumarakom maintained by District Tourism Promotion Council Kottayam	Operational	90 KLD
			4	Ernakulam	Sewage treatment unit, Kerala water	Operational	4.5 MLD

Table 45 Action Plan for Polluted River Stretches as per OA 673/2018

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status					
					authority Elamkulam Ernakulam (3 MLD)			
					STP owned Greater Coachin Development Authority, Kadavanthara Kochi (0.45 MLD)	Operational	0.45MLD	
					STP Treatment Plant at Bhrmapuram Kochi Corporation, Ernakulam	Operational	0.1 MLD	
					STP at Wellington Island, Kochi Corporation.	Operational	0.1 MLD	
					STP at Kalamaserry market.	Operational	0.01 MLD	
			5.	Kannur	STP at Thaliparambu (0.5 MLD) Taliparambu Municipality Kannur.	Operational	0.5 MLD	
			6.	Thrissur	STP at Guruvayoor Thrissur District.	Not at commissioned	3 MLD	
					FST at Mattampuram	Not started functioning	0.01 MLD	
					Revamping of 55 KLD STP at Kuriyanchira Slaughter house cooperation Thrissur.	Operational	0.035 MLD	
			6.	Wayanad	STP at Taluk hospital, SulthanBathery (0.05 MLD)	Operational	0.14 MLD	

Table 45 Action Plan for Polluted River Stretches as per OA 673/2018

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status				
			7.	Kozhikode	CSTP at Narayanagaram near stadium vadakara	Operational	0.1 MLD
			8.	Idukki	6 KLD ETP for Kumali slaughter house	Operational	0.006 MLD
					STP at comfort station Adimali	Operational	0.1 MID
			9.	Malappuram	STP at Malappuram Muncipal Bus Stand	Operational	0.03 MLD
					STP at Tirur (fish market)	Operational	0.45 MLD
					STP at Muncipal Bus Stand Tirur.	Operational	0.05 MLD
			<ul style="list-style-type: none"> • 107 MLD STP in Thiruvananthapuram District at Muttathara (Activated Sludge with extended aeration process). The present sewerage system cover 43 out of 100 wards of Thiruvananthapuram corporation area either partly or fully. At present only 60% of the 107 mld STP is used. Completion of ongoing works will enhance the utilization by 20%. Full utilization can be achieved only by expanding the sewer network. DER for the coverage of uncovered area of Thiruvananthapuram Corporation and for the rehabilitation of existing sewerage system is under preparation. After getting AS for this work, the full capacity of 107 MLD STP can be utilized • Considering the contamination of Karamana river and for providing sewerage systems for the 19 wards on the bank of this river, DPR prepared and submitted to GOK on 16.10.2021 for issuing AS under RKI. Sewer laying work of this 19 wards can be finished by 31/12/23, subject to the availability of funds. DPR for the remaining 81 wards for the full capacity utilisation of 107 MLD STP is under preparation and expected to be completed by December 2021. • 4.5 MLD STP at Elamkulam , Kochi (Activated sludge process) The existing Sewage Treatment Plant located at Elamkulam is having a capacity of 4.50 mld. The plant works in activated sludge treatment process. In Kochi existing sewerage system covers only 5% of Kochi Corporation. Present utilisation capacity of this plant is only 3MLD. DER for utilizing unutilized capacity of Elamkulam plant is under preparation. The plant was commissioned as early in 1959 and maintenance of the sewage Treatment Plant is done by KWA. Presently sewerage network available only for the STP at Elamkulam and Marine Drive. KWA has prepared a master plan for the coverage of Kochi Corporation. As part of this KWA has submitted DPR of 1.75 MLD sewerage network for 				

Table 45 Action Plan for Polluted River Stretches as per OA 673/2018

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status					
			<p>Elamkulam. DPR for 5 MLD STP for Elamkulam also submitted to GoK for AS. DPR of another 30 MLD STP and its network is also under preparation. New CSTPs will be installed with proper network system. Tapping & diversion of the drains having high sewage load to STPs to be constructed</p> <ul style="list-style-type: none"> • 3 mld STP at Guruvayur (Activated sludge process) The Guruvayoor Sewerage Project is planned to provide an effective sewerage system for the thickly populated area under Guruvayoor Municipality. The work completed and is functioning from September 2021. Length of network is approximately 7 km. • Medical College 5MLD STP Works of 5MLD STP under AMRUT for Medical College, Thiruvananthapuram completed and started functioning from Sep 2021. This STP is exclusively for Thiruvananthapuram Medical college campus. • The works of 12 MLD STP at Kureppuzha, Kollam is progressing well and is expected to be commissioned before 30th June 2022. <p>Details of proposed STPs/FSTPs in the State:</p>					
			Details	STP	FSTP	ETP	Total (no.s)	Funding agency
			Under Construction	9 nos, capacity - 20.19 MLD	1 nos, capacity -0.1 MLD	Nil	10	<ul style="list-style-type: none"> • Proposals being implemented by AMRUT H is funded by CPDB(50%),State Govt. (30%), Concern LSGD(20%) • Proposals being implemented by IMPACT is funded by KIFBI, RKI.
			Work started	1 nos, capacity - 1 MLD	Nil	5 nos, capacity -0.14 MLD	1	
			DPR stage	33 nos, capacity- 4.419 MLD	Nil	Nil	38	
			AS issued	Nil	1 nos, capacity -0.25 MLD	Nil	1	

Table 45 Action Plan for Polluted River Stretches as per OA 673/2018

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status				
			To be Retendered	08 nos, capacity- 33.565 MLD	Nil	Nil	8
			DPR Approved KIIFB/ RKI	5 nos, capacity- 16.668 MLD	Nil	Nil	5
			Decided to submit DPR for As	1no., capacity- 0.59 MLD	1 nos., capacity- 0.5 MLD	Nil	2
			TS issued	1no., capacity- 0.06 MLD	Nil	Nil	1
			Selection notice issued but selection agreement to be executed	5 nos, capacity- 4.94 MLD	2 nos., capacity- 0.2 MLD	Nil	7
			Awarded but not started	4 nos, capacity- 19.86MLD	Nil	Nil	4
			Work started but stalled	1 no., capacity- 0.27 MLD	2 nos., capacity- 0.2 MLD	Nil	3
			Technical sanction to be issued	Nil	2 nos (mobile septage plants), capacity- 0.2 MLD	Nil	2

Table 45 Action Plan for Polluted River Stretches as per OA 673/2018

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status				
			Tendering stage	2 nos., capacity- 0.1415 MLD	Nil	Nil	2
			Total	70 nos., capacity- 101. 775 MLD	7 nos., capacity- 101. 775 MLD Septage Plant- 2 nos, capacity- 0.2 MLD	70 nos., capacity- 0.8MLD	84
	Commencement of setting up of STPs and connecting all the drains and other sources of generation of sewage to the STPs must be ensured	Progressing		Progressing			
	Timeline for completing all steps of action plans including completion of setting up STPs and their commissioning	Progressing		Progressing			
	Chief Secretaries may set up appropriate monitoring mechanism at State level Specifying accountability of nodal authorities not below the Secretary level Chief Secretaries may have	Completed		<p>*Vide G.O.(Rt)No.93/2020/WRD dated 28.01.2020 Government of Kerala nominated Deputy Secretary (Projects), Water Resource Department as the nodal authority, Government of Kerala for monitoring the compliance of the directions in the order on fortnightly basis and to maintain record of progress and to act as an accountable person to the Chief Secretary for the purpose.</p> <p>*Vide G.O.(Rt)No.223/2020/WRD dated 12.03.2020 Government of Kerala appointed a monitoring committee comprising of Additional Chief Secretary, Water Resources Department as Chairperson and Principal Secretary, LSGD, Principal Secretary, Environment, Secretary, Water Resources Department and Staff officer to Chief Secretary as nodal officers & members.</p>			

Table 45 Action Plan for Polluted River Stretches as per OA 673/2018				
Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status	
	an accountable person attached in their office for this purpose			
	Monitoring at State level must takeplace	Fortnightly		Review on progress of action plans is being done at district and state level

4.4 Thelineer ozhukum nava keralam

A campaign with public participation for making the water sources in the state pollution free has been launched in the state.

II. General purpose.

- Water Sanitation: To keep all the water bodies in the state clean and tidy.

(1) Sub-objectives

- Check the sanitary condition of water bodies in all the local bodies in the state and identify the contaminated areas.
- Make a list of large bodies of water, ponds, streams, creeks, and polluting sources, mainly with the participation of the people
- Based on this, samples from sources of serious contamination are subjected to preliminary water quality testing to determine the level of contamination.
- Clean the contaminated areas through a public cleaning campaign.
- Develop a scientific alternative system of action with public participation to eliminate polluting sources.
- Establishment of Local Self Government Level Action Plan to prevent dumping of waste through polluting sources and to treat the waste in such sources scientifically.
- To plan scientific solid-liquid waste projects with the participation of local bodies under the leadership of Local Governments and in

collaboration with all the affiliated agencies of various departments with half co-ordination and public participation.

- To achieve sustainability by providing liquid waste management systems at the household-institutional public level and to enable local bodies to achieve complete sanitation status by providing liquid waste systems along with solid waste.

III. Approach.

- Implementation of a sustainable program for prevention of water pollution in each local government body with the participation of the people through the coordination of various departments under the leadership of the Local Self Government Institutions
- Implementation of 'Freshwater Navakeralam' as a public education program with the participation of students, government agencies concerned for waste disposal, youth and voluntary organizations with the participation of local bodies.
- Raising awareness among the general public about the need for clean treatment of water resources, the need for scientific liquid waste management and the declining availability of drinking water through intensive intensive information dissemination campaign.

4.5 Coastal Action Plan

Coastal and marine water pollution has increased throughout the world, mainly due to direct discharges from rivers, increased surface runoff and drainage from expanding port areas, oil spills and other contaminants from shipping, and domestic and industrial effluents. Action plan prepared for mitigation of coastal pollution along the state, prepared by the State Pollution Control Board and submitted to the State Government for approval is given below in Table 46:

Table 46 Coastal Action Plan

SI No.	Key Activities and Components	Implementing Agencies	Proposed Time Frame for Implementation and Completion of activities
A	Recognition Phase		
1	Collection and maintenance of information relating to Coastal area		
a.	Collection of Geographical data of coastal area, 5 km from shore line towards land	KSPCB,LSGD, NCCR,KCZMA	30.06.2023
b.	Details on natural/manmade drains/ flood channels and their flow	LSGD, Irrigation Dept.	
c.	Collection of Hydrological data of identified drains	Water Resources Dept. ,Irrigation Dept.	
d.	Details on total sewage generation/industrial effluent generation/Total waste generation and treatment facilities (STPs/ETPs)	Industries Dept., KSPCB,LSGD	
2.	Digital Mapping of all the collected information	KSPCB,KSRRRC	
3.	Monitoring present seawater quality	KSPCB,NCCR	
4.	Identifying residential cluster	LSGD	
5.	Details of total wastewater generation in the coastal areas	DUA/DP/SM	Done
6.	Details of solid waste generation in the coastal areas	DUA/DP/SM	Done
7.	Details of sewage treatment facilities in the coastal LSGI s	DUA/DP/SM	Done
8.	Details of biodegradable and non-biodegradable solid waste management facilities in the coastal LSGI s	DUA/DP/SM	Done
9.a	Quantification of existing gap in sewage treatment in the coastal LSGIs	DUA/DP/SM	Done
9.b	Quantification of existing gap in processing of non-biodegradable & biodegradable waste in the coastal LSGIs	DUA/DP/SM	Done
		DUA/DP/SM	Done
		LSGs 88	Identification & formulation phase- 6 months, Execution phase -24 months

4.6 Restoration of water bodies (ponds)

In connection with O.A. No. 325/15, the NGT directed all states to formulate action plan for restoration of water bodies. The State Government appointed the Irrigation, Design and Research Board of Water Resources Department the nodal agency for compliance of the NGT order.

The MoJS had provided a list of 11456 ponds for restoration in the State in connection with the above O.A. Based on 11456 ponds, 1406 ponds (1007 ponds which overlaps with the list of ponds identified within 3km buffer width of 21 polluted stretches under OA 673/2018 of Hon NGT and 399 ponds which have area greater than 5 hectare) spanning all across the 14 districts, were derived as first priority list. Accordingly, for collection of metadata of ponds, a Mobile Application was developed under Kerala Water Resources Information System (Kerala WRIS). An important feature of the Mobile Application is that it has options for Geotagging and Geofencing, which respectively facilitate collection of exact location and surface area of ponds. Further, Executive Engineers of Minor Irrigation Divisions were entrusted with the task of collecting status of ponds through their field engineers.

District Collectors were requested to:

1. Conduct immediate Stock meeting with District Level Field Officers to prioritize the ponds for restoration through field verification, from among the 'Polluted/ Inaccessible/ Overgrown vegetation/ Dried up/ Filled up' ponds
2. District Collectors may direct District Officers of Kerala State PCB to develop mechanisms for water quality testing of identified ponds.
3. District Collectors shall further direct and coordinate with District level Field Officers to develop Action Plan for restoration of priority ponds and shall identify the source of funds for restoration of priority ponds.

4. District level Field Officers may be instructed to share the Action Plan to the Secretary, Water Resources Department along with a copy to the Chief Engineer, IDRIB.

Accordingly, Action Plans for restoration of water bodies are being prepared by District Collectors and in accordance with the same, restoration works will be taken up in a time bound manner.

V. Polluted Industrial Clusters Management Plan

Kerala is a densely populated state where almost all areas are urbanized. This combined with high literacy rate and concomitant heightened environmental consciousness resulted in large no. of complaints against a variety of industries. This resulted in bringing a vast number of industries having even small pollution potential under the consent purview of the Pollution Control Board. In the State, the Pollution Control Board had brought even small units such as cattle farm, poultry farm long before the Central Pollution Control Board brought out guidelines for these. Due to the large no. of complaints received from units such as flour mills, cement storage, pig farm, hollow bricks, meat stall etc. the Pollution Control Board was constrained to bring these and similar small scale units with pollution potential under the consent purview.

Another such sector in which the Pollution Control Board intervened long before the national scenario is in the case of High Rise Buildings. The rapid proliferation of High Rise Buildings with residential apartments necessitated setting up of individual sewage treatment plants in these buildings as centralised sewerage system is present only in a small area of the state that too in two districts only.

All the above factors are reflected in the consent administration database of the state. There are 10575 Red, 47707 Orange, 60013 Green and 6806 White category industries under consent purview. Out of the above, 13167 industries are discharging a total of about 367 MLD of wastewater which is fully treated. Only 16.7 MLD (i.e. less than 5%) of this treated effluent is discharged directly into rivers/ nallahs.

The chemical industries in the state are concentrated in the Eloor-Edayar industrial belt in Ernakulam District. As part of the assessment of Comprehensive Environmental Pollution Index (CEPI) of 88 identified industrial clusters in the country, the CPCB in collaboration with IIT Delhi had conducted

monitoring of Greater Cochin Area (GKA) in 2009. The industrial cluster of Greater Cochin Area includes the above industrial belt. The CEPI score then reported by the CPCB was 75.08 and GKA was identified as Critically Polluted Area (CPA). In the wake of this, moratorium on developmental activities was imposed in the GKA area. Reassessment was done by the CPCB in 2011 and as the score had improved to 57.39, the moratorium was lifted. In 2018, the CPCB again conducted monitoring and Board engaged an accredited agency for third party monitoring. The score in 2018 had further improved to 52.94 with the sub-index scores of Air, Water and Land being 47.38, 35.88 & 29.50 respectively. Sub-index score > 60 shows a critical Level of Pollution in respect of environment component, whereas a score between 50-60 shows a score level of pollution with reference to the environmental component. For GKA all the three sub indices are below severe pollution level. With respect to the CEPI score, which is calculated from the sub index values, Polluted Industrial Area with CEPI Score < 70 Critically Polluted Area with (CPA) and those with CEPI Score ≥ 60 & < 70 is Severely Polluted Area (SPA). Thus GKA with score of 52.94 comes neither under CPA with score > 70 nor under SPA with score 60-70 but under OPAs (other polluting Areas) with score < 60 . Though the order of the Hon'ble NGT in O.A. 1038/18 applicable to CPA is not applicable to the State, action plan had been prepared for further reducing pollution in GKA. All the major actions proposed in the action plan have been implemented except for Common Effluent Treatment Plant for small and medium scale industries in Edayar area, remediation of contaminated sites (Kuzhikkandam Thodu and surrounding area) and municipal solid waste management in Kochi Corporation.

VI. AIR QUALITY MANAGEMENT PLAN

6.1 Current Status

For monitoring the ambient air quality in the state, a network of 35 manual as well as 9 continuous monitoring stations has been set up across all districts. The parameters SPM, RSPM, SO₂, NO_x are being monitored in all manual monitoring stations and along with PM_{2.5} in certain stations. In the Continuous Ambient Air Quality Monitoring Station (CAAQMS), SO₂, NH₃, CO, O₃, PM₁₀, PM_{2.5}, etc. are monitored.

In connection with O.A. no.s 76 of 2017, 260 of 2017 and 259 of 2017 filed before the Hon'ble NGT South Zone, a study of the air quality data from 23 manual stations and 8 CAAQMS in the 8 major cities in the state viz., Thiruvananthapuram, Kollam, Alappuzha, Kochi, Thrissur, Kozhikkode, Kannur, and Kasaragod was conducted during the pre lockdown (1st March 2020 to 23rd March 2020), lockdown (23rd March 2020 to 31st May 2020) and post lockdown (1st June 2020 to 30th June 2020) periods.

The study, conducted by the Joint Committee constituted by the Hon'ble NGT in the above O.A.s, showed that the concentration of all the pollutant parameters measured in 29 stations out of 30 stations in eight cities during the period 1st March 2020 to 30th June 2020 is well within the limit with low-level concentration of pollutants. Only in one CAAQMS at Vyttila exceedance of the pollutant CO was observed for a short period. However, this may be shifted/varied due to Vehicular Emissions, Burning of biomass, crop residues, and Solid waste, Dust emission from roads, Construction and Demolition Waste, Industrial Emission, etc.

6.2 Present Status of Air Quality

The Board has established 9 Continuous Ambient Air Quality Monitoring Stations (CAAQMS) in six districts (9 stations) and data is being displayed at 9 prominent locations across the state. As per the real time data available from these Continuous Ambient Air Quality Monitoring Stations (CAAQMS), the ambient air quality in Kerala falls under satisfactory – moderate range.

6.3 Future Plans

The following short term and long term measures are planned to be implemented in the State for maintaining/improving the ambient air quality in the state. In order to improve the air quality each department shall implement the action in a time bound manner.

6.4 Action Plan

The following short term and long term measures are to plan to be implemented in the State for maintaining the ambient air quality.

Table 47 Action Plan for improving Air Quality

Short term steps suggested for improving Air Quality

SL. NO.	ACTION	IMPLEMENTING AGENCY	IMPLEMENTATION TIMELINE
1	Launching extensive awareness drive against polluting vehicles	Motor Vehicle Department	
2	Ensuring strict action against visibly polluting vehicles	Motor Vehicle Department	
3	Steps to prevent parking of vehicles in non designated areas.	Motor Vehicle Department /State Police- Traffic	
4	Introducing wet/Mechanized vacuum sweeping of roads.	Local Self-Government Department	
5	Controlling dust pollution at construction sites by providing an appropriate covering system	Local Self-Government Department	
6	Ensuring carriage of construction material in closed/covered vessels.	Police Department	

Long term steps suggested for improving Air Quality

SL. NO.	ACTION	IMPLEMENTING AGENCY	IMPLEMENTATION TIMELINE
1	Retrofitting of diesel vehicles with particulate filters	Motor Vehicle Department	
2	Installation of the vapour recovery system in fuelling stations	Petroleum and Explosives Safety Organization (PESO) /Pollution Control Board	
3	Promoting battery operated vehicles	Motor Vehicle Department	
4	Banning of old diesel vehicles in a phased manner	Motor Vehicle Department	
5	Undertaking Greening of open areas	Local Self-Government Department/ Public Works Department	
6	Creation of green buffers along the traffic corridors.	Local Self-Government Department/ Public Works Department	
7	Development of a proper system for ensuring garbage/municipal solid waste/biomass/leaves connection and disposal and to avoid open burning.	Local Self-Government Department	
8	Promoting the use of LPG only and to avoid the use of kerosene/ firewood in restaurants/dhabas/roadside eateries.	Local Self-Government Department	
9	Introduce water fountains at major traffic intersection, wherever feasible	State Highway Authority of Kerala (SHAK)/ National Highways Authority of India / Public Works Department (PWD)	
10	Take steps for blacktopping/pavement of road shoulders to avoid road dust	Public Works Department (PWD)	
11	Prepare an action plan for public transport on CNG mode.	Motor Vehicle Department	
12	Ensure the proper collection of solid waste (biomass)	(Local Self-Government Department (LSGD)	
13	Ensure strict enforcement of the ban on burning of agricultural waste and crop residues	Agriculture Department	
14	Ensure strict action against industrial units not complying with standards.	Pollution Control Board	
15	Ensure DG sets meeting the standards only be allowed to operate	Department of Electrical Inspectorate/Pollution	

VII. OIL CONTINGENCY PLAN FOR KERALA AND FOR SHORE LINE CLEAN UP

Kerala has a coastal line of 590 km and the entire coast is prone to oil spill disasters as one of the international oil transportation route is adjacent to the coastal line of the State. Out of the 14 districts 9 of them are oil spill prone. Besides, the state has an oil refinery in Ernakulam, which increases the vulnerability of the state. There is one Major Port located in the State of Kerala. In addition, there are 3 Government captive ports. Some of these ports handle oil cargo. The oil tankers and other ships visiting the ports located in Kerala pose a risk to the coastline areas, whenever they are involved in fire incident, collision, allusion, grounding etc. Accidental discharges may involve escape of bunker fuel or oil cargo resulting from a marine incident. The threat is largely a function of the types of oil cargo and bunkers carried the degree of navigational hazards, the weather, and shipping density in the area. The passing merchant ships also pose risk to the coastal areas to the waters adjoining the Kerala coast.

As per the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996, crisis groups have to review the status of onsite and offsite emergency plans. A review meeting was held by the Additional Chief secretary, Environment on 16.06.2016 to review the level of preparedness of major accident hazard units to deal with chemical accidents. In the meeting, it was decided that Kerala State Pollution Control Board in association with the Coast Guard shall prepare oil spill emergency plan for the State urgently and furnish it to Government for approval. Hence Kerala PCB proposes to prepare the plan with the help of a third party.

The scope of the study is to prepare Oil Spill Contingency Plan for Shore Line Clean up for the State of Kerala. The scope of work includes marine oil spills of any manner that occur within 12 nautical miles (24km) of Kerala's coastline & approaches and the riverine systems extending 40km inland or till tidal effect is evident or whichever is more. The objectives of the work are the following:

- To address controlling, containing, and recovering an oil spill in quantities that may be harmful to navigable waters or adjoining shorelines
- To protect the environment by minimizing potential damage to marine and coastal environment and natural to minimize spread of oil on the sea surface.
- To clean and restore oil contaminated shorelines to original state.

VIII. NOISE POLLUTION MANAGEMENT PLAN

The Noise Pollution (Regulation and Control) Rules, 2000 and further amendments made in 2002 empower State Government to permit use of loud speaker or public address system subject to certain conditions. The Noise Rules envisages categorization of area into industrial, commercial, residential and silence area/zones for the purpose of implementation of noise standards for different areas. Accordingly, the Local Self Government Department had vide notification No. G.O (P) No. 64/02 dated 20/04/2002 notified the entire State into 4 zones, viz., and industrial, commercial, residential and silent. All town planning schemes are to be prepared or modified or revoked subsequent to this notification based on this categorization of areas and any disputes on the same is to be referred to the District Collector for appropriate decision.

The maximum permitted sound level to be adhered to by the industry during its operation, conditions for providing additional control measures wherever necessary for attaining the same, etc. are being enforced by the Kerala State Pollution Control Board in case of industries and other establishments. Sound levels are monitored and directions issued, if necessary to ensure compliance.

The District Magistrate and Police are the authorities concerned with respect to ensuring ambient noise standards. The permission for public address system is being granted by the Police Department. The Kerala State Pollution Control Board is giving support to Police Authority for monitoring sound level from loud speakers on request.

The following table shows the action plan of the State as per the directions of the NGT in O.A.681/18.

Table 48 Noise Pollution Management Plan

Sl. No.	Action	Responsible agency/ department	Current status
1	Arrangement of noise monitoring devices	Police Department	The details of noise monitoring devices and its specification were obtained from the Kerala State Pollution Control Board. A team headed by the ADGP, Social Policing and Traffic to select a suitable device for the Police Department has been constituted. The ADGP, Social Policing and Traffic has submitted the report with the details of Technical specification of noise monitoring device to be purchased for Police Department and suggested to procure 19 devices one for each District through GEM Portal. Action has been initiated for the purchase of the device.
2	Training to the Police staff regarding the use of sound level meter	Police Department	Training imparted
3	Development of robust protocol for taking appropriate action against the defaulters	Police Department	Draft protocol has been prepared.
4	Installation of noise limiters in potential noise polluting devices	Police Department (loud speakers/ public address system/vehicles) Kerala State pollution Control Board (establishments coming under the consent purview of the Board)	Action shall be taken Direction is being given by the Kerala State pollution Control Board to all potential establishments/ industries which come under the consent purview of the Board to install noise limiters with data loggers in all sound producing equipments/instruments and to retrofit existing equipments/instruments with the noise limiters with data loggers. Condition regarding the same is also being incorporated in the consents being issued from the Board.

IX. MINING ACTIVITY MANAGEMENT PLAN

Kerala is endowed with limited mineral resources and hence the number of mines (major minerals) are limited and they are mainly of mineral sand, limestone, limeshell, graphite bauxite/aluminous laterite etc. These minerals are won by open cast mining to an average depth level of up to 50m especially in limestone mines. Mineral sand is extracted by scooping and making small pits/trenches and here mining does not involve any threat to life and environment.

Among the minor mineral quarries, granite building stone and laterite building stones are the most abundant in the State and quarrying activities are mostly carried out in the midland areas. The increase in population and also due to the big boom of the construction industry, there is a huge demand of minerals especially for granite/laterite building stone, construction grade sand and brick/tile clay. But the spatial extension of mineral deposits is being reduced day by day due to fast urbanization and development of new roads. The total area of mining in the State is 15.65 sq.km which accounts for 0.04% of the total extent. There is a huge decline in the number of quarries during the last 10 years on account of stringent regulatory mechanisms and environmental concerns. The maximum number of granite building stone quarries are located in Malappuram district (93 quarrying leases and 14 quarrying permits), followed by Kannur, Kozhikode and Palakkad districts. The distribution of granite building stone quarries in the State is depicted in Table 1.

Table 49 Distribution of Granite building stone quarries in the State

Sl. No.	District	Quarrying Permit	Quarrying Lease
1	Thiruvananthapuram	3	42
2	Kollam	2	22
3	Pathanamthitta	5	29
4	Alappuzha	0	0
5	Kottayam	7	20
6	Idukki	2	17
7	Ernakulam	9	48
8	Thrissur	2	24
9	Palakkad	32	48
10	Malappuram	14	93
11	Kozhikode	7	54
12	Wayanad	3	6
13	Kannur	13	53
14	Kasaragod	3	13
	Total	101	468

9.1 Mining Inventory of major minerals

Mineral Sand mining dominates in Kollam district, Lime Shell is mined in Alappuzha, Lime stone in Palghat and Graphite in Ernakulam. The district wise distribution of major minerals is illustrated in Table 50 below.

Table 50 Distribution of major mineral leases

Sl. No.	District	Mineral	No. of Leases		Lease holder
1.	Kollam	Mineral Sand	5	4	M/s. Indian Rare Earth Ltd. (IREL)
				1	M/s. Kerala Minerals and Metals Ltd., Chavara
2.	Alappuzha	Lime shell	1		M/s. Muhamma Clam Marketing Co-operative Society No.A1078
3.	Kottayam	Lime shell	1		M/s. Vaikkom White Lime shell Co-operative Society Ltd. No.3147
4.	Ernakulam	Graphite	1		M/s. Thomson Graphite Mines and Crucible Works
5.	Palakkad	Limestone	1		M/s. Malabar Cements Ltd.

Notably major minerals as mineral sand and limestone is mined by Government owned Companies, Limeshell is mined from the Vembanad lake by few Co-operative Societies. Graphite mining is comparatively meager and is being carried out by a Private Company.

9.2 Mining Inventory of Minor Minerals

Granite building stone and laterite building stone constitute the majority of minor minerals quarried in the State. Analysis of production and demand manifests that there is a deficit supply of minerals and hence there is a heavy dependency to external sources. Sand mining from rivers has led to several environmental issues and hence as an alternative, crushed rock sand is widely used for constructional purposes. In addition to the afore-said minerals china clay, silica sand, ordinary earth and tile/brick clay are also being mined from different localities. Ordinary earth is extensively removed from the mid land regions for leveling of land to facilitate construction of buildings. The distribution of granite building stone quarries and crushers are depicted in Figures 7 given below.

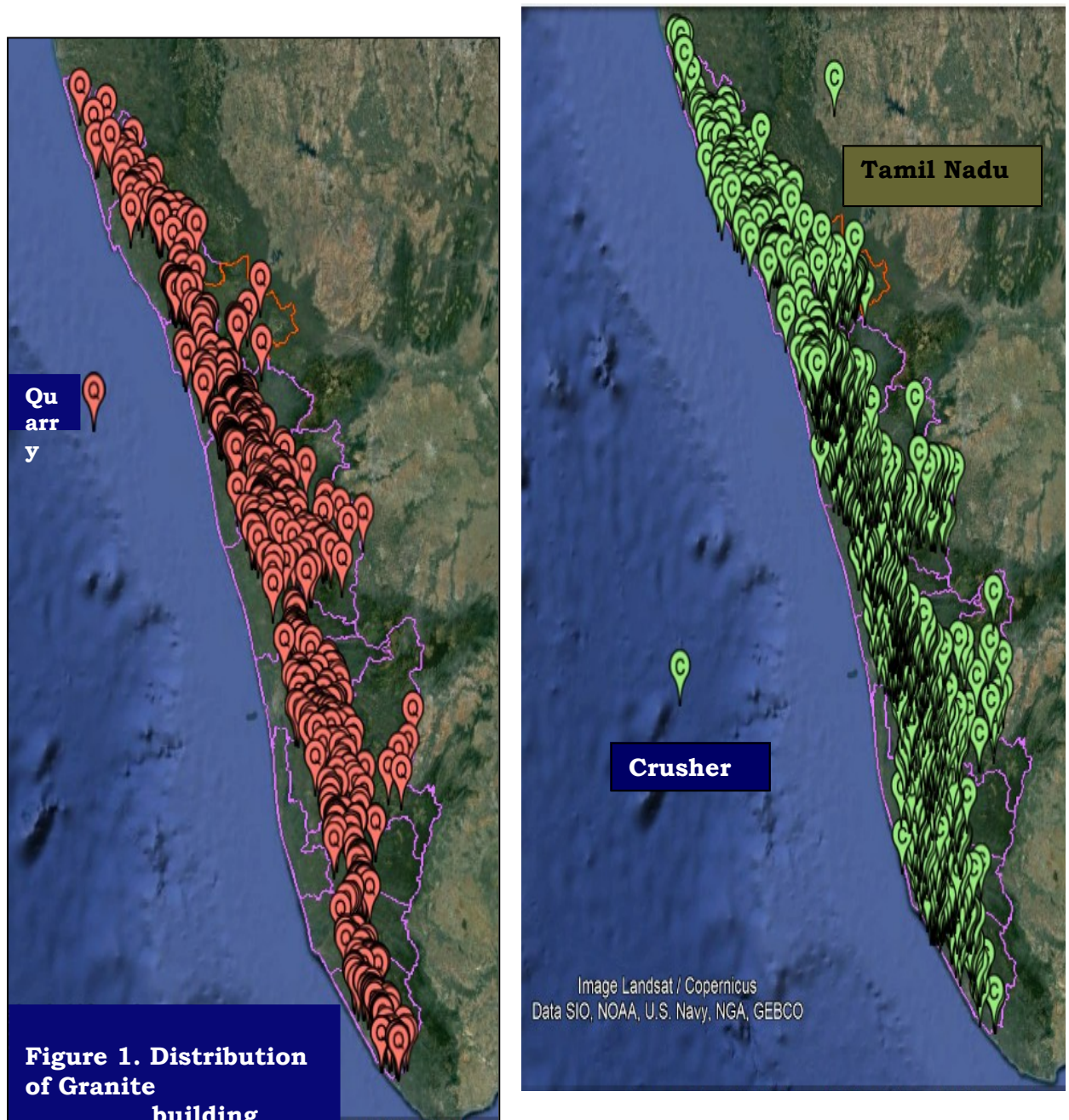


Fig. 7: Distribution of crushers

Dealers licenses are issued for stocking and selling of minor/major minerals. Such stock yards, spread over in various parts of the State, has ensured availability of construction materials, even in places where there is apparently nil production.

9.3 Regulation of Mining Activities

In Kerala, quarrying and mining of minerals are regulated by the powers vested under the Mines and Minerals (Regulation and Development) Act, 1957, Mineral Concession Rules 1960, the Kerala Minor Mineral Concession Rules 2015, the Granite Conservation and Development Rules, 1999. The Department of Mining and Geology is empowered to administer the said rules in the State.

However, certain officers/authorities in other department such as Revenue, Police have also been declared as authorities to enforce the rules, specifying the area of jurisdiction, extent of powers to be exercised and the duties to be performed by them in each case. The Mineral Exploration Division and Mineral Development and Mining Lease Division of the Department of Mining and Geology administer mineral development in Kerala.

As per the Kerala Minor Mineral Concession Rules 2015, enacted as directed by the Hon'ble Supreme Court regulates minor mineral administration in the State. Mining activities under these rules mandates prior environmental clearance and approved mining plan. In addition, for granite quarrying licences such as Consent from Pollution Control Board, D&O Licence from LSGD and Explosive Licence are also pre-requirements.

It is evident that there exists strict regulatory mechanism to ensure scientific and sustainable mining practice. Mining Licences are issued only after obtaining clearances/NOC's from other statutory authorities. Compliance of environmental conditions in the clearance certificate is monitored by multiple organizations. The revenue collection from mining sector during 2021-2022 stood at 207 crores.

10.State Wetland Conservation Plan

(To be submitted by State Wetland Authority)

XI. Future plan for the state

The following measures are planned to be implemented in the state in various waste management. The action plan for waste Management is as given below. The timeline for completing the works also mentioned in the table.

15.1 Solid Waste

No.	Subject	Existing Gap	Activities	Implementing agency	Timeline
	Waste to Energy plant-	Kozhikode- To be started	Construction of Waste to Energy plant	KSIDC	2 years
		Kollam, Palakkad, and Kannur DPR completed	Construction of Waste to Energy plant	KSIDC	2 years
		Ernakulam	Construction of Waste to Energy plant	KSIDC	2 years
		Munnar	Construction of Waste to Energy plant	Munnar GP	
		Thiruvananthapuram, Malappuram and Thrissur	Identification of land for Waste to Energy plant	District Collector	3 years
2.	Co-incineration cement plant	DPR being prepared	Modification and commissioning	Malabar cement	1 year
3.	100% Door to door collection households and establishments	More than 50% by Authorised waste collectors like Haritha Karma Sena and	100% Door to Door collection is to be achieved	LSGIs	
4.	MRF/MCF/RRF	Thiruvananthapuram-57 MCF Pathanamthitta- 2 MRF Alappuzha- 14 RRF 33 MRF 8 MCF Alappuzha-MCF existing- 37 no.s RRF existing- 6 no.s MCF gap-23 no.s RRF gap- 11 no.s Idukki- 2 MRF Thrissur- MCF existing- 247 no.s MCF gap-613 no.s RRF existing- 31 no.s RRF gap- 3 no.s MRF existing- 1 no. Palakkad- MCF existing- 100 no.s MCF gap- 54 no.s MRF existing- 2 no.s RRF existing- 2 no.s RRF gap- 4 no.s Malappuram- MCF existing- 122 no.s RRF existing- 20 no.s RRF gap-3 no.s Kozhikodu- MCF existing-55 no.s MCF gap- 16 no.s MRF- 5 no.s Kasargod- 1 MCF& 1 MRF		LSGIs	
5.	Decentralised treatment units	Community level- 869 (aerobin, biobins) Household level- 411009 no			

6.	Rendering plants	Rendering plants- 22 no.s			
7.	Modern Slaughter houses	Slaughter house large-22 no.s Slaughter house small- 61 no.s			
8.	Sanitary napkin and diaper	Action is being taken at the Government level for the collection of sanitary napkin and diaper and transporting it to common biomedical waste treatment facility			
9.	Scrap collection				
10.	Interstate movement of waste				
11.	Bio mining dumpsites	Start biomining at Njalianparmbu dumpsite and work awarded at Kureepuzha Kollam. Tendering stage at Kottayam, Bhramapuam, and Chelora. Out of the 41 dumpsites			
12.	Secured land under SWM Rules	11 Regional Sanitary Landfill, land (25 acre) has been identified at site of FACT at Ambalamedu, Ernakulam and action is being taken for takeover.			
13.	Authorisation under SWM Rules is to be obtained by local bodies	24 authorized 02 submitted 17 not applied			
14.	Annual report under SWM Rules to be submitted to KSPCB	1st annual report to be submitted on 12/11/2021		KSPCB	Already submitted
15.	Extended producer responsibility as per Rule 17 of SWM Rules	Financial assistance is to be obtained for collection	Implementation of EPR	LSGD KSPCB	

15.2 Plastic Waste

No.	Subject	Existing	Activities	Implementing agency and partners	Timeline
1	Institutional Mechanism and policy framework for plastic waste management	State level task force on plastics has already been constituted under the chairmanship of Hon. Chief	Formation of task force and action cells at ULB, district and state levels and providing technical assistance and adequate capacity building	State level DoE, LSGD, UDD, RDD LSGIs, GIZ	6 months

No.	Subject	Existing	Activities	Implementing agency and partners	Timeline
		Secretary.			
			Policy and Regulatory Framework for elimination of single-use plastics, development of End-of-Life waste management infrastructure, enforcement of PWMR through byelaws of local bodies etc.	KSPCB, GIZ, LSGD, UDD, RDD, SM, HKM, Kerala State Consumer Affairs Department,, Dept. of Finance	6 months to 1 year
		Board officers along with the officials of departments conducted inspections for the strict implementation of SUP ban in the State. Out of the 465 inspections conducted as on October 2020, 153 violations were observed. An amount of Rs. 13, 05,000/- was imposed as fine to the violators and collected Rs.3, 35,000/- as fine. Confiscation of banned items was also done for the strict implementation of ban in the State.	Enforcement of Ban imposed on the use of identified Single-Use Plastic Items at District / ULB /GP level (Enforcement actions against violations; Identification and closure of manufacturing facilities of prohibited SUP items)	KSPCB, UDD, RDD, LSGD, with the support of Police department	Continuous process on enforcement of ban
		Green protocol has been strictly enforced at the government institutions.	Action taken for reducing elimination of SUP items in State/UT Govt. offices, attached / subordinate offices, PSUs/ organizations	/KSPCB, LSGD, SM, HKM, Industries department	6 months
2	Tracking, monitoring and reporting system for the management of litter (including SUPs)		Baseline assessment and Plastic waste Inventorisation at the state level	KSPCB, LSGD, ULBs, HKM, SM, GIZ, NCSCM,	6 months to 1 year
			Management of Littered Single-Use Plastic Items	ULBs, GPs, SM, HKM, GIZs, GPs, KSPCB, KILA, LSGD	6 months to 1 year
			Systems of check on cross boundary movement of plastic and plastic wastes	KSPCB, GIZ, LSGD, ULBs, Police department, District collector	6 months to 1 year
			Development of digital tools and guidelines for	KSPCB, GIZ, SM, HKM, CED	6 months to 1 year

No.	Subject	Existing	Activities	Implementing agency and partners	Timeline
			tracking, monitoring and reporting of litter		
3	Technological solutions to manage plastics by adopting circular economy principles		Technological solutions to reduce, reuse and/or recycle plastics (demonstration project with producers and recyclers)	KSPCB, GIZ, Producers, Industries department	6 months to 1 year
			Dissemination of best practices for technological solutions	KSPCB GIZ, Producers, LSGI, CED, Producers	6 months to 1 year
			Strengthening the plastic waste management systems (including infrastructure, leveraging of funds, strengthening the ULB network, development of EPR plan of the state and operational structure)	LSGD, SM, HKM, RDD KSPCB, GIZ, Producers	6 months to 1 year
			Plans for scientific disposal and management of Plastic Waste (Development of database of plastic waste processors, strategy for the development of recycling infrastructure, Strategy for End-of-Life Management options of the alternative materials, Development of industrial composting facilities for compostable plastics etc.)	LSGD, SM, HKM, KSPCB, GIZ, Industries department, Department of Finance	6 months to 1 year
4	Strengthening Plastic waste management and extended producer responsibility system		Knowledge products (e.g. policy briefs, guidance paper) are considered in the decision-making process	GIZ, KSPCB	6 months to 1 year
5	Identifying and promoting alternatives to plastics		Development and Promotion of Alternatives to Prohibited Single-Use Plastic Items and promoting product eco-design innovation	KSPCB, HKM, SM, GIZ, Industries department	6 months to 1 year
6	Awareness generation and capacity building		Formulation of IEC activities (Targeted awareness raising activities at State, District and ULB/GP level, Promotion of alternate materials, Competitions and	KSPCB, LSGD, HKM, SM, GIZ, KSCSTE, KSUM	6 months to 1 year

No.	Subject	Existing	Activities	Implementing agency and partners	Timeline
			hackathons organized for school and college students)		
			Strategies for capacity building (This will also include Capacity building for repurposing and promoting reuse of plastic packaging, adopting alternate materials etc.)	SM, HKM, LSGD, UDD, RDD, KSPCB, GIZ	6 months to 1 year

15.3 Construction and Demolition Waste Management

SI. No.	Subject	Existing & Gap	Activities	Implementing agency	Funding agency	Timeline
1.	Arrangement for separate collection of C&D waste to C&D waste Deposition point.	Check gaps w.r.t: - Separate collection point of C&D Waste - Identification of common C&D waste deposition points	<p>Identification of common C&D waste deposition points by the Districts.</p> <p>1. Identification of bulk generators shall be carried out in the district.</p> <p>2. Prepare detailed Inventorisation for C&D waste generated, disposed</p> <p>3. Establishment of designated C & D waste collection points shall be established in each Taluk.</p> <p>4. Taluk wise C&D storage centres should be implemented</p> <p>5. Designated deposition points for C & D waste shall be established in the District head quarters</p> <p>6. Make arrangements and place appropriate containers for collection of waste and shall remove at regular intervals or when they are filled, either through</p>	ULB LSGDs KSPCB District administration & Revenue Department Suchitwa Mission		

			own resources or by appointing private operators			
			7. Approval of Waste Management Plan submitted by Waste Generators before Construction starts records shall be maintained by ULBs.			
			8. Ensure other waste (such as solid waste) does not get mixed with this waste and is stored and disposed separately.			
			9. Proper collection, transportation, processing and disposal of C&D waste shall be ensured in the district. They shall get the collected waste transported to appropriate sites for processing and disposal either through own resources or by appointing private operators.			
			10. Appropriate incentives are to be given to generator for salvaging, processing and or recycling preferably in-situ.			
			11. The waste management plan of the generators is to be examined and sanctioned within a period of one month or from the date of approval of building plan, whichever is earlier from the date of its submission			
			12. Keep track of the generation of construction and demolition waste within its jurisdiction and establish a data base and update once in a year			

			13. Device appropriate measures in consultation with expert institutions for management of construction and demolition waste generated including processing facility and for using the recycled products in the best possible manner		
			14. Make provision for giving incentives for use of material made out of construction and demolition waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads		
			15. Adequate Air pollution control measures shall be taken as per the CPCB guidelines.		
			16. Obtaining authorisation from KSPCB for processing facility		
			17. State Pollution Control Board is to monitor the implementation of these rules by the concerned local bodies and the competent authorities.		
			18. PCB is to prepare annual report with special emphasis on the implementation status of compliance of these rules and forward report to Central Pollution Control Board before the 31st July for each financial year.		
			19. The Town and Country planning Department shall incorporate the site in the approved land use plan so that there is no disturbance to the processing facility on a long term basis.		

21.	Whether local authority have fixed user fee on C&D waste and Introduced permission system for bulk waste generators who generate more than 20tons or more in one day or 300 tons per project in a month?		<p>Common by-laws may be implemented in District. Local C&D waste management plans can be integrated to develop common collection and recycling facilities</p> <p>1. Fix rates to be paid by Waste Generators for Collection, Storage & Transportation of Waste shall be incorporated in the building approval plan.</p> <p>2. Public notices shall be issued that construction and demolition waste should only be disposed at pre-identified/notified sites and must be displayed in newspaper notification and same must be informed in the approval of plan to hand over the C &D waste.</p> <p>3. Chalk out stages, methodology and equipment, material involved in the overall activity and final clean up after completion of the construction and demolition.</p> <p>4. Seek assistance from concerned authorities for safe disposal of construction and demolition waste contaminated with industrial hazardous or toxic material or nuclear waste if any.</p>	ULB LSGDs		
26.	Setting up of C&D recycling Facility in all Districts	Check whether district has any C&D waste recycling facility	<p>Plan should ensure viable operation of C&D plant including assured market for C&D products.</p> <p>1. Land identification for setting up of common C&D waste recycling facility.</p> <p>2. Installation of required infrastructure facility.</p> <p>3. Adequate green belt development in the common C &D waste</p>	ULB LSGDs KSPCB District administration Suchitwa Mission Town planning department		

			recycling plant.			
			4. As per the guidelines of CPCB compliance needs to be done			
31.	Usage of recycled C&D waste in non structural concrete, paving blocks, lower layers of road pavements, colony and rural roads	Is there any policy on usage or promotion on usage of C&D waste?	<p>Local authority may make give appropriate incentives on usage of C & D waste. A % of usage in public works may be specified/ any other scheme.</p> <p>1. District administration shall frame a Policy for management of C&D waste.</p> <p>2. Provisions for using materials made by C&D waste in Construction Activity like paving blocks, lower layers of road pavements, colony and rural roads etc by executing an agreement with PWD and industries engaged in manufacturing of cement blocks</p> <p>3. Who generate more than 20 tons or more in one day or 300 tons per project in a month shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar and shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work and keep the concerned authorities informed regarding the relevant activities from the planning stage to the implementation stage and this should be on project to project basis.</p>	ULB LSGDs PWD		
35.	ICE on C&D waste management	Is there any sustained system of creating	Action plan for awareness and education	ULB LSGDs KSPCB		

		awareness created among local communities.	1. Training program's shall be organized through KSPCB to ULBs once in 6 months.	District administration		
			2. Intensive mass awareness to public by local means viz., making handouts/ Newspaper notifications/ through media advertisement and announcements through loudspeakers			

15.4 Biomedical waste Management

SI. No.	Subject	Existing & Gap	Activities	Implementing agency	Funding agency	Timeline
1	Inventory and Identification of Healthcare Facilities	Check whether all HCFs generating BMW are Identification of Healthcare Facilities	Inventory available only of HCFs under the purview of SPCB. Defaulters identified and notices issued. The inventory shall be updated with all HCFs including clinics, hospitals, Veterinary hospitals, Ayush hospitals, animal houses, etc generating biomedical waste. LSGD ensure that all HCFs obtained SPCB Consent/authorization before issuing license which helps to bring all HCFs under the SPCB purview.	Local bodies, DMO, Veterinary Department KSPCB Individual HCFs LSGD		
2	Adequacy of facilities to treat biomedical waste	Check if there is any gap between Quantity of Biomedical Waste generated per day and quantity of Biomedical waste treated and disposed in the District? In case of no access to CBWTFs, adequacy of existing disposal of BMW	Action plan for setting-up CBWTF or providing access to CBWTF with 75 Km from places waste generation. Action plan for management of BMW through captive facilities in case of no access to CBWTF: Healthcare facilities shall be mandated to execute agreement with common biomedical waste	ULBs DMOs Veterinary Department KSPCB Health department Animal husbandry		

			<p>treatment facilities Biomedical waste generated in the HCFs were collected, treated by KEIL or IMAGE and disposed through CBWTF of IMAGE. Deep burial pits are to be stopped completely. Captive incinerators to follow new emission standard by CPCB through modernisation or otherwise to stop functioning of incineration and join CBWTFs.</p>			
3	Tracking of BMW	Check whether barcode system is implemented by all HCFs and CBWTFs?	Check whether Bar code is provided by the CBWTFs and the transporting vehicles are provided with GPS.	<p>DMOs CBMWTF HCFs KSPCB IMAGE KEIL Local bodies Health department Animal husbandry</p>		
4	Awareness and education of health care staff	Whether training has been organized for all stakeholders? Trainings are conducted by KSPCB and CBWTFs to all stakeholders periodically.	Trainings are conducted periodically	<p>Health department KSPCB IMAGE CBMWTF KEIL</p>		
5	Adequacy of funds	Whether adequate funds are allocated to Government healthcare facilities for biomedical waste management by State Govt?	Allocate adequate funds to Government health care facilities for biomedical waste management by State Govt.	<p>LSGD DMO HCFs Individual Private HCFs State Government Health department</p>		
6	Compliance to Rules by HCFs and CBWTFs	Is there any district level mechanism to monitor compliance by Hospitals / HCFs?	Inspections and monitoring are to be done periodically to verify the compliance with the rules	<p>DHO KSPCB District administration Health department Veterinary officer Local bodies DMO LSGD</p>		

				IMA		
7.	Establish CBWTFs concentrating on southern and northern most districts in the State					
8	District Level Monitoring Committee	Check whether District Level Monitoring Committee has been constituted and meetings are being organized?	Meetings are to be conducted regularly	DMLC Members KSPCB Health department		
9	Ensure pretreatment of solid biomedical waste and liquid biomedical waste by all HCFs	Check if HCFS are required to install ETPs for waste water generated–	This is to be included in inventory. Action plan for installation of ETPs by HCFs where applicable	DHO KSPCB District administration Health department Veterinary officer Local bodies DMO LSGD IMA		
10.	Sewage treatment plant	Check whether STP provided	This is to be included in inventory. Action plan for installation of STPs by HCFs where applicable	DHO KSPCB District administration Health department Veterinary officer Local bodies DMO LSGD IMA Private hospitals		

15.5 Antimicrobial Resistance Action plan

No.	Subject	Existing & Gap	Activities	Implementing agency	Timeline
1.	Antimicrobial surveillance of the environment	Nil	Thiruvananthapuram, Ernakulam, Kozhikode	KSPCB, CET	1 year
2.	AMR database	Nil	To be prepared	KSPCB, CET	1 year
3.	Standard operating procedures for AMR	Nil	To be prepared	KSPCB, CET, University of Kerala	1 year
4.	Separate biosecurity guidelines for different sources	Nil	To be prepared	KSPCB, CET, University of Kerala	1 year
5.	Study on efficiency of effluent treatment	Being done	Being done	KSPCB, CET	1 year
6.	Awareness programmes	Being done	Being done	KSPCB, CET, University of Kerala	1 year

15.6 Hazardous waste Management plan

No.	Subject	Existing & Gap	Activities	Implementing agency	Funding Agency	Timeline
1.	Compliance of direction in OA 804/2017		Action is being taken	Industries dept; Labour dept; Port authorities		Action being taken continuously process
2.	Third party inventorization of hazardous waste	Inventorization 2017-18 prepared by Board	KSPCB intends to do the same with the help of third party. Proposal of NIIST is requested.	KSPCB		-
3.	Closing on line manifest system for online tracking of hazardous waste movement		KSPCB introduced a new software in which online submission of manifest is also introduced.	KSPCB		Online submission of manifest is introduced
4.	Environmental auditing of hazardous waste treatment storage disposal facility, captive secured landfill and captive incinerator	Tendering done	The Board invited tenders. Technical evaluation is over. Financial evaluation is proposed to be done shortly.	KSPCB		6 months
5.	Earmarking of land for recycling in the industrial estate/cluster		Action is being done.	Industries department		Action being done
6.	Training to labourers in consultation with the Occupational Safety and Health training institution		Action is being initiated.	Labour department		Action being done
7.	Transfer of land for ETP for Kuzhikandom project	Funding and land from HIL	Tendering process is under progress. Technical sanction is pending due to the non-transfer of land identified for establish ETP.		State Government SPCB M/S FACT IRE HIL MERCHEM	Action being done
8.	Remediation Eayattuchal	off Funding required	Action is being initiated. The case is pending and the Hon'ble NGT vide order letter dated 13/04/2021 directed to constitute a committee to study the issue. The constitution of committee and its first meeting are over			Action being done

9.	Vadavathoor, Kottayam		Kottayam municipality Rs. 23.2 has proposed a project of 23.20 Crores with financial aid of world Bank to the Suchitwa Mission and the same is pending for the approval.	World Bank	
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15.7 E-waste Management plan

Sl. No.	Subject	Existing & Gap	Activities	Implementing agency	Funding agency	Timeline
1.	Inventory / Generation of E-Waste / Bulk-waste generators	Check whether SPCB/PCC has completed inventory of E-Waste in the District. Inventory of bulk waste generators	<p>Completion of inventory</p> <p>i. Detailed inventory shall be prepared of all the types waste generators/bulk consumers/producers etc as per the e-waste rules 2016.</p> <p>ii. KSPCB had entrusted the project for the inventorization of E-waste outsourced to NIIST, Pappanamcode, Thiruvananthapuram and the work initiated.</p> <p>iii. Checking of informal trading dismantling and recycling. PCB in coordination with District Administration has to carry out quarterly drive for checking of this activity. The DLMC constituted as per OA 606/2018, has been entrusted to overlook the matter on E-waste Rule</p> <p>iv. Facilitate collection and disposal of e-waste</p> <p>v. Strengthen system of enforcement</p> <p>vi. Identify hot spots dumped with e waste and make them under formal sector</p>	KSPCB LSGD District Administration DLMC members		
2.	E-Waste collection points	Availability of E-Waste collection points / call centres / kiosks in villages -	Identification / registering E- Waste collection centres in association with	KSPCB LSGD Revenue Department		

		Blocks / /towns / cities	Producers - their PROs or Recyclers 1. The LSGDs shall set up collection centres and join with authorized collection centres/recycler approved by SPCB for disposal of the e-wastes			
			2. LSGD shall ensure that the units obtain KSPCB authorization/consent before issuing license All collection centers to follow guidelines			
			Eco park for collecting formal and informal collection in a single park			
			Buy back system with declared appreciable price for e-waste items to be introduced in national level			
			Steps to be taken through brand owners to operate more number of e-waste collection centers			
3.	Linkage among Stakeholders to channelize E-Waste	Check whether District administration has information on collection centres established by Producers / PROs? Administration should also identify authorised E-waste recyclers in the district or in State to channelize	Action plan to establish linkages between ULBs / Collection Centres of Producers and PROs / SPCBs / Bulk waste generators / Recyclers / SPCBs / District Administration / Public i. Identification of authorized E-waste recyclers/Dismantlers in the state to channelize the E-waste collected in the District by executing MOU with recyclers/ dismantler ii. To link Local bodies with e-waste dismantlers/recyclers for channelization of waste collected in District	KSPCB LSGD District Administration		
			Enable citizens to deposit e-waste through toll free numbers in each district			
4.	Regulation of Illegal E- Waste recycling / dismantling	Prevalence of informal trading, dismantling, and recycling of E-waste is in District	Action plan in coordination with SPCBs/PCCs and District Administration to check this activity.	KSPCB LSGD Police Industries Department		

			<p>1. ULB's is required to hand over the e- waste collected in their jurisdiction to the KSPCB authorized e- waste recycler or dismantlers by executing an MOU with the recycler/ dismantlers in the nearby District.</p> <p>2. Inventorisation of trading activity/ recycling/dismantling in the district shall be carried out by ULB's</p> <p>3. KSPCB in coordination with District Administration has to carry out quarterly drive for checking of this activity</p>	District Administration		
5.	Integration of informal sector	Whether mechanism exists for bringing informal sector into main stream in collection and recycling of E-Waste	<p>Evolve mechanism by involving producers/PROs</p> <p>1. Inventorization of informal sectors engaged in collection and recycling activity of e- waste in the district to bring these units under consented purview to ensure that the units being operated complying rules</p>	LSGD KSPCB Industries Department		
6.	Awareness and Education	Are there any programs at district level for awareness about E- waste management?	<p>Plan special workshops and awareness campaigns through Producers / PROs</p> <p>Conduct meetings/ awareness programs on the management of e- wastes</p>	LSGD KSPCB Industries Department		
7.	Submission of annual report as per E-waste Management rules					

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status				
1.	Ensure 100% treatment of sewage at least insitu remediation	31.03.2021	<p>*The sewage generated in the state is treated by septic tank - soak pit system or STP. Individual septic tank - soak pit systems are provided for households and small establishments. Individual STPs are provided for establishments such as flats, hotels, hospitals, etc. There is no open defecation in the state.</p> <p>Details of existing STPs/Septage treatment plants in the State:</p>				
			Sl. No.	City Town	STP location	Status	STP installed Capacity
			1.	Thiruvananthapuram	Common sewage treatment plant, Muttathara, Trivandrum maintained by Kerala water authority	Operational	107 MLD
					STP at Kumarichanda	Operational	0.01 MLD
					STP at Thiruvananthapuram Medical college- phase 1 and 2	Operational	5 MLD
			2.	Pathanamthitta	STP at Sannidhanam (5 MLD) maintained by Travancore Dewasom board	Seasonally operated during festival season	5 MLD
					STP at pamba (3.5 MLD) maintained by Travancore Dewasom Board.	Seasonally operated during festival season	3.5 MLD
			3.	Kottayam	STP for house boat (0.09 MLD) at Kumarakom maintained by District Tourism Promotion Council Kottayam	Operational	90 KLD
			4	Ernakulam	Sewage treatment unit, Kerala water authority Ernakulam (3 MLD)	Operational	4.5 MLD
					STP owned Greater Cochin Development	Operational	0.45 MLD

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status					
					Authority, Kadavanthara Kochi (0.45 MLD)			
					STP Treatment Plant at Bhrmapuram Kochi Corporation, Ernakulam	Operational	0.1 MLD	
					STP at Wellington Island, Kochi Corporation.	Operational	0.1 MLD	
					STP at Kalamaserry market.	Operational	0.01 MLD	
			5.	Kannur	STP at Thaliparambu (0.5 MLD) Taliparambu Municipality Kannur.	Operational	0.5 MLD	
			6.	Thrissur	STP at Guruvayoor Thrissur District.	Not at commissioned	3 MLD	
					FST at Mattampuram	Not started functioning	0.01 MLD	
					Revamping of 55 KLD STP at Kuriyanchira Slaughter house corporation Thrissur.	Operational	0.035 MLD	
			6.	Wayanad	STP at Taluk hospital, SulthanBathery (0.05 MLD)	Operational	0.14 MLD	
			7.	Kozhikode	CSTP at Narayanagaram near stadium vadakara	Operational	0.1 MLD	
			8.	Idukki	6 KLD ETP for Kumali slaughter house	Operational	0.006 MLD	
					STP at comfort station Adimali	Operational	0.1 MID	

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status				
			9.	Malappuram	STP at Malappuram Municipal Bus Stand	Operational	0.03 MLD
					STP at Tirur (fish market)	Operational	0.45 MLD
					STP at Municipal Bus Stand Tirur.	Operational	0.05 MLD
				<ul style="list-style-type: none"> 107 MLD STP in Thiruvananthapuram District at Muttathara (Activated Sludge with extended aeration process). The present sewerage system cover 43 out of 100 wards of Thiruvananthapuram corporation area either partly or fully. At present only 60% of the 107 mld STP is used. Completion of ongoing works will enhance the utilization by 20%. Full utilization can be achieved only by expanding the sewer network. DER for the coverage of uncovered area of Thiruvananthapuram Corporation and for the rehabilitation of existing sewerage system is under preparation. After getting AS for this work, the full capacity of 107 MLD STP can be utilized. Considering the contamination of Karamana river and for providing sewerage systems for the 19 wards on the bank of this river, DPR prepared and submitted to GOK on 16.10.2021 for issuing AS under RKI. Sewer laying work of this 19 wards can be finished by 31/12/23, subject to the availability of funds. DPR for the remaining 81 wards for the full capacity utilisation of 107 MLD STP is under preparation and expected to be completed by December 2021. 4.5 MLD STP at Elamkulam , Kochi (Activated sludge process) The existing Sewage Treatment Plant located at Elamkulam is having a capacity of 4.50 mld. The plant works in activated sludge treatment process. In Kochi existing sewerage system covers only 5% of Kochi Corporation. Present utilisation capacity of this plant is only 3MLD. DER for utilizing unutilized capacity of Elamkulam plant is under preparation. The plant was commissioned as early in 1959 and maintenance of the sewage Treatment Plant is done by KWA. Presently sewerage network available only for the STP at Elamkulam and Marine Drive. KWA has prepared a master plan for the coverage of Kochi Corporation. As part of this KWA has submitted DPR of 1.75 MLD sewerage network for Elamkulam. DPR for 5 MLD STP for Elamkulam also submitted to GoK for AS. DPR of another 30 MLD STP and its network is also under preparation. New CSTPs will be installed with proper network system. Tapping & diversion of the drains having high sewage load to STPs to be constructed 3 mld STP at Guruvayur (Activated sludge process) The Guruvayoor Sewerage Project is planned to provide an effective sewerage system for the thickly populated area under Guruvayoor Municipality. The work completed and is functioning from September 2021. Length of network is approximately 7 km. Medical College 5MLD STP Works of 5MLD STP under AMRUT for Medical College, Thiruvananthapuram completed and started functioning from Sep 2021. This STP is exclusively for Thiruvananthapuram Medical college campus. The works of 12 MLD STP at Kureppuzha, Kollam is progressing well and is expected to be commissioned before 30 June 2022. <p>Details of proposed STPs/FSTPs in the State:</p>			

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status						Funding agency
			Details	STP	FSTP	ETP	Total (no.s)		
			Under Construction	9 nos, capacity - 20.19 MLD	1 nos, capacity -0.1 MLD	Nil	10	<ul style="list-style-type: none"> Proposals being implemented by AMRUTB is funded by CPDB(50%), State Govt (30%), Concern LSGD(20%) Proposals being implemented by IMPACT is funded by KIFBI, RKI. 	
			Work started	1 nos, capacity - 1 MLD	Nil	5 nos, capacity -0.14 MLD	1		
			DPR stage	33 nos, capacity- 4.419 MLD	Nil	Nil	38		
			AS issued	Nil	1 nos, capacity -0.25 MLD	Nil	1		
			To be Retendered	08 nos, capacity- 33.565 MLD	Nil	Nil	8		
			DPR Approved KIIFB/ RKI	5 nos, capacity- 16.668 MLD	Nil	Nil	5		
			Decided to submit DPR for As	1no., capacity- 0.59 MLD	1 nos., capacity- 0.5 MLD	Nil	2		

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status					
				TS issued	1 no., capacity-0.06 MLD	Nil	Nil	1
				Selection notice issued but selection agreement to be executed	5 nos, capacity-4.94 MLD	2 nos., capacity-0.2 MLD	Nil	7
				Awarded but not started	4 nos, capacity-19.86MLD	Nil	Nil	4
				Work started but stalled	1 no., capacity-0.27 MLD	2 nos., capacity-0.2 MLD	Nil	3
				Technical sanction to be issued	Nil	2 nos (mobile septage plants), capacity-0.2 MLD	Nil	2
				Tendering stage	2 nos., capacity-0.1415 MLD	Nil	Nil	2
				Total	70 nos., capacity-101.775 MLD	7 nos., capacity-101.775 MLD Septage Plant- 2 nos, capacity-0.2 MLD	70 nos., capacity-0.8MLD	84

Sl. No.	Activity to be monitored	Timeline	Submission of progress by State/UT- compliance status	
	Commencement of setting up of STPs and connecting all the drains and other sources of generation of sewage to the STPs must be ensured	Progressing		Progressing
	Timeline for completing all steps of action plans including completion of setting up STPs and their commissioning	Progressing		Progressing
	Chief Secretaries may set up appropriate monitoring mechanism at State level Specifying accountability of nodal authorities not below the Secretary level Chief Secretaries may have an accountable person attached in their office for this purpose	Completed		<p>*Vide G.O.(Rt)No.93/2020/WRD dated 28.01.2020 Government of Kerala nominated Deputy Secretary (Projects), Water Resource Department as the nodal authority, Government of Kerala for monitoring the compliance of the directions in the order on fortnightly basis and to maintain record of progress and to act as an accountable person to the Chief Secretary for the purpose.</p> <p>*Vide G.O.(Rt)No.223/2020/WRD dated 12.03.2020 Government of Kerala appointed a monitoring committee comprising of Additional Chief Secretary, Water Resources Department as Chairperson and Principal Secretary, LSGD, Principal Secretary, Environment, Secretary, Water Resources Department and Staff officer to Chief Secretary as nodal officers & members.</p>
	Monitoring at State level must take place	Fortnightly		Review on progress of action plans is being done at district and state level

11.9 Air Quality Management

Short term steps suggested for improving Air Quality

SL. NO.	ACTION	IMPLEMENTING AGENCY	IMPLEMENTATION TIMELINE
1	Launching extensive awareness drive against polluting vehicles	Motor Vehicle Department	
2	Ensuring strict action against visibly polluting vehicles	Motor Vehicle Department	
3	Steps to prevent parking of vehicles in non designated areas.	Motor Vehicle Department /State Police- Traffic	
4	Introducing wet/Mechanized vacuum sweeping of roads.	Local Self-Government Department	
5	Controlling dust pollution at construction sites by providing an appropriate covering system	Local Self-Government Department	
6	Ensuring carriage of construction material in closed/covered vessels.	Police Department	

Long term steps suggested for improving Air Quality

SL. NO.	ACTION	IMPLEMENTING AGENCY	IMPLEMENTATION TIMELINE
1	Retrofitting of diesel vehicles with particulate filters	Motor Vehicle Department	
2	Installation of the vapour recovery system in fuelling stations	Petroleum and Explosives Safety Organization (PESO) /Pollution Control Board	
3	Promoting battery operated vehicles	Motor Vehicle Department	
4	Banning of old diesel vehicles in a phased manner	Motor Vehicle Department	
5	Undertaking Greening of open areas	Local Self-Government Department/ Public Works Department	
6	Creation of green buffers along the traffic corridors.	Local Self-Government Department/ Public Works Department	
7	Development of a proper system for ensuring garbage/municipal solid waste/biomass/leaves connection and disposal and to avoid open burning.	Local Self-Government Department	
8	Promoting the use of LPG only and to avoid the use of kerosene/ firewood in restaurants/dhabas/roadside eateries.	Local Self-Government Department	
9	Introduce water fountains at major traffic intersection, wherever feasible	State Highway Authority of Kerala (SHAK)/ National Highways Authority of India / Public Works Department (PWD)	
10	Take steps for blacktopping/pavement of road shoulders to avoid road dust	Public Works Department (PWD)	
11	Prepare an action plan for public transport on CNG mode.	Motor Vehicle Department	
12	Ensure the proper collection of solid waste (biomass)	(Local Self-Government Department (LSGD))	
13	Ensure strict enforcement of the ban on burning of agricultural waste and crop residues	Agriculture Department	
14	Ensure strict action against industrial units not complying with standards.	Pollution Control Board	
15	Ensure DG sets meeting the standards only be allowed to operate	Department of Electrical Inspectorate/Pollution	

11.10 Noise Pollution Management plan

Sl. No.	Action	Responsible agency/ department	Current status
1	Arrangement of noise monitoring devices	Police Department	The details of noise monitoring devices and its specification were obtained from the Kerala State Pollution Control Board. A team headed by the ADGP, Social Policing and Traffic to select a suitable device for the Police Department has been constituted. The ADGP, Social Policing and Traffic has submitted the report with the details of Technical specification of noise monitoring device to be purchased for Police Department and suggested to procure 19 devices one for each District through GEM Portal. Action has been initiated for the purchase of the device.
2	Training to the Police staff regarding the use of sound level meter	Police Department	Training imparted
3	Development of robust protocol for taking appropriate action against the defaulters	Police Department	Draft protocol has been prepared.
4	Installation of noise limiters in potential noise polluting devices	Police Department (loud speakers/ public address system/vehicles) Kerala State pollution Control Board (establishments coming under the consent purview of the Board)	Action shall be taken Direction is being given by the Kerala State pollution Control Board to all potential establishments/ industries which come under the consent purview of the Board to install noise limiters with data loggers in all sound producing equipments/instruments and to retrofit existing instruments or equipments with the noise limiters with data loggers. Condition regarding the same is also being incorporated in the consents being issued from the Board.

References

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3. <https://mausam.imd.gov.in>
4. <https://mines.gov.in>
5. <https://sdma.kerala.gov.in/>
6. <https://cleankeralacompany.com/>
7. No. 711/G/2022/SM letter from Suchitwa Mission
8. <https://dmg.kerala.gov.in/mineral-resources/>

8.5.3. Action plan

Table 42: Action plan

SI. No.	Subject	Activities	Implementing agency	Funding agency	Timeline
1.	Monitoring of industrial/non-industrial consented units in the state	Survey of industrial/non-industrial consented units in the state using Mobile application	KSPCB		
		Inspection of consented units, collection of effluent sample, emission sample and hazardous waste if any	KSPCB		
		Instruction for non compliance units if any	KSPCB		
		Strict monitoring of waste disposal (effluent, solid wastes, sludge) in the industrial unit in the surveyed area and also in the catchment of the river	KSPCB		
		Quality of treated water generated and the quantity of water reused	KSPCB		
		Ensure proper treatment and disposal facility for waste water in the establishments	KSPCB		
		Monthly progress report is to be submitted by the District office to Head office	KSPCB		