ANNUAL REPORT 2021-22

CENTRAL POLLUTION CONTROL BOARD
REGIONAL DIRECTORATE, BENGALURU

CENTRAL POLLUTION CONTROL BOARD
REGIONAL DIRECTORATE BENGALURU

RD's MESSAGE 2021-22

Dear Readers

The year 2021-22 started with the challenges and went through testing times, amid the persisting COVID situation. However, as usual we strived to maintain the quality work & carried out our activities as per the mandates. The first and foremost challenge was to coordinate with the industries and stakeholder organization to convert nitrogen producing pressure swing adsorbent (PSA) based nitrogen plants to produce oxygen in the event of huge demand for medical oxygen due to COVID pandemic. CPCB, RD, Bengaluru took lead and coordinated with various industries to convert their nitrogen PSA plants to produce medical oxygen gas. Several days, we tirelessly persuaded many industries to produce oxygen from industrial PSA plants. Once, the COVID situation slowly strolled to normalcy, CPCB, RD resumed the field assignments and carried out several inspections, field monitoring activities and other outstation assignments. We were also in the forefront, conducting various awareness activities and training programmes through webinar as well as interactive workshops, right from the World Environment Day, 2021. RD, Bengaluru has contributed outstandingly by filing Technical Reports before Honourable Green Tribunal (NGT) and High Courts. As usual we have strived our best to produce quality reports in each matter and provided significant inputs and suggestions in many NGT matters. With immense please, I proudly present the gist of TEAM RD, Bengaluru's activities in the form so Annual Report- 2021-22. Apart from regular activities, this year we could publish two technical handbooks and one research article collaborating with Karnataka PCB and other stakeholders.

For further information, please see CPCB website and please reach us through email in case of queries and suggestions.

S Suresh, Regional Director
Bengaluru-560079
080-23233739/ zobangalore.cpcb@nic.in/ www.cpcb.nic.in

Bengaluru-79
080-23233739
zobangalore.cpcb@nic.in
www.cpcb.nic.in

CENTRAL POLLUTION CONTROL BOARD
REGIONAL DIRECTORATE BENGALURU

CREDITS

OVERALL SUPERVISION & COORDINATION
S. SURESH
REGIONAL DIRECTOR

REPORT PREPARATION & COMPILATION
ANJANA KUMARI V
SCIENTIST D

LAYOUT
Dr DEEPESH V
SCIENTIST C

CONTRIBUTIONS
ALL TECHNICAL, SCIENTIFIC, ADMIN & ACCOUNTS OFFICIALS

Bengaluru-79
080-23233739
zobangalore.cpcb@nic.in
www.cpcb.nic.in

Table of Contents

S.No	Description	Page No
1.	Inspections/monitoring conducted during 2021-22	01
2.	A. Project Head I: Pollution Assessment (Survey and Monitoring)	02
3.	1.1 Auditing of NAMP Stations	02
4.	1.2 Auditing of NWMP Stations	02
5.	1.3 Monitoring of inter-state river water quality stations	02
6.	1.4 Review of status of implementation of action plans in Non-attainment cities under NCAP	02
7.	B. Project Head – II. Scientific, technical activities, R & D	03
8.	2.0 Infrastructure development of laboratory, personnel protective equipment, muffle furnace, flame photometer, digital burettes, DO meter etc	03
9.	2.1 Development of Ring Test Facility	04
10.	2.2 Procurement of computer and peripherals & software	05
11.	2.3 Procurement of AC's, furniture's & fixtures, replacement of UPS etc	05
12.	2.4 Operation & Maintenance and of capacity building of CAAQMS stations in Bengaluru, Revamping & Strengthening with air quality parameters of CAAQMS etc	05
13.	3. Project Head – III (b) Industrial Pollution Control (Standards, Technologies and Enforcement)	06
14.	3.1 Salary of regular staff, TTA, Medical Re-imbursements, Children Education Allowance, performance auditing, LTC and other allowances	06
15.	3.2 Laboratory activities:	06
16.	3.3 Weeding out of old files and disposal of old/obsolete items:	08
17.	3.4 Inspections/monitoring conducted in compliance to Hon'ble NGT/other court directions	09
18.	3.4.1 Key highlights of NGT & other court directed works	09
19.	a. Monitoring of MSW landfill site & water quality of the nearby drains & river for leachate contamination	09
20.	b. Joint committee report submitted before the Hon'ble NGT SZ Bench, Chennai in the matter of O.A No. 71/2021	12
21.	c. Environmental damage imposed against illegal sand mining in Sita River, Udupi, Karnataka	13
22.	d. Joint committee report submitted before the Hon'ble NGT SZ Bench, Chennai in the matter of O.A No. 24/2021	14
23.	e. Compliance verification of M/s Mother Earth Enviro Pvt. Ltd (MEEPL), Treatment Storage & Disposal Facility (TSDF) & environmental damage assessment	15
24.	f. Assessment of Environmental damage caused due to improper handling of flyash by M/s UPCL, Udupi	15
25.	g. Joint committee report submitted before the Hon'ble National Green Tribunal, Southern Zone, Chennai in the matter of OA 54 of 2016 (SZ)	16

S.No	Description	Page No
26.	h. Joint Committee Report submitted before Hon'ble NGT, PB, New Delhi in the matter of NGT case OA No. 324/2021	16
27.	i. Joint Committee report submitted to Hon'ble NGT, Chennai in the matter of NGT case OA 225/2021	17
28.	j. Joint Committee constituted by Hon'ble NGT, Chennai in O.A No. 13 & 14 of 2020	17
29.	k. Joint committee constituted in the matter of NGT case OA 304/2019 regarding the safe distance for stone queries with the habitation in Kerala	18
30.	l. Issues with respect to siting of petrol pumps in Kerala	18
31.	3.5 Deepawali Monitoring, 2021	19
32.	3.6. Implementation of Rajabhasha	19
33.	3.7. Redressal of public complaints	20
34.	3.8 RTI Matter	21
35.	3.9 Study visit of the committee on Subordinate Legislation, Rajya Sabha to Goa	21
36.	4.0 Project Head – IV: Training programmes, mass awareness, capacity building, etc.	21
37.	4.1 Celebration of World Environment Day-2021	21
38.	4.2 Celebration of Ocean Day, 2021	22
39.	4.3 Webinar on "Legacy Waste Management in Karnataka"	22
40.	4.4 Awareness cum Demonstration for Eco-Friendly Ganesha Festival	22
41.	4.5 Awareness Programme on "International Day of Clean Air for Blue Skies"	22
42.	4.6 Celebration of World Ozone Day-2021	23
43.	4.7 Celebration of Engineers Day, 2021	24
44.	4.8 Customs Awareness week-2021	25
45.	4.9. Mass awareness program on phasing out single use plastic during iconic week October 4-10, 2021 as part of Azadi Ka Amruth Mahotsav	25
46.	4.10 Training & awareness campaign to field staff of SPCBs & PCCs and Educational institutions during Deepawali, 2021	26
47.	4.11 Guidance/training to students:	26
48.	4.12 Training on Wastewater treatment technologies	26
49.	4.13 Series of presentation at R R Institute of Technology, Bengaluru	27
50.	4.14 Next-Gen Municipal Solid Waste Management Conference	27
51.	4.15 Sustainable Development Initiatives for the Asian Countries	27
52.	4.16 District Level Training Program on Implementation of Bio-medical Waste Management Rules, 2016	27
53.	4.17 World Water Day, 2021	28
54.	4.18 International Women's Day, 2021	28
55.	4.19 Online training- Mentoring Young Environmental Leaders	28
56.	4.20 Training programmes attended	28
57.	Implementation of e-office	29
58.	5.0 Waste Management and Urban Pollution Control (plastic waste, Hazardous Waste, Municipal Solid Waste, Bio-Medical Waste, E-Waste & Vehicular Pollution)	29
59.	5.1 Random inspections of Hazardous Waste Units	29

S.No	Description	Page No
60.	5.2 Assessment of effectiveness of implementation of ban on Single Use Plastics (SUPs)	30
61.	5.3 Plastic Waste Recycling Industries Under EPR	31
62.	5.4 Inspection of Pan and Gutka manufacturing industries under Plastic waste management rules	31
63.	5.5 Disposal of Incinerable HW in Kerala	31
64.	5.6 Application of drones: Inputs from CPCB, RD, Bengaluru	32
65.	5.7 Conversion of Nitrogen Plant to Oxygen plant	33
66.	6.0 Technical documents prepared & published:	34
67.	6.1 "Handbook on Sampling and Preservation techniques for collection of water and wastewater samples"	34
68.	6.2 Document titled "Quality Assurance, Quality Control and good laboratory practices in water and wastewater laboratories"	34
69.	6.3 Published a research article on Modified method of COD analysis in calcium rich effluents	34
70.	Report on "Statistical Analysis of Ambient Air Quality data in Bengaluru and other Non- attainment cities in Bengaluru"	35

CENTRAL POLLUTION CONTROL BOARD
Regional Directorate, Bengaluru

Annual Report- 2021-22

Due to pandemic COVID-19 situation during FY 2021-22, the field visits & regular monitoring got restricted, hence not many fields investigations/monitoring could be conducted except for executing NGT directions. However maximum efforts were made in conducting awareness programmes on various environmental related topics through webinar & uploaded in social media. Several technical documents were prepared and submitted for publications. The major achievements of RD, Bengaluru during FY 2021-22 is detailed below:

Inspections/monitoring conducted under various projects

During 2021-22, following inspections were conducted under various activities and reports submitted in time bound manner.

S.No	*Description*	*Nos*
1.	No. of NWMP stations audited	22
2.	Inter-state water quality monitoring	08
3.	No. of NAMP Stations audited	04
4.	Inspections under NGT/High Court directions	48
5.	Inspections under public complaints	02
6.	Plastic Waste Recycling Units	12
7	Inspection of Pan & Gutka manufacturing industries	05
8.	Inspection of industries under random verification of Hazardous Waste Inventory	36
9.	Inspections of MSW sites	04
10.	Inspections under Rule 9 of HOWM Rules, 2016	01
11.	Inspections under Rule 11 of HOWM Rules, 2016	03
12.	Inspection of M/s Canara Paper Mills for ZLD project	01

13.	Inspection of CTSDFs	03
14.	Inspection of CBMWTFs	02
15.	Assessment of phasing out of SUP in Bengaluru & Thrissur City	02
16.	Inspection of Construction & Demolition Waste Processing Site	01
	Total	**154**

A. Project Head I: Pollution Assessment (Survey and Monitoring)

1. Strengthening of National Ambient Air Quality Stations (NAMP), Implementation of action plan for non-attainment cities, Inspection/Auditing of National Water Quality Monitoring Programme and review of action plan in polluted river stretches, monitoring of inter-state water quality stations.

1.1. Auditing of NAMP Stations

There are 74 NAMP stations in the region and 04 stations were audited during 2021-22. The capacity of ambient air quality monitoring station and manpower was evaluated for all states during 2021-22. The shortcomings after the audit were notified to the concerned SPCB's/ PCC's.

1.2. Auditing of NWMP stations

There are 520 NWMP stations in the region and 22 stations were audited during the year. The sampling procedure, preservation techniques and analytical methods was evaluated. The shortcomings after audit were communicated to the concerned SPCBs for corrective action.

1.3. Monitoring of inter-state river water quality stations

Seven inter-state river water quality stations were monitored in each quarter. Among these, the DO levels in river Tungabhadra, Cauvery, Manjira, Krishna, Bhīma and Godavari is more than 6 mg/L while in River Thenpennaiyar the DO levels are less than 1mg/L indicating anaerobic conditions. Similarly, BOD levels in Thenpennaiyar is in the range of 32 to 47 mg/L. River Thenpennaiyar falls below designated best use class E. Other rivers are falling in class- A & C.

1.4 Review of status of implementation of action plans in Non-attainment cities under NCAP

- CPCB has identified 132 non-attainment cities in the Country. In order to review the status of implementation of action plans, CPCB has identified nodal-officers. From RD, Bengaluru seven nodal officers have been identified to review the action plans and to submit report for once in two months for seven cities i.e., four cities (Bengaluru, Davangere, Hubli-Dharwad and Kalaburgi) in Karnataka and three cities (Kurnool, Kadapa and Ananthpur) in Andhra Pradesh.

- Regular review meetings of the city implementation committees are being conducted with the local authorities. So far two visits have been made to each of the cities by

CPCB-nodal officers to review the ground level implementation status and status reports/performance assessment reports are submitted.

- City specific clean air action plans have been prepared and rolled out for implementation in all NACs of above mentioned states. City action plans include actions to control vehicular emission, road dust, biomass/crop/garbage/MSW burning, construction activities, industrial emission and other city specific sources and have timelines and responsible agencies identified for implementing actions.

- City level implementation Committee and Air Quality Monitoring Cell at ULB level have been constituted in all NACs of Andhra Pradesh & Karnataka.

- The major issues and challenges in addressing the local authorities includes:

  i. Institute of Repute to be associated with CPCB for field visits to ensure the City Micro Action Plans are implemented.
  ii. Role of IoR to be defined clearly and their close coordination with line departments w.r.t. improvement of air quality of the city is very much required.
  iii. City Level Implementation Committee to be constituted with the concerned departments including CPCB.
  iv. Need for strengthening of infrastructure / monitoring capacity and capability for Source emission monitoring by SPCB (Air Quality)
  v. Lack of coordination among interdepartmental agencies for implementation of Micro level action plans Ex. Vehicular emission monitoring and Fuel Quality check.
  vi. With regard to Air Quality in the cities, need for installation of continuous ambient air quality monitoring stations and to be made operational. (the same is under progress).
  vii. Particulate Matter being the prominent source, micro level plan and actions to be taken with focus on vehicular emission control, construction activity in staggered manner and improvement of Road infrastructure of all cities.
  viii. Fund transfer to ULBs and other line departments from SPCBs for implementation of action plans to be channelized.
  ix. Industrial sources for Air Pollution to be focused and measures to be devised for enforcement. Monitoring mechanism to be strengthened.

B. Project Head – II. Scientific, technical activities, R & D

2.0 *Infrastructure development of laboratory, personnel protective equipment, muffle furnace, flame photometer, digital burettes, DO meter etc.*

The Regional Laboratory of Central Pollution Control Board, Regional Directorate, Bengaluru is having an advanced Environmental Laboratory for meeting its regulatory functions. The Regional Laboratory comprises of Air, Water/Waste water, Bio-science and Solid/Hazardous Waste sections and each section is having designated area or separate facility to analyze the respective samples of ambient air & source emission, water & waste water, bacteriological and solid & hazardous waste respectively.

Infrastructure:

The Regional Laboratory, Bengaluru is:

- Equipped with Sophisticated instruments such as GC-MS, GC, ICP- OES, IC, AOX Analyzer, Atomic Absorption Spectrometer (AAS), UV-Vis spectrophotometer, Bomb Calorimeter, Flash Point Apparatus, Analytical & Micro Analytical Balances, Ultra-Pure Water Purification System etc.
- Equipped to monitor and analyze Physico–Chemical Parameters, Metals, Pesticides, PAH, VOCs etc. in water & waste water samples, Particulates, Gaseous parameters, Metals etc. in AA & SE samples, Calorific Value, Flash Point, TCLP etc. in solid & HW samples.
- Equipped to analyze Bacteriological parameters such as Total and fecal Coliforms, E. coli, Fecal Streptococci, Heterotrophic plate count etc. in water and waste water samples.

Other salient features:

The other salient features of the Regional Laboratory, Bengaluru are highlighted below:

- Centralized air-conditioner system with negative pressure area
- Chemicals & Glassware Storage Rooms
- Sample Storage Room (Walk in Cooler)
- Balance Rooms with conditioning facility & anti vibration table
- Uninterrupted Power Supply
- Room for water purifier
- Separate room for heat generating equipment
- Fume Hoods & Ducts for exhausting Vapours from laboratory area
- Occupational Safety Equipment like Emergency Showers, Eyewashes, Goggles, Aprons etc.
- Sensitive Fire Alarm & Fire Fighting Systems
- Restricted Laboratory Access System

2.1 Development of Ring Test Facility

RD Bengaluru from long time is attempting to install the Ring test facility used for conducting Inter-Laboratory comparison on ambient air quality monitoring & analysis methods. Major parts of the facility consisting of mass flow meters of different flow capacities, mass flow controller, standard gas cylinders of known concentration, dilution system for maintaining desired concentration, ozone generator, continuous analyzers etc. have been procured. The tendering process for the procurement of the remaining items including compressor for dilution air generation, air drying and purification system, gas handling chamber, racks etc. were taken up and revised tender document was prepared. An S&T Committee was constituted to oversee the procurement and the following works have been completed;

- The technical specifications were finalized and tender document was published in CPP Portal and CPCB website
- Pre-Bid meeting was conducted as per the schedule
- The technical bids were opened and technical evaluation of the bids were completed
- The Committee finalized the technical comparative statement, prepared on the basis of the original bids and documents received.
- Approval from the competent authority is sought for opening of financial bids and completion of further formalities

2.2 Procurement of computer and peripherals & software

This office is having Annual Maintenance Contract for smooth operation & maintenance of the existing computer systems, laptops, printers and scanners. The optimal usage of computers, printers and scanners were achieved by timely procurement of Cartridges, drums & blades and other accessories as applicable. The provision of computers to individuals has made self-sufficient by allowing them to do tasks independently in a speedy manner.

In order to have upgraded facilities, during the financial year 2021-22, following items were purchased:

- Ten numbers All in one Dell computers of i7 intel core and 11th generation with integrated web cam and 1TB capacity HDD.
- Ten numbers of HP Monochrome Laser Beam Printers
- 25 cartridges of canon and Hp printers.
- Four computers were upgraded with 8 GB RAM to increase the speed of computers.
- Digital signatures for two officials for the purpose of e-procurement purchased.

2.3 Procurement of AC's, furniture's & fixtures, replacement of UPS etc.

A 30 KVA UPS (Uniline) for power back up along with 32 nos of 100 AH batteries purchased and installed in I floor through authorized agencies identified by the seller. The existing 60 KVA UPS in II floor is under CAMC maintenance by M/s Power One Microsystems Pvt Ltd., Bengaluru.

Eight Air Conditioners were purchased for UPS rooms and other locations in I and II floor through GeM portal. Presently, Air Conditioners (Cassette and split type) installed in I and II floors are maintained through CAMC awarded to M/s Toot MNE Pvt Ltd., Bengaluru.

2.4 Operation & Maintenance and of capacity building of CAAQMS stations in Bengaluru, Revamping & Strengthening with air quality parameters of CAAQMS etc.

Three CAAQM Stations are being operated under supervision of RD Bengaluru, located at Peenya (Industrial), BTM Layout (Residential) and Kadubeesanahalli – (Commercial). The air quality parameters monitored in the stations are PM_{10}, $PM_{2.5}$, NO, NO_2, NOx, NH_3, SO_2, CO, O_3 & BTX. The meteorological parameters such as Ambient Temperature, Relative humidity, Solar Radiation, Wind speed, Wind direction, Vertical wind speed and Barometric pressure are also measured. The supervision of the O&M by third party agency and analysis of data generated on quarterly basis has been carried out. Overall data capture rate is more than 90% for the year. The annual auditing of stations, covering the performance of analyzers & calibration, data generation and transmission, physical status etc. was carried out in July, 2021 and report was sent to HO. The commissioning report of newly installed analyzers in the stations were also prepared and sent along with the audit report. The O&M agency was instructed to rectify the shortcomings.

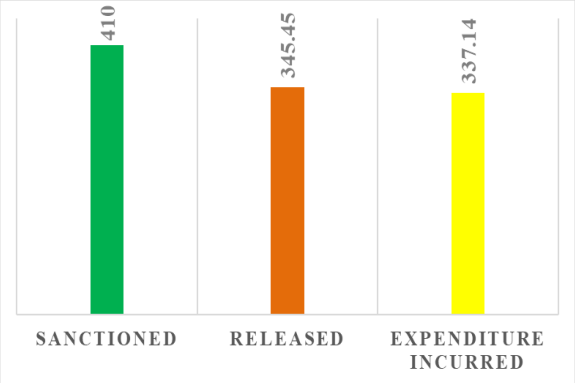
As the CPCB representative in the Committee, the meeting of the technical committee constituted by Kerala SPCB for evaluating the technical and financial specification of CAAQMS to be established at Alappuzha and Palakkad was attended through VC to finalize the tender

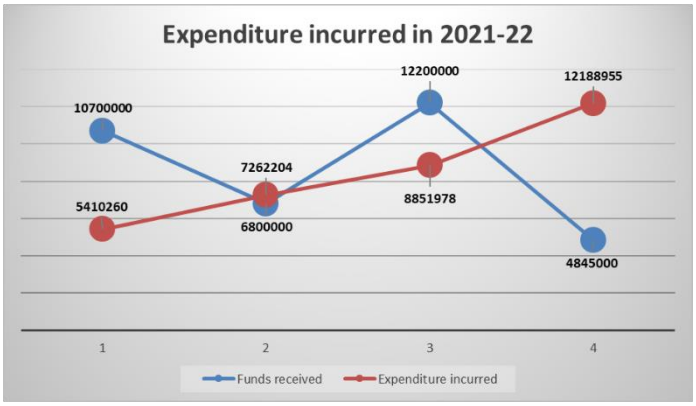
documents. It was informed in the meeting to review the proposed locations, to meet the CPCB guidelines.

3. Project Head – III (b) Industrial Pollution Control (Standards, Technologies and Enforcement)

3.1 Salary of regular staff, TTA, Medical Re-imbursements, Children Education Allowance, performance auditing, LTC and other allowances

Salary of staff are deposited timely. All bills are processed and settled well within the time following official norms. Rs. 4.10 crores have been sanctioned for RDB; out of which Rs. 3.37 crores expenditure has been incurred.





3.2 Laboratory activities:

Accreditation / Certification:

The Regional Laboratory, Bengaluru is:

- Accredited by NABL as per ISO/IEC 17025:2017 for 85 scope parameters comprising of ambient air, stack emission, water, waste water and solid waste. In February 2022, the laboratory successfully completed the Desk Top Surveillance Audit as per the standard and NABL requirements. The accreditation of the laboratory as per the standard ISO/IEC 17025:2017 was renewed by NABL till 3rd March 2023.
- Licenced by BIS as per the Standard IS/ISO 45001:2018 for implementation of Occupational Health & Safety Management System (OHSMS). In September 2021, OHS recertification cum change over audit was carried out by BIS as per IS/ISO 45001:2018 and the licence was renewed till 31st January 2023.
- Recognized under Environment Protection Act, 1986 as Environmental Laboratory to carry out the functions entrusted under the said Act and the Rules. Laboratory has submitted its application for renewal of recognition under E(P)Act, 1986 to CPCB Delhi in January 2022 which is under process.

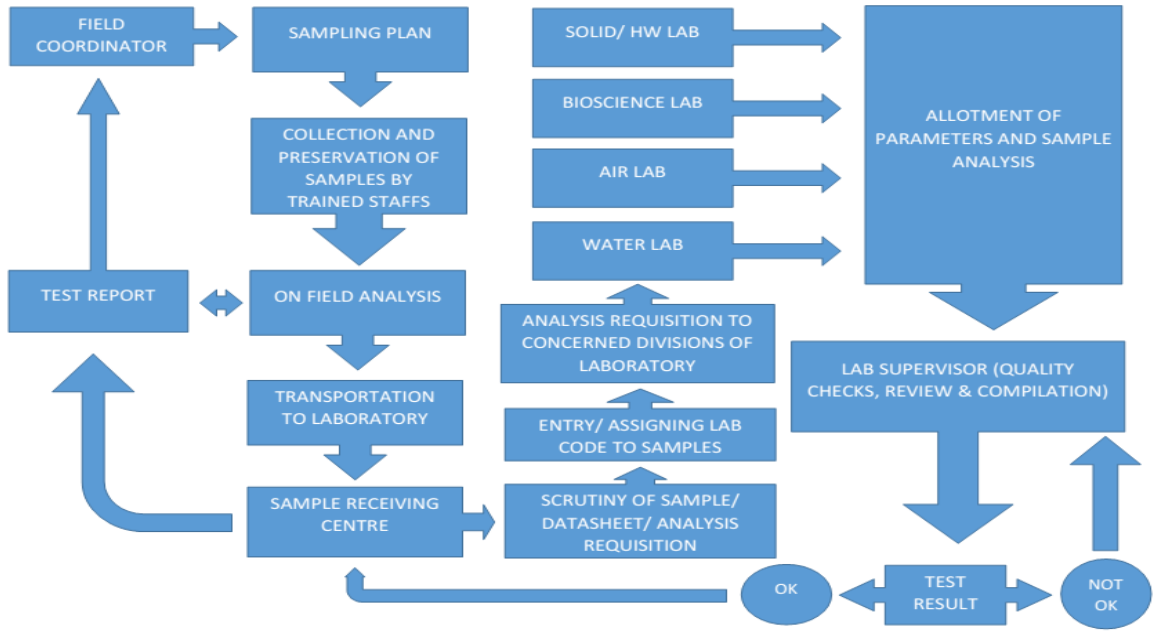
Meeting sampling requirements:

The laboratory is taking utmost care in implementing the above accreditations/certifications and strictly following requirements as per the above standards from collection of samples to till submission of test report. The laboratory deputes staff for sampling of water and/or air as per the test programme. The sampling locations are selected according to the monitoring plan of water, air, soil and sediments prepared in accordance to specific projects of CPCB. The laboratory staff / designated individuals responsible for drawing of samples from fields (water, air, soil, sediments,

etc.) follow the documented procedure for the transportation, receipt, handling, protection, storage, retention and disposal of test items to assure the integrity of the test and interests of the laboratory.

Handling of samples in the laboratory:

Sample drawn as per the approved sampling programme is handed over to the laboratory along with requisition slip which contain sample details and parameters to be analysed. On receipt of the samples in the laboratory, review of test request is done with check list available in the laboratory. Sample is registered by replacing the field code of the sample with unique laboratory code. With laboratory code of the sample, parameters are allotted to the concerned analysts and once analysis is completed, the results are entered in the concerned note book. The test results are verified and then compiled. After sample decoding, test report is prepared and send to the customer with the signature of authorized signatory. Thus, the laboratory has system for identifying test items and it is retained throughout the life of the item in the laboratory without any confusion. The Sample Flow Chart presented below in **Figure shows** the movement of sample in the laboratory:



Sample Flow Chart

The remnant of the samples is disposed of after all the tests are completed 15 days after issue of test report in such a manner that the environment of the laboratories remains clean.

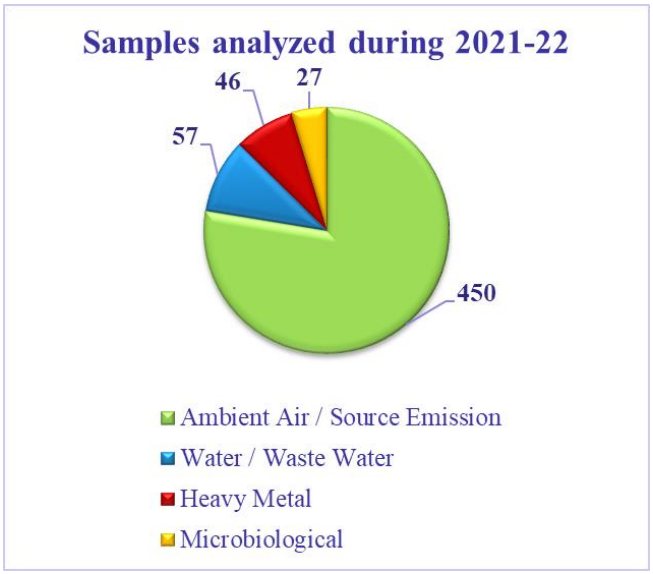
Quality Control:

Quality control practices such as the regular use of certified reference material and/or internal quality control using secondary reference materials, participation in proficiency testing, replicate testing of the sample, retesting of sample remnants and correlation of results for different characteristics of a sample are followed for monitoring validity of tests carried out. Quality control data are analysed and when found to be outside pre-defined criteria, planned action is taken to correct the problem and to prevent reporting of incorrect results. The laboratory is regularly participating in Proficiency Test (PT) / Analytical Quality Control (AQC) programme and getting satisfactory performance. In 2021-22, the laboratory participated in 33rd & 34th AQC Programme conducted by CPCB H.O. Delhi for Heavy Metals and Physico – Chemical parameters and came out with a performance of 77.78 % and 86.36 % respectively.

Environmental samples analysed during 2021-2022:

The Regional Laboratory has received and analysed about 580 Nos. of environmental samples for various parameters during the financial year 2021-22 and the details are presented below:

Sl. No.	Details of Environment Samples	No. of Samples Analysed
1	Ambient Air / Source Emission	450
2	Water / Waste Water	57
3	Heavy Metal	46
4	Microbiological	27
Total		**580**



The above table shows that the laboratory has received on an average of about 48 Nos of samples per month during the financial year 2021-22. Due to covid-19 pandemic, field activities restricted as a result receipt of environmental samples to the laboratory too decreased to about 50% since 2020.

3.3 Weeding out of old files and disposal of old/obsolete items:

A Committee was constituted as part of Special Campaign Drive for "Weeding out of old files and other unused and obsolete materials including E-wastes". The Committee reviewed and finalized the list of old files to be disposed and also prepared the inventory of the other old items such as e-waste, lab instruments, furniture fixtures and other miscellaneous items. and all the items identified for disposal have been shifted to the ground floor of the office. The disposal of the items was taken up in a phased manner and in the Weeding out of unwanted files and old unusable items in the first and second floor of RD, Bengaluru office has been successfully completed. The weeded out files and old papers, plastic containers and old tyres were disposed off to the highest quoted bidder and 1411 kg of old file paper/reports, 54 kg of plastic items and 220 kg of old tyres were disposed in the first phase, which generated Rs. 25,234.00/- as revenue to the office. Approximately 200 sq. ft of utilizable space has also been created in the first & ground floor of RD Office. A report in this regard was prepared and forwarded to H.O. The disposal of other items identified to be disposed, including e-waste, lab instruments & equipment, furniture fixtures, old batteries & other miscellaneous items shall be taken up in the second phase.

3.4 Inspections/monitoring conducted in compliance to Hon'ble NGT/other court directions

In the financial year 2021-22, 50% of the work was dedicated for executing & implementing NGT directions. Officials from RD, Bengaluru officiated as member in 32 joint committees constituted by Hon'ble NGT and involved in inspections/ monitoring as detailed below. Totally around 72 affidavits were filed in various courts 2021-22. The officials in association the SPCBs/ PCC and other agencies identified by the NGT, conducted site inspections/ monitoring and audits in compliance with NGT orders. RD, Bengaluru's interventions and involvements in joint committees have resulted in positive outcomes and resolve for issues raised in the Tribunal. Around 48 inspections/monitoring were conducted including industries, drains, STPs, MSW Site, TSDF, surface water monitoring, ground water monitoring etc., queries & reports are submitted to NGT

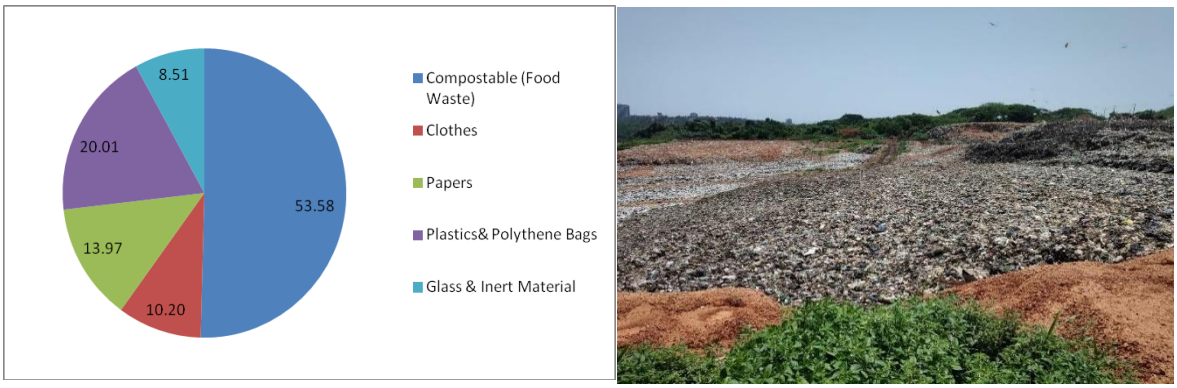
3.4.1 Key highlights of NGT & other court directed works

a. Monitoring of MSW landfill site & water quality of the nearby drains & river for leachate contamination:

A. MSW & PLASTIC WSTE MANAGEMENT:

The Hon'ble High Court of Karnataka in WP No. 9367 of 2020 titled Karnataka legal services authority versus the State of Karnataka & others had directed CPCB to make a site visit at the municipal solid waste site at Pachanady, Mangalore with a view to ascertain whether the plastic waste is being treated and disposed of in accordance with law. Accordingly, the existing municipal waste processing site and the adjacent landfill site/legacy waste dump site were visited and the details of MSW collection and processing were examined during the monitoring to assess the compliance to regulatory norms. A detailed report with respect to the generation, collection and disposal of plastic waste by the municipality, the gaps identified in this regard and recommendations for improvement was prepared and submitted before the Hon'ble Court. The major observations and recommendations made in the report are;

- The Mangalore Municipality is generating on an average 300 – 350 TPD of municipal solid waste, which consists of approximately 20 % plastic waste and the Corporation is practicing door to door waste collection with a broad segregation into wet waste, mixed waste and dry waste apart from other specific waste collection streams such as market waste, poultry waste etc.
- It was observed that due to the lack of segregation of MSW, all the three waste fractions contain plastic waste;
    - The dry waste collected and brought to the waste processing yard on weekly basis.
    - The mixed waste (mix of wet and dry waste) which is diverted into the land fill on daily basis
    - The wet waste fraction, which is processed in the yard.



Waste composition and legacy waste storage

- MCC is segregating some quantities of plastic wastes from the dry waste fraction and mixed waste fraction, which are compacted using baling machines and stored in the waste processing site. Approximately 250 – 270 Tons of segregated and mixed dry waste including plastic waste is stored presently in the processing yard.
- Considering the quantity of plastic waste generated in the city (50-60 TPD on avg.) and the available capacity of baling machines in the MSW processing plant (6-7 TPD), it can be inferred that only a very meagre quantity of plastic waste is getting properly segregated and disposed in a scientific manner and majority of the recyclable and non-recyclable fractions of the plastic waste, especially in the wet waste and the mixed waste collected on daily basis is still diverted for landfilling and a huge gap exists in the generation and proper disposal of plastic waste.
- MCC shall explore options for disposing the recyclable plastic waste through other authorized plastic waste recyclers in the city, till the time full-fledged equipment and machineries are procured and commissioned as per DPR prepared.
- Considering the practical difficulties in achieving the segregation of plastic wastes as proposed in the DPR, it is felt that alternate options such as utilization of non-recyclable fractions for bitumen mixing in road construction can also be explored by the MCC.
- It is observed that the low density plastics, polythene bags, wrap films etc. constitute a major part of the dumped legacy waste and movement of the same due to water infiltration, as the top of the waste dump is not compacted, may be the major reason for the sliding of wastes. Segregation of low density plastic waste may be carried out as far as possible before compacting and capping of the legacy waste to prevent such incidents of massive waste slides. Huge quantities of plastic wastes are available in the dump sites, which can be recycled or scientifically disposed, after proper segregation.

The Hon'ble Court took the report into record and directions were issued to the Municipality for responding to the report and the compliance to recommendations is being reported by the MCC and matter is going on before the Court. In this connection, high level meetings convened by the Principal Secretary, Urban Development, Govt of Karnataka, Municipal Commissioner, Mangalore and the Deputy Commissioner, DK District for discussing upon the observations made in the report by CPCB and further actions for management of MSW and legacy waste at the landfill site was attended and technical inputs and views of CPCB were communicated.

B. LEACHATE CONTAMINATION FROM LANDFILL: The Hon'ble High Court of Karnataka had further directed CPCB to carry out the testing of water at various levels including at the entry and exit point to find out the exact quality of water supplied to the people at large by the Mangaluru City Corporation, while hearing the same Writ Petition. Accordingly, after completing the preparatory works and gathering the basic information with concurrence of other offices involved, the CPCB team completed the site visit & monitoring during 29-30th Dec, 2021. The CPCB team, in the presence of other agencies, collected water samples from Ten different locations, covering the possible entry & exit points and the same were analysed to assess the quality water supplied for domestic consumption. A detailed report covering all the aspects as directed by the Hon'ble Court was prepared and submitted by CPCB. The major conclusion and recommendations made in the report are:

Major sampling points and the drain joining the River

- Leachate stream flowing out from the MSW land fill site is not meeting the prescribed Standards as per the E (P) Act**.** However, analysis results of the samples collected at the intermediate drain, nearby to the Land fill site (Vamanjoor Village, 1.5 km from the landfill site), the major drain at "ManjalPatha" (5-6 km from the site) and River 'Gurupura' samples, where the leachate is getting mixed ultimately, does not indicate major impact from the leachate stream.
- It has to be inferred that the in situ treatment by microbial culture addition, the dilution by storm water and free flow with available aeration in the rocky terrain flow path is naturally degrading the pollutant loads in the leachate stream and not causing much impact in the joining drains and River water.
- The major drain at 'Manjalpatha' is directly meeting the 'Gurupura' River, near 'Marakkada' Railway Bridge. Presence of Total Coliforms and high values of e-coli reported in this drain at indicate mixing of raw sewage/partially treated sewage along with storm water. Higher values of parameters such as Ammonical Nitrogen, Nitrate, Alkalinity, Nitrate, TDS etc. are also reported in this drain in comparison with the river water quality.
- However sufficient dilution is available in the River water and the analysis results of three water samples collected from the 'Gurupura' River, at the 'Maravoor' Dam Reservoir - downstream of the River, near 'Marakkada' bridge - immediately after the confluence of the drain and at 'Moodeshedde' Dam - upstream point of the River indicates similar characteristics.
- The results of the samples taken from the WTP at Kenjar and two nearby residences, where the treated water is being supplied indicates that the treated water from the WTP is mostly conforming to the drinking water standards as per IS 10500;2012.
- Slight increase in Tri Halo Methane - THM (Bromodichloro methane & dibromochloro methane) values and presence of COD (11-13 mg/L) is reported in all the samples. Higher THM values are probably resulted from reaction between the Free Residual Chlorine in the treated water and slight amount of COD (organic matter) reported in the treated water.
- The MCC shall take adequate steps to address the following issues;
    - Providing temporary treatment facility for Land fill leachate stream by utilizing the collection tank and the existing Leachate Treatment Plant (LTP) at MSW processing facility or Sewage Treatment Plant at 'Pachanady' after assessing the capacities, till the

installation of permanent LTP at land fill site as part of legacy waste bio mining project.

- Ensure proper operation and maintenance of the existing Leachate Treatment Plant (LTP) at MSW processing facility.
- The contamination/sewage mixing in the major storm water drain meeting the 'Gurupura' River is likely to affect the River Water quality, especially in the lean flow period/Summer season and needs to be addressed effectively.
- As a long term measure MCC may explore the possibility of diverting the contaminated storm water drain to the existing STP by installing collection wells or to divert the drain to the downstream of 'Maravoor' Dam reservoir, which is not utilized for potable purposes due to salt water intrusion.

- The operator of the WTP at 'Kenjar' shall optimize the Chlorine dosing for disinfection, so as to control the THM formation to be within limits. Random samples shall be collected from the distribution network/end user so as to identify and eliminate chances of any local contamination, as evident from some of the sample analysis results.
- KSPCB shall regularly monitor the water quality parameters at relevant locations including storm water drains, River, performance of LTP and STP, etc. and coordinate with MCC for bringing required improvements.

The Hon'ble Court has taken the report into record and directions were issued to the Municipality for responding to the report and the compliance to recommendations is being reported by the MCC and matter is going on before the Court.

b. Joint committee report submitted before the Hon'ble NGT SZ Bench, Chennai in the matter of O.A No. 71/2021-

The Hon'ble NGT moved an application on its own taking SUO MOTU cognizance, based on the News items in The New Indian Express Newspaper, dated 10.02.2021, "Oil leak from titanium factory hits Thiruvananthapuram coast, public barred from affected stretch" and News item in the Hindu, dated: 10.02.2021, "Furnace oil from Titanium Factory spills into sea" and News item in Mathrubhumi, English Edition Dt. 10.02.2021, "Glass furnace pipe bursts at Titanium factory in TVM, oil leaked to sea". The Tribunal appointed a Joint Committee consisting of Senior officials from office of the District Collector, KSPCB, TNCZMA (replaced by Kerala CZMA afterwards), CPCB and NIOT to inspect the area in question and submit a factual as well as action taken report including imposition of environmental compensation and the remedial measures for restoring the damage caused to marine ecology and the extent of oil spill in the sea, the nature of damage caused to the aquatic and marine life and the remedial measures to restore the same to its original position and also to assess the environmental compensation, if there is any violation. CPCB was made the nodal agency in the matter.

In compliance to the directions, the Committee meetings were convened and the site visit at the industry premises was conducted to inspect the premises, collect samples and verify the related documents. The Joint Committee members had detailed deliberations on the oil leakage incident, causes and impact on surrounding environment, preventive actions taken after the incident and on-going actions by other agencies and departments. The Committee members also conducted a detailed inspection of the plant, furnace oil storage section, drains through which the oil leak reached the seashore etc. and the TORs given by the Tribunal in its order were deliberated in detail. The soil and water samples collected by the Committee were handed over to Kerala SPCB for the analysis of relevant parameters. The Committee also decided to collect few reference soil samples so as to correlate with the earlier results. Accordingly, the Committee finalized its report after the receipt of the results and the same

was submitted before the Hon'ble Tribunal. Some of the key findings and recommendations of the Joint Committee report are;

With respect to the incident of oil leakage which happened due to negligence in assessing the pipeline for damages, as part of routine safety audits, the following steps needs to be implemented by the unit to avoid such incidents in future;

The periodic assessment of Pipe Integrity (including internal crack, corrosion and erosion) has to be made at least once in five years, so that the status of the pipeline shall be known and accordingly replacement period for the pipe shall be decided.

The onsite emergency plan needs to be revisited to incorporate such scenarios of leakages of furnace oil or other chemicals into the seashore considering the proximity of the unit to the sea shore and existence of effluent drain.

The unit shall install automatic leak detection and cut-off systems to avoid such leakages and should implement the recommendations made by the Committee constituted by Govt. of Kerala, without further delay.

With respect to the overall improvement in environment management and assessment of long term impact of the oil leakage as well the historical practice of effluent discharge on the coast line including marine ecosystem, the unit shall take up a detailed long term study in consultation with reputed institutes in this field (Fisheries & Marine ecology) in line with the internationally accepted systematic methods for surveying an affected shoreline after an oil spill such as Shoreline Clean up and Assessment Technique (SCAT).

The analysis results indicate presence of traces of oil & Grease still in the sea shore sand samples and a detailed investigation and risk assessment study for remediation of sea shore shall be carried out to assess the impacts occurring from activities handling oil and grease, acid etc. and extent of damage (spatial) to environment, ecology and livelihoods estimated. Based on these estimates, emergency response procedures (ERP) shall be developed and costs assigned in the annual budget for monitoring the ERP. In this regard, the entire expenditure for the investigation, risk assessment study and remediation shall be borne by the unit.

Considering that the unit has installed systems such as MFRO which facilitates reuse of treated effluent, the practice of discharge of effluent to the sea shore shall be discontinued by the unit. KSPCB may consider amendment of the Consent conditions to this extent after ensuring that reject management systems are installed by the unit to achieve Zero Liquid Discharge status.

The unit shall comply with the CRZ notifications and obtain the necessary clearances from KCZMA as per the regulations.

The report has been taken into record by the Tribunal and some additional details have been sought from the Committee and the submission of the same is under progress.

c. Environmental damage imposed against illegal sand mining in Sita River, Udupi, Karnataka

OA 71/2017 in the matter of illegal sand mining at River Sita, Udupi, Karnataka: Joint committee was directed to assess the environmental damage caused by illegal sand mining and restoration cost. The committee assessed the following:

i. Environmental compensation for dredging carried out in 535m length in Sita river without obtaining necessary clearances under the CRZ Notification, 2011 and EIA Notification 2006

ii. Environmental compensation for dumping of 47,155 M3 of dredged materials to fill up part of the Seeta river and reclaiming about 5.9 acres of land in the CRZ (ecologically sensitive Mangrove buffer zone and fish breeding) area.

iii. Restoration cost of the 5.9 acres of reclaimed land
   a. Removal of dredged materials stored at 5.9 acres
   b. Removal of bund constructed around stored dredged material
   c. Cost of restoration of mangrove

The total cost of environmental compensation of **Rs. 2,00,65,165/-** was estimated and submitted to NGT.

The Hon'ble NGT accepted the report and in its judgement dated 27 July, 2021 directed the following: "the Public Works Department, Port and Fisheries Department, Udupi and Minor Irrigation Department, Udupi are jointly and severely liable to pay the environment compensation primarily of Rs. 2,00,65,165/- (Two crores sixty-five thousand one hundred sixty-Five) which can be deposited with the Karnataka State Coastal Zone Management Authority under the account of Coastal Environment Management Fund within a period of three months and they are at liberty to recover the amount from the 15th respondent who had done this, if they are liable to obtain necessary permission under the tender conditions and committed any violation of tender conditions, in accordance with law".

d. Joint committee report submitted before the Hon'ble NGT SZ Bench, Chennai in the matter of O.A No. 24/2021

In the Original Application No. 24 of 2021 related to installation of a Water Treatment Plant (O.A Ninan, Kerala. Vs The State of Kerala, Thiruvananthapuram & ors) the Hon'ble Tribunal had appointed a Joint Committee in order to ascertain the allegations made in the application and the feasibility of the project at the present site and also regarding the scientific and environmental effect of utilizing the water without having any proper treatment system of the reject water and sludge that is to be generated. The joint committee comprised of the District Collector, KSPCB, CPCB, State Public Health Engineering Department and the Urban Development Department. The Committee noted during the site visit that WTP is in proposal stage only and site acquisition and civil works etc. are yet to commence at the proposed site. The Joint Committee had detailed deliberations on the major contentions raised by the petitioner regarding the feasibility, siting criteria, environmental impacts related to reject management etc. and accordingly the report was finalized and submitted before the Tribunal. Some of the key findings and recommendations of the Joint Committee report are;

The proposed Water Treatment Plant (WTP) by KWA at the identified location is not expected make much adverse impact on the environment, if the plant design and operations are conducted as per the proposal detailed by KWA before the Joint Committee.

The back wash and sludge management, shall be carried out in the following manner, as already proposed by the KWA;

Filter back wash management - The Wash water recycling system as envisaged by KWA as part of the proposal shall be materialized as a component of the treatment plant along with

various other components of the plant and discharge of back wash water outside the WTP premises shall be eliminated.

Sludge management system – A proper sludge management system, including sludge thickening and sludge dewatering either by using drying bed, sludge lagoon, filter press, vacuum filtration or centrifuge shall be provided for disposal of sludge as part of the proposed WTP. The dried sludge shall be reused/disposed in an environment friendly manner for land fill, brick and tile manufacturing etc.

The standard practices have been followed for the feasibility studies and identification of location of the proposed WTP and deviation from existing guidelines/manuals by relevant authorities such as CPHEEO etc. were not observed by the Committee and it is felt that modifications may not be required

Further directions/final order are awaited in the matter.

e. Compliance verification of M/s Mother Earth Enviro Pvt. Ltd (MEEPL), Treatment Storage & Disposal Facility (TSDF) & environmental damage assessment

Hon'ble NGT in OA No. 104/2020 has directed a joint committee to verify the compliance of MEEPL, TSDF w.r.t EC conditions, CTO & Authorization under HOWM Rules, 2016 and assess the damage caused to environment. And to assess environmental compensation against them for the damage caused to environment and if there are any remediation measures required on account of the damage caused, suggest the ways and means to remedy the situation.

In compliance to NGT order, joint committee inspected MEEPL and submitted the comprehensive report highlighting the non-compliance by MEEPL. Committee assessed environmental compensation of Rs**. 3,13,50,000/-** for violations observed. The NGT accepted the report and issued directions to concerned departments to implement the recommendations of the committee and submit ATR. M/s MEEPL filed the statement of objections to the joint committee report. On reviewing the statement of objections and records furnished, the joint committee submits that there points wise reply to the objections raised by M/s MEEPL. In addition, as per the directions of the Hon'ble NGT, the independent report on action taken report by CPCB was file in the NGT.

f. Assessment of Environmental damage caused due to improper handling of flyash by M/s UPCL, Udupi

Hon'ble NGT in OA 26/2013 has directed joint committee to assess the environmental damages on account of the environmental violations in the area of fly ash management, ash pond, ambient air quality, fugitive emissions etc. which undoubtedly has caused severe damage to the environment and the ecology of the area.

The said committee estimated Environmental Compensation (EC) of Rs. 4.89 Crores, following the methodology that was developed by CPCB in compliance of directions of the Hon'ble NGT-PB in O.A. 593/2017 (WP Civil No 375/2012), Paryavaran Suraksha Samiti Vs Union of India. As the applicant filed the objections, the Hon'ble NGT constituted the joint committee comprising of members from CPCB, NIAS and ISEC. The committee members from NIAS and ISEC estimated the compensation as Rs. 70, 04, 10,828/- (Rupees

Seventy crores four lakhs ten thousand and eight hundred twenty-eight only) for the damage caused to health of the people. The Project proponent - M/s Udupi Power Corporation Ltd also filed the statement of objections on the estimation of compensation in the joint committee report.

The Hon'ble NGT directed the committee to submit the reply to the objections. Accordingly, the reply to the objections was submitted.

g. Joint committee report submitted before the Hon'ble National Green Tribunal, Southern Zone, Chennai in the matter of OA 54 of 2016 (SZ)

The Original Application (O.A.) 54 of 2016 (SZ) is a Suo Motu case taken by the Hon'ble National Green Tribunal (NGT), South Zone, Chennai based on the news item published in "The Hindu" dated 08/03/2016 titled "Lake in heart of Bengaluru city turns graveyard for fish". The Hon'ble NGT (SZ) constituted a Joint Committee comprising of the Deputy Commissioner of Bengaluru (Urban), Senior scientist from Regional Office of Central Pollution Control Board (CPCB), Bengaluru, Karnataka State Pollution Control Board (KSPCB) and the Commissioner, Bruhat Bengaluru Mahanagara Palike (BBMP) to inspect the area in question and find out the source of pollution and persons who are responsible for causing pollution. Central State Pollution Control Board is the nodal agency for co-ordination.

Based on the field inspection, analysis results of wastewater, groundwater and surface water samples collected and verification of the official documents furnished by the concerned departments, the Joint Committee submitted a detailed report to the Hon'ble NGT. The Hon'ble NGT considered the Joint Committee report vide order dt 10/06/2021 directed the joint committee to submit the inspect the area and submit the status report.

In compliance to the order, the Joint Committee, inspected the STPs and ETP in the catchment, wastewater samples were collected and analyzed, monitored the water quality of lake, storm water drain and verified the measures implemented and submitted the report to the NGT. The Environmental compensation to be paid by BWSSB, BBMP and Madras Engineering Group and Centre was estimated. In addition, as per the directions of the NGT, independent action taken report by the CPCB was submitted.

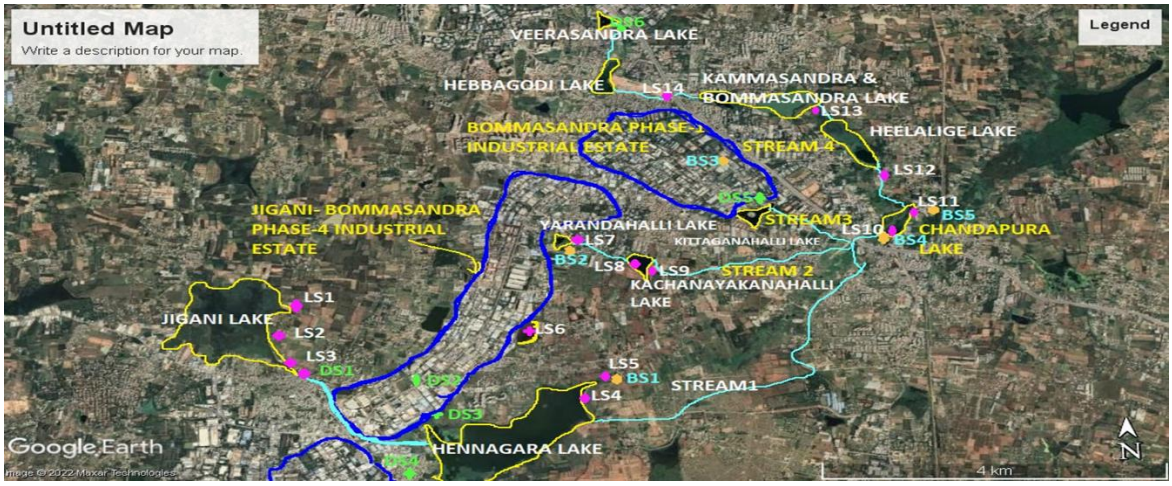
h. Joint Committee Report submitted before Hon'ble NGT, PB, New Delhi in the matter of NGT case OA No. 324/2021

The Hon'ble NGT moved an application on its own taking SUO MOTU cognizance, based on the News items in The New Indian Express Newspaper, dated 21.11.2021, titled "Lakes of Bengaluru: Industrial effluents, raw sewage; stinky tale of Chandapura lake", wherein it was reported that the condition of the lake has worsened due to encroachment, dumping of sewage and industrial effluents.

The tribunal constituted seven-member joint committee of the CPCB, State PCB, Indian Institute of Science, Bengaluru, SEIAA, Karnataka, National Wetland Authority, State Wetland Authority and the District Magistrate, Bengaluru to ascertain compliance of environmental norms in the matter of buffer zone of the lake, violation of Solid Waste

Management Rules, 2016, Air (Prevention and Control of Pollution) Act, 1981, Water Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Wetlands Rules, 2017 and the Hazardous Waste Management Rules, 2016.

In compliance to the order committee convened several meetings & conducted field inspections and carried out monitoring of nine lakes, six bore wells & six drains.



Sampling locations in and around Chandapura Lake

As per the preliminary investigations carried out by committee, there is a clear indication of both sewage and industrial contamination in the lakes & drains. Accordingly, committee suggested recommendations to the District Magistrate, KIADB, KSPCB and Karnataka State Wetlands Authority and submitted the report to Hon'ble tribunal.

Hon'ble tribunal accepted the report and constituted the High level Committee headed by Chief Secretary, Govt. of Karnataka to ensure the implementation of recommendation of the joint committee.

i. Joint Committee report submitted to Hon'ble NGT, Chennai in the matter of NGT case OA 225/2021

Hon'ble tribunal has constituted four-member joint committee in order to verify the compliance w.r.t to CRZ notification 2011 & 2019 at the Karwar beach. In compliance to said order, site inspection was conducted and found few structures constructed without obtaining NOC from KSCZMA and falls in HTL. Although, there was no environmental damaged caused, in order to discourage such activities environmental penalties were calculated. Accordingly, facts have been submitted to the Hon'ble tribunal. Further orders from NGT is awaited.

j. Joint Committee constituted by Hon'ble NGT, Chennai in O.A No. 13 & 14 of 2020

O.A No 13/2020 & 14/2020 (in IA 72/2021) is a case registered by the Hon'ble Tribunal, Special Bench; Padma Kodali vs State Environmental Impact Assessment Authority Environment and Forest Department and Ors. and Padma Kodali vs Karnataka State Pollution Control Board and Ors., regarding grievances on those industries i.e. a proposed

cement grinding industry namely, M/s Sree Sai Industries and the other unit of the project proponent are in the vicinity of ecologically sensitive area, surrounded by agricultural lands and agricultural activities. It has also been alleged that, the industrial units in question have been set up and are operating in violation of environmental norms, without requisite consents.

Several meetings were conducted followed by site investigation in the presence of Deputy Commissioner, Vijayanagara to assess the impacts of the activities in Haruvanahalli, Hospete, Bellary.

The draft joint committee report has been prepared and circulated among the members of the committee for comments, verification of the data/information submitted and provide concurrence for filing the report before Hon'ble NGT, Southern Zone, Chennai.

k. Joint committee constituted in the matter of NGT case OA 304/2019 regarding the safe distance for stone queries with the habitation in Kerala

The matter of distance criteria for stone quarries in Kerala is a controversial issue. After NGT directions to maintain 200 m distance, the order was challenged by quarry owners and the state of Kerala. The matter was discussed in detail in High Court of Kerala and in the apex court, NGT directions were effaced from the records on the ground that NGT passed the order without hearing the affected parties. Hon'ble Supreme court directed the project proponents to approach NGT and directed NGT to consider the matter afresh after hearing all stakeholders.

NGT vide order dt. 9th December, 2021 constituted the committee to conduct expert study to determine safe distance from stone queries. Accordingly, CPCB constituted joint committee consisting of experts from IISM, Dhanbad, IIT Roorkee, CBRI, CFMRI, CPCB and Wadia Institute of Himalayan Geology. CPCB being the nodal agency conducted series of joint committee meeting and is in the process of finalizing an expert study in selected quarries in Kerala.

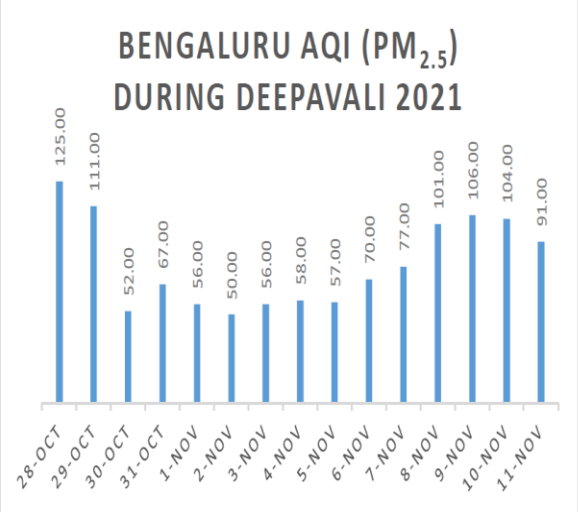
l. Issues with respect to siting of petrol pumps in Kerala

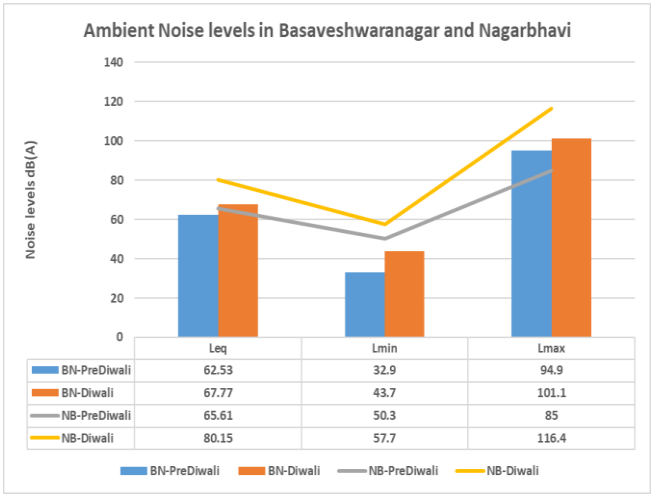
Subsequent to the CPCB guidelines for petrol pump including distance criteria got introduced, the state of Kerala is facing a lot of issues in complying with the distance criteria. Due to this, there are several litigations filed in Hon'ble NGT and High Court of Kerala and many of the new petrol pumps are unable to materialize due to the legal tangle. Kerala PCB also differed in many things including the date of applicability of guidelines and made amends with the siting criteria due to the high population density in Kerala.

CPCB RD, Bengaluru actively coordinated with Kerala PCB to sort out the issues regarding petrol pump siting guidelines and conducted interactive sessions with the Competent Authority of Kerala PCB. The matter was also discussed in detail with the empaneled advocate and several statements were filed in support of CPCB guidelines. The inputs received from Kerala PCB and advocate were shared with the concerned division at CPCB. The batch cases on petrol pump matter is listed for final hearing after vacation of Hon'ble court.

3.5 Deepawali Monitoring, 2021

Monitoring of Ambient Air Quality was carried out at two locations during Deepawali for consecutive 15 days starting from 28th October, 2021 to 11th November, 2021. The ambient noise level measurement was carried out for pre Deepawali day on and Deepawali day at two locations at two locations.





An overall increasing trend was observed in the concentrations of SO_2, NO_2, PM_{10} & $PM_{2.5}$ which may be attributed to either increased movement of vehicles or low dispersion rate, as compared to previous year 2020, except on few pre-Deepawali days. Further, concentrations of SO_2 were also observed to be below the detectable limit in both the locations.

3.6. Implementation of Rajabhasha:

Hindi Diwas was celebrated on 14th September, 2021. Message was given by RD emphasizing the need to perform more routine simple official work in Hindi. A brief PPT was also prepared and circulated in connection with the works being carried out in Hindi by office. Awareness messages was given in Hindi by an official on the importance of celebrating eco-friendly Ganesha festival & Deepawali festival. The speech competition in Hindi on "COVID19 & its impact" was conducted. The prizes were distributed to the winners.

This office attending Town Official Language Implementation Committee (TOLIC) meetings and sending quarterly progress report on official language implementation activities.

3.7. Redressal of public complaints

i. Public complaint BPCL, Kochi

BPCL Kochi refinery is the largest public sector crude oil refinery in India with a production capacity of 15.5 million tonnes per year. Many complaints and allegations are raised against this refinery, which is situated at Ambalamugal, Kochi from the local residents regarding the air, water and noise pollution. Based on the frequent complaints received in PMOPG and other Government departments, Kerala State Pollution Control Board (KSPCB) constituted a technical committee to verify the ground realities of allegations against BPCL Kochi Refinery projects as per Proceedings No: PCB/HO/HWM/416/90 dated 14.12.2020 of Chairman, KSPCB which includes members from CPCB, RD, Bengaluru and other different departments/ organizations concerned. A report summarizing the ground realities of these allegations in the above issue and committees' observations/findings along with recommendations was submitted to KSPCB. Later the complainants approached the honourable NGT and the matter was heard in detail and the NGT directed BPCL to pay environmental compensation in tune of Rs. 2 crores and directed KSPCB and other regulatory bodies to take actions against the non-compliances.

ii. This office has received around 75 public complaints either directly or forwarded by H.O through mails Complaints are forwarded to concerned stakeholders for necessary action

3.8 RTI Matter

During the FY, this office has received 16 RTIs and one Appeal. All the RTIs are processed and disposed in time bound manner.

3.9 Study visit of the committee on Subordinate Legislation, Rajya Sabha to Goa

Sh. S Suresh, Regional Director and Smt. Sowmya D, Scientist D attended the "Study visit of the Committee on Subordinate Legislation, Rajya Sabha" to Goa on 29/10/2021 and filed visit on 30/10/2021. The proceedings of the visit prepared and submitted

4.0 Project Head – IV: Training programmes, mass awareness, capacity building, etc.

Series of training programmes & mass awareness activities were conducted during 2021-22. The details are given below:

4.1 Celebration of World Environment Day-2021

In the event of World Environment Day-2021 on theme "Ecosystem Restoration" series of event conducted at RD, Bengaluru on 5th June, 2021 are as follows:


CENTRAL POLLUTION CONTROL BOARD
REGIONAL DIRECTORATE, BENGALURU

In pursuit of clean environment

CELEBRATION OF WORLD ENVIRONMENT DAY 2021

Zoom Meet Link

Meeting ID: 898 3746 4608
Passcode: hLXTW3

Schedule

12.00 P.M.-12.10 P.M. Introductory remarks by Regional Director

12.10 P.M.-12.20 P.M. Video presentation of Plantation and watering the plants

12.20 P.M.-12.35 P.M. Presentation by Dr. B.S. Anupama, Sc C on theme Ecosystem Restoration

12.35 P.M.-12.55 P.M. Presentation by Smt. Anjana Kumari V, Sc D on Restoration of Water Bodies

12.55 P.M.- 01.15 P.M. Presentation by Smt. P.K. Selvi, Sc D on Restoration of contaminated sites & reclamation of closed common TSDF

01.15 P.M.- 01.20 P.M. Vote of Thanks Smt. Sowmya D, Sc.D.

The Regional Directorate of Central Pollution Control Board, Bengaluru is conducting online environmental literacy quiz. Test your knowledge with CPCB quiz and lead from the front for Recreating, Reimagining and Restoring our ecosystems/ environment. All participants are awarded e-certificates. Link & timings is given below:

Date: 5th & 6th June, 2021
Day: Saturday & Sunday
Timings: 00.00 hrs. of 5th June, 2021 to 23.59 hrs of 6th June, 2021

Quiz link : https://form-timer.com/start/480a9c6e

Dr. Deepesh V, Sc.C Coordinator for Quiz

- Series of presentations made through VC.
- Video clippings of officials of RD, Bengaluru on plantations were played
- Hosted online environmental literacy quiz on 5th and 6th June 2021
- A rare species of baobab tree sapling was planted by Sh. Vivek K along with Sh. Seenivel raj in the office premises as part of World Environment Day on June 5th, 2021.
- Organised WED 2021 celebrations through Webinar in association with Prakriti Institute of Environmental Science (PIES) and Nagarjuna College of Engineering and Technology on 4th and 5th June, 2021. In this programme officials of RD, Bengaluru delivered presentations on various topics of ecosystem restoration.

- Regional Director participated as a guest in the national level programme WED-2021 Launch of UN Decade of Ecosystem Restoration" organised by Seeds of Sustainability on 5th June, 2021. The programme was inaugurated by Sri Suresh Prabhu, Honourable MP & India's Sherpa for G7 and G20.

4.2 Celebration of Ocean Day, 2021

On the event of World Ocean Day on 8th June, 2021, the inspiring message on the theme "The Ocean: Life and Livelihoods" was shared by RD to all staff. The messages were also shared with SPCBs & PCCs.

4.3 Webinar on "Legacy Waste Management in Karnataka"

Webinar on "Legacy Waste Management in Karnataka" was organized by Directorate of Municipal Administration, Karnataka on 17th June, 2021 to the officials of DMA. Sh. S. Suresh, RD participated as guest and explained the importance on legacy waste management and recent NGT orders for reclamation of old dumpsites.

Smt. Anjana Kumari V, Sc. D delivered the presentation on "Legacy Waste Management-CPCB Guidelines" in local language and explained in detail the methods of legacy waste management etc.

4.4 Awareness cum Demonstration for Eco-Friendly Ganesha Festival:

In the event of Ganesh Chaturthi festival awareness. CPCB & KSPCB jointly conducted an awareness and demonstration programme in Gangamma Thimmaiah Government School (middle and high school students) on 08.09.2021 to educate the children and staff about impacts of POP based Ganesha idol, Single use plastics on environment and the importance of celebrating Eco-friendly Ganesha festival amidst COVID19 pandemic.

Similar demonstration and awareness programme was conducted on 09.09.2021 in Lakshit Apartments, Basaveshwara Nagar, Bengaluru.

4.5 Awareness Programme on "International Day of Clean Air for Blue Skies"

In the event of "International Day of Clean Air for Blue Skies" document on "Statistical Analysis of Air Pollution in Non-attainment cities of Karnataka" prepared by Sh. S. Suresh, RD and Smt. Anjana Kumari V, Sc. D was released.

Awareness Programme was conducted in Gangamma Thimmaiah PU College, Rajajinagara, Bengaluru on 'International Day of Clean Air for Blue Skies' 7th September, 2021where around 192 students participated. The programme comprised of Plantation & watering of saplings and awareness talk on the topics 'Air Quality in Bengaluru and initiatives taken by Government of India to curtail emissions into the air' and importance of Clean air and explained the significance of International day of clean air for blue skies based on this year's Theme 'Healthy air, Healthy Planet'.

4.6 Celebration of World Ozone Day-2021

In the event of World Ozone Day-2021, CPCB, Regional Directorate, Bengaluru organized a Webinar on 'Montreal Protocol - Keeping us, our food and vaccines cool' on 16th September, 2021, in association with Karnataka State Pollution Control Board (KSPCB). CPCB, RD, Bengaluru invited concerned State Pollution Control Boards (SPCBs), Educational Institutions, Academicians, Industry Associations, NGOs, and Research & Development units etc

Sh S Suresh, Regional Director, CPCB, RD-Bengaluru gave opening remarks and mentioned about the need for protection of layers. He also emphasized about the importance of Ozone layer protection through plantation of trees, reduced appliances and following simple lifestyle changes etc.

4.7. Celebration of Engineers Day, 2021:

The Regional Directorate, Bengaluru in collaboration with Nagarjuna College of Engineering and Technology celebrated Engineer's Day on 15-09-2016 organized by department of civil engineering. Regional Director addressed the gathering, highlighting the significance of Engineer's Day celebrations, giving interesting and fascinating facts about Sir M Visvesvaraya, the gem among human beings. It was indeed very inspiring to learn about Sir M V's life. A short documentary on the life and work of Sir M Visvesvaraya made the audience understand him better and look up to him in awe and admiration.

The event was organized to commemorate the birthday of Bharat Ratna Sir M Visvesvaraya, thereby understanding the significance of celebrating Engineer's Day. The event gave an insight into some interesting facets of Sir M V's life for adopting in individual's life.

4.8 Customs Awareness week-2021:

As a part of **"Customs Awareness week -2021"** presentation was made by Smt. Anjana Kumari V, Sc. D for customs officers all over the country on ***"Import & Export of Hazardous Wastes- Responsibilities of Customs***" under provisions of H&OWM Rules, 2016" through webinar on 28.10.2021 and specific queries on procedural actions needed in import & export of hazardous waste was deliberated in the discussion session.

4.9. Mass awareness program on phasing out single use plastic during iconic week October 4-10, 2021 as part of Azadi Ka Amruth Mahotsav:

a. During the Iconic week October 4- 10, 2021 as part of "Azadi Ka Amruth Mahotsav" RD, Bengaluru in association with Karnataka, Kerala, Goa State Pollution Control Boards, Government Departments, NGOs, material recovery facilities, Institutions and several industrial associations conducted an intensive campaign for reducing/eliminating use and littering of single use plastic items in its jurisdiction and mass outreach was made on the theme.

b. As part of the programme, series of webinars on phasing out of single use plastics were conducted. Awareness campaigns were conducted at residential localities, schools, institutions, government offices, public places such as market, shops and parks to discourage the use of identified single use plastic items having low utility and high littering potential.

c. Posters highlighting banned single use plastics and alternate materials were displaced at public places.

d. Letters were addressed to government departments for conducting campaigns for reducing/eliminating littered single use plastics in Government Offices. Awareness was also created about the recently notified Plastic Waste Management Amendment Rules, 2021.

e. Around 25 mass awareness programs were conducted by RD, Bengaluru in collaboration and addition to this KSPCB has conducted awareness programmes in all the districts of Karnataka.

f. As an outcome, awareness programme has impacted wide range of people of all age groups, professions and economic status. It is observed that most of the Government offices have initiated the process to declare their work place as plastic free zones. In Karnataka state alone approximately 4,37,568 kg dry waste was picked from litters by cadets of NYKS/NSS during 1st – 31st October, 2021 and channelized for scientific disposal under Clean India Programme and Azadi Ka Amrutha Mahotsav campaign. An immense impact was observed in public places, institutions and commercial placed after the campaign, where use of single use plastics are drastically reduced.

4.10 Training & awareness campaign to field staff of SPCBs & PCCs and Educational institutions during Deepawali, 2021

As a means of dissemination, Regional Directorate, CPCB, Bengaluru has also organized series of awareness campaign and training sessions for all SPCBs/PCCs, Schools and Students of different educational institutions in collaboration with Karnataka State Pollution Control Board on 22.11.2021 through video conferencing, to demonstrate the protocol for carrying out ambient air quality monitoring during Deepawali and also created awareness on Green Crackers. The you tube links for the awareness programmes are given as:

1. https://www.youtube.com/watch?v=FUzTiEfUkaY
2. http://youtu.be/svBECoB6gAM

CPCB informed all SPCBs/PCCs and RDs vide letters dated September 15, 2021 to carry out noise monitoring on pre-Deepawali day (October 29, 2021) and Deepawali day (November 04, 2021) & ambient air quality monitoring from October 28th to November 11th 2021 and submit the report by November 19, 2021.

4.11 Guidance/training to students:

- Regional Laboratory, CPCB, Bengaluru regularly providing guidance/training to engineering and science graduate/post graduate students to complete their projects as a part of their curriculum. In the financial year 2021-22, four engineering graduate students from SJB Institute of Technology, Bengaluru, were guided to complete their projects in Regional Laboratory, Bengaluru. The title of the project is "Performance study of STPs with different treatment technologies in removal of nitrogen compounds". These students were taken to STPs having different treatment technologies, collected samples and brought it to the laboratory for further analysis. Based on the analytical results, the nitrogen removal efficiency of the STPs was studied and accordingly students were guided to prepare the report and completion of their project.

- Hands-On-Training (Ambient Air Quality and Noise Monitoring) was imparted to students of different Educational Institutions for the period October 28th to November 11th 2021 during the field monitoring, sampling and analysis by Regional Laboratory (B).

- In January 2022, Under GSDP, lecture was given on the topic "Guidelines for record keeping" at EMPRI, Bengaluru.

- In February 2022, a manual on "Quality Assurance and Quality Control and good laboratory practices in water and waste water laboratories" prepared jointly by Regional Laboratory, CPCB, Bengaluru and Central Environmental Laboratory, KSPCB, Bengaluru was released by the Member Secretary, KSPCB in association with CPCB, RD, Bengaluru.

4.12 Training on Wastewater treatment technologies:

Trainees from Environmental Management & Policy Research Institute (EMPRI), Bengaluru, Govt. of Karnataka, visited the laboratory to learn about the sewage & effluent treatment technologies, sophisticated instruments and its application in the environmental field, handling of environmental samples in the laboratory etc. A series of lecturers through power point presentations on the above topics followed by visit to the laboratory was arranged to them on 29th November, 2021.

4.13 Series of presentation at R R Institute of Technology, Bengaluru

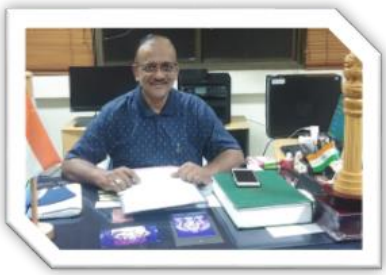
As a part of faculty development programme on "Sustainability –Present & Future" series if presentation was made by CPCB officials on 15th November, 2021 which are as follows:

- Sh. S. Suresh, Regional Director was invited as Chief guest and delivered speech on sustainable development so that our future generation can also enjoy the clean and green environment.
- Smt. Anjana Kumari V, Sc. D delivered presentation on "Polluted River Stretches- Action Plan"
- Smt. Sowmya D, Sc. D made a presentation on "Plastic waste management: A road map for sustainability"

4.14 Next-Gen Municipal Solid Waste Management Conference

The Conference on "Next-Generation Municipal Solid Waste Management" was organized by Recommerce team on 25th November, 2021 at Hotel Ashoka. Smt. Anjana Kumari V, Sc. D was participated and delivered a presentation on "Current Scenario – Solid Waste Management Policies". The session was more interactive and specific queries on Solid Waste Management Rules was deliberated in discussion session.

4.15 Sustainable Development Initiatives for the Asian Countries:



Three days' workshop on "Sustainable Development Initiatives for Asian Countries" was organized by Prakruthi Institute of Environmental Studies, Bangalore in association with CEPHA Network, Indian Institute of Technology Madras during November 23-25, 2021. In the said workshop, Smt. Selvi P K, Sc. D made a presentation on ""Challenges and Strategy for Abating Air Pollution in non-Attainment Cities".

Sh. S. Suresh, Regional Director, CPCB, Bengaluru took part as an expert in the Panel Discussion on Sustainable Goals and Initiatives for the Asian Countries.

4.16 District Level Training Program on Implementation of Bio-medical Waste Management Rules, 2016

Environmental Management Programme and Research Institute, Bengaluru has conducted series of training programme through VC for all districts on Karnataka on Implementation of Bio-medical Waste Management Rules, 2016. Smt. Anjana Kumari V, Sc. D has participated as expert member and delivered presentation on "NGT directions in implementation of Biomedical Waste Management Rules, 2016" on 25th January, 2022.

4.17 World Water Day, 2021:

On the occasion of World Water Day, 2022 presentation was made by Smt. Anjana Kumari V, Sc.D. on the theme "Ground Water- Making invisible visible" on 26th March, 2022 to the NGO's working on betterment of Environment.

4.18 International Women's Day, 2021:

International Women's Day is observed on 08th March every year. RD Bengaluru organized a meeting with the Women employees and the officials to discuss the UN theme for the year, 'Gender Equality Today for a Sustainable Tomorrow' with presentations.

4.19 Online training- Mentoring Young Environmental Leaders:

Sh. S. Suresh, Regional Director was invited as a Chief guest and resource person for an online training with an objective to mentor young environmental leaders for students in Kerala. The programme was jointly organized by the officers of Kerala PCB, District Administration-Alapuzha along with many other NGO's working in the field of Environment Protection. As a resource person RD enlightened the huge gathering of students on the regulatory framework and the importance of culturing environmental protection in students.

4.20 Training programmes attended:

- CPCB sponsored training programme on "Soil Pollutants Impact Assessment and Remediation of Contaminated Sites" conducted online during March 07-09, 2022 by IIT-Roorkee was attended by Sh. Vivek. K, Sc.D.

- CPCB sponsored three days online training programme on "Design of Solid Waste Management facility and Common Bio-medical Waste Treatment Facility" during March 14-16, 2022 was attended by Smt. Anjana Kumari V, Sc.D.

- CPCB sponsored three-days online Training Programme organised by CEERA, National Law School of India University on "Environmental Legislations, Interpretation, Enforcement, Legal and Statutory Requirements - Case Studies" from March 28th to 30th, 2022 was attended by Smt. P.K. Selvi, Sc.D.

- CPCB sponsored three-days online training programme on "Advanced Instrumentation Techniques Especially Ion Chromatograph" was organized by CSIR-NEERI, Delhi Zonal Centre (DZC) during 23rd -25th March, 2022 was attended by Dr. Deepesh V, Sc.D.

- CPCB sponsored two days online training programme on "Eco-toxicity – Environmental monitoring, Environmental toxicology group" was organized by CSIR-NEERI, Nagpur during 24th -25th March, 2022 was attended by Sh. Sudhagar C, SSA

Implementation of e-office:

The implementation of E-Office in CPCB was taken up and the access and login credentials has already been provided to all employees and the employee database has been updated. The procurement of scanner for digitization of documents was completed and migration of old files have been taken up on requirement basis and the same has been completed for all technical files being forwarded to CPCB, H.O. Internal movement of files and circulars through e-office have also been practiced. The leave balance details of all employees were updated in the e-office LMS as per data received from H.O and leave applications and approval is practiced exclusively through e-office for all the employees.

5.0 Waste Management and Urban Pollution Control (plastic waste, Hazardous Waste, Municipal Solid Waste, Bio-Medical Waste, E-Waste & Vehicular Pollution)

Under this project, RD, Bengaluru carried out inspection and monitoring of four MSW sites and one C & D processing facility in Karnataka & Goa. Three units were inspected under Rule 11 and one unit under Rule 9 of HOWM Rules, 2016. Detailed monitoring of one unit was carried out under Rule 9 of HOWM Rules

Several awareness and capacity building initiatives were carried out for stakeholders on effective waste management in line with the integrated waste management rules of 2016. TSDFs, CBWTF, E-waste recyclers, EPR authorizations and hazardous waste inventory verification were done in the southern region.

5.1 Random inspections of Hazardous Waste Units

1. In compliance to Hon'ble NGT matter O.A No. 804 of 2017 regarding Compliance of Hazardous Waste Management Rules, CPCB published 'Mechanism to cross verify the status of hazardous waste generating / handling units', wherein criteria for selection of industries for Random verification and confirmation of hazardous and other waste generation and management has been laid down.

2. Accordingly depending on the number of units in each state, percentage of units to be verified and cross checked were calculated by i.e., Karnataka (90 units out of 3562 (2.5 %)); Kerala (81 units out of 1616 (5 %)); Goa (85 units out of 1688 (5%)).

3. Similar criteria have been laid down for SPCBs as well. In this regard, the same was shared through series of meetings / video conferences with Karnataka (03) and Kerala SPCBs (01) regarding Random Verification of Hazardous Waste Units by SPCBs.

4. Karnataka SPCB has constituted a three-member committee for carrying out the random verification of at least 10 % of the hazardous waste generating / handling units vide office order dated 07.12.2021. Similar initiatives have been advocated in other States Kerala and Goa.

5. The details of the inspections carried out in the States are given below;

State	No of Units	Units to be verified as per criteria	No of units inspected by RD, Bengaluru	No of units inspected by Third party + KSPCB	No of Units inspected by KSPCB
Karnataka	**3562**	**90**	**10**	**30**	**01**
Kerala	**1616**	**81**	**10**	**12**	**-**
Goa	**1688**	**85**	**02**	**07**	**-**

5.2 Assessment of effectiveness of implementation of ban on Single Use Plastics (SUPs)

As per the directions of UPC – II Division effectiveness of implementation of ban on Single Use Plastics (SUPs) was assessed in Bengaluru in Karnataka and Thrissur in Kerala. In Karnataka and Kerala, State Government has imposed blanket ban on manufacture, supply, storage, transport, sale and use of certain single use plastics (disposable plastics). 12 broad categories of SUPs including plastic carry bags, plastic banners, plastic buntings, flex, plastic flags, plastic plates, plastic cups, plastic spoons, straw, cling films and plastic sheets used for spreading on dining table irrespective of thickness including the above items made of thermocol and plastic which use plastic micro beads are banned.

The market survey and study was conducted at material recovery facilities at Bengaluru and Trissur and findings of the study are as follow:

- Many of the banned SUPs are still available and is being used in Karnataka and Kerala. SUPs in use are regularly finding its way to the final disposal points and in roadside litter/ garbage. However, use of banned SUPs are drastically reduced due to awareness among venders and public.
- In Bengaluru, 13.5% of the dry waste collected is SUPs. The prohibited SUPs accounts for 4% of the dry waste. Permitted SUPs such as plastic bags which constitute or form an integral part of packaging in which goods are sealed prior to use at manufacturing/processing units and plastic used for packing of milk and milk products such as dairy products accounts for 9.5% of the mixed dry waste.
- In Thrissur, SUPs accounts for 16.9% to 33.6 % of the dry waste collected in the mixed dry waste.
- Alternatives to SUPs are available on a lesser scale compared to plastic items.

- Step for effective implementation of the ban of SUPs needs to be taken by the local body.
- There is a requirement for proper awareness among various stake holders for the effective implementation of ban on SUPs.

5.3 Plastic Waste Recycling Industries Under EPR

Most of the plastic waste recycling industries are small scale (around 2-4 TPD or 750 MT/Annum) and have facilities such as grinders, cutting machine and extruders. Plastic waste from industries and ULBs are collected, processed and converted to granules. Granules sold to Mould & Tarpaulin sheet manufacturing industries. The process flow diagram is as follow:

Raw material------Grinder--------- Cutting Machine --------Extruder--------Product

The follow ups were made with Karnataka, Kerala and Goa SPCBs for inspection and updating inventory of plastic waste recycling industries in the region. Inspections of plastic waste recycling facilities were carried out and details are as follows:

Sl	State	Total number of plastic waste recycling industries	Number of industries inspected by RD, Bengaluru
1	Karnataka	111	9
2	Kerala	144	2
3	Goa	13	-
	Total	**268**	**11**

5.4 Inspection of Pan and Gutka manufacturing industries under Plastic waste management rules

As per the directions of CPCB, Delhi, 5 number of pan and Gutka manufacturing industries in Hubli (2), Bidar (1) and Chitradurga (2), Karnataka were inspected under Plastic waste management rules and legal samples of packing materials were collected and forwarded to CPCB, Delhi for analysis. Based on the inspections, Closure directions under section 5 of E(P)A, 1986 were issued to industries at Hubli and Chitradurga and EC of Rs. 28.8 lakhs and 54 lakhs were imposed, respectively.

5.5 Disposal of Incinerable HW in Kerala.

As per the Kerala SPCB's request regarding the disposal of chemicals/ drugs through controlled incineration in compliance with Hazardous and Other Waste Trans boundary Rules, 2016 in the neighbouring States as they are not having HW incinerator facility in the State. CPCB, RD, Bengaluru took initiative and discussed the matter with the HW incinerator facility in Bengaluru and Karnataka PCB. Kerala PCB has requested CPCB intervention in disposing many Incinerable hazardous waste including confiscated narcotics. CPCB has carried out initial discussion with the concerned officials of Karnataka State Pollution Control Board and the authorities of common HW

incinerator facility in Karnataka. Eventually, Karnataka State Pollution Control Board provided the details of various waste recycler/ waste disposal facility to Kerala.

5.6 Application of drones: Inputs from CPCB, RD, Bengaluru

In response to the letter DO No. AV-29017/44/2020-SDIT-MOCA dated 27-10-2021 from the Secretary, Ministry of Civil Aviation, GoI, New Delhi and subsequent circular dated 21-01-2022 from IT Division, CPCB, this office suggested potential application of Drones/ Unmanned Aerial Vehicles (UAVs) in Environmental Monitoring and Regulatory Compliance Verification. Following suggestions were given in this regard.

1) Survey and mapping of industries with high pollution potential: Drones/ UAVs can be deployed to survey, map and generate GIS/ Cartography based digital repositories to assess the land use change and natural resources in the vicinity of 17 categories, GPI or high hazard installations. Such digital repositories shall be helpful to track the regulatory compliances over a period of time, episodal pollution, accidents, spills, land use changes due to pollution/ discharge, etc. Such digital maps also will help in quick response from CPCB in the event of any mishap/ accidents/ episodal pollution. With regular survey, mapping on GIS module shall help CPCB to plan routine inspections/ monitoring, emergency responses, regulatory intervention in case of non-compliances, containment/ mitigation measures in case of accidents and also can track the overall performance of the industry.

2) Routine aerial reconnaissance survey of industries: Aerial survey of industries as a part of regulatory compliance verification, especially to assess the green belt, buffer zones, surface water bodies, unauthorized surface discharges, contaminated areas, unauthorized solid waste dumps, stacking of soil/ earth, excavations, installations, operational status of outdoor treatment systems, monitoring/ coordinating manual monitoring, aerial survey for unusual activities, etc. Drones with IR and NIR sensors can sense heat variations and quickly points out flue gas/ stack leakages/ effluent discharges.

3) Real time assessment of episodal pollution/ accidents/ spills in hard to reach areas: In the event of environmental mishaps, drones/ UAVs are handy to track episodal pollution/ spills at hard to reach areas due to difficult terrain or places temporarily inaccessible due to safety concerns. Drones help locate accurate sample points, access routes with shortest distances and also help review factors which may impact the safety of field team.

4) Assessment and tracking of surface pollution: Can be used for the assessment of polluted river stretches, polluted water bodies, contaminated land/ site, waste dumps, illegal waste dumps along the roads, unauthorized discharges, etc. Long term assessment can generate pollution trend and effectiveness of remediation measures. Some of the specific application areas are tracking nitrate runoff, assessing eutrophication, water acidification, algal blooming, fish kills, etc.

5) Provide support to ground based monitoring/ investigation: Drones/ UAVs can be handy tool to plan manual monitoring as it gives an overview of the difficult terrains. It also can reveal the pit falls/ potential hazards in field monitoring by sensing the presence of toxic gases in the premises and even can be used to draw samples from the middle of a river, or from a contaminated/ mishap site, etc.

6) Use in remote sensing studies: Drones/ UAVs mounted with multi spectral sensors can interact with some of the specific pollutants and the spectral data can be delineated into useful insight with the help of a GIS/ remote sensing software. This can be useful in tracking pollution, spills and accidental leakage/ discharges, etc. A robust GIS/ remote sensing platform is required to use this features. Multispectral sensors along with visual camera opens an opportunity to collect data which are not perceived by human eye and these can be very useful in many environmental scenarios including contamination/ pollution studies, assessment of green belt, crop damage due to pollution, etc. A multispectral sensor set at a specific band/ wavelength can quickly detect a particular pollutant and can track its transport/ dispersion.

7) Remote coordination/ evaluation of sensitive activities: Field monitoring, environmental investigation, survey of episodal pollution, implementation of remediation measures, environmental sampling, site inspections based court directions, etc., can be aired live and the footages can be remotely monitored, stored for evidence and can be streamed real time for supervision/ coordination/ evaluation by competent authority.

8) Possible use of drones in atmospheric pollution: Though an emerging field, multi spectral drone data coupled with GIS and remote sensing shall be a powerful tool to study the atmospheric composition/ pollution. Drones coupled with IoT based sensors are available to measure wide range of environmental gaseous components, combustible gases, atmospheric physical parameters and even particulate load. These applications help track dispersion of pollutant and to cross check the pollutant load in ambient air and that measured by the fixed monitoring/ sampling/ online analyser devices. It is possible to develop a customized drone application software incorporating the above applications on a GIS/ remote sensing/ Aerial imagery platform. CPCB may explore such a possibility and may develop an application to suite our working needs and requirements.

5.7 Conversion of Nitrogen Plant to Oxygen plant:

- In view of pandemic situation, as per the directions of CCB necessary follow-ups, meetings were conducted with SPCBs & industries having PSA based nitrogen plant in the jurisdiction of RD, Bengaluru.
- Series of review meeting conducted by CCB were attended and updated the status of progress on daily basis
- M/s Raichem Pvt Ltd., Raichur has successfully converted their PSA based nitrogen plant to medical oxygen plant and commissioned at Navodaya hospital having 195 beds. It can produce 1 TPD medical oxygen which is equivalent to 100 jumbo cylinders.

6.0 Technical documents prepared & published:

Along with regular monitoring & inspections, CPCB RD, Bengaluru has prepared and published following technical documents during the FY 2021-22:

6.1 "Handbook on Sampling and Preservation techniques for collection of water and wastewater samples"

Published field handbook on various sampling & preservation techniques for collecting water & wastewater samples from various environmental domains. CPCB collaborated and extended technical guidance in publication of handbook. The handbook is a ready reckoner for any field staff engaged in sampling and preserving water and wastewater.

6.2 Document titled "Quality Assurance, Quality Control and good laboratory practices in water and wastewater laboratories"

Quality Assurance and Quality Control plays an important role in any laboratory. Systematic quality assurance and quality control programmes are required to minimize error and to produce reliable data. In this connection CPCB in collaboration with Karnataka State Pollution Control Board published a user manual titled "Quality Assurance, Quality Control and good laboratory practices in water and wastewater laboratories". The manual will be useful to environmental laboratories, regulators, scientific community and other stakeholders.

6.3 Published a research article on Modified method of COD analysis in calcium rich effluents

Petrochemical industries manufacturing Propylene oxide and propylene glycol generates effluent with high TDS & this may be attributed to high calcium and chloride content. Many techniques, including dilution of sample, removal of calcium chloride by addition of sodium hydroxide were tried. But reproducible results could not be obtained. In light of more stringent discharge standards, prescribed by pollution control board, need for an accurate and reproducible method of determining the COD, without positive interference from chloride was essential as requested by NGT.

Existing method was modified where sample was taken without any dilution and after adding required amount of mercuric sulphate, maintaining 10:1 ratio, sample was stirred in a magnetic stirrer for a specified period and allowed to settle. Whole sample was taken for reflux and after refluxion, sample was cooled and titrated against ferrous ammonium sulphate. Method validation was carried out for parameters like Linearity, Accuracy, Bias, Precision, Detection limit, system suitability and robustness and found satisfactory.

The research article on the modified method of COD analysis was published in Indian journal of Science and Technology.

6.4 Report on "Statistical Analysis of Ambient Air Quality data in Bengaluru and other Non-attainment cities in Bengaluru"

CPCB has identified 132 non-attainment cities in which the prescribed National Ambient Air Quality Standards (NAAQS) are violated consistently over a period of five years w.r.t. PM_{10}. These cities have been identified based on ambient air quality data obtained under National Air Quality Monitoring Programme (NAMP). In Karnataka four cities have been identified as non- attainment cities namely Bengaluru, Kalaburgi, Davangere and Hubli Dharwad. The Action plans have been prepared and implementation of action plans in non-attainment cities is in progress.

In order to assess the status of Ambient Air quality in these cities, a quality monitoring study carried out in collaboration with M/s Nagarjuna College of Engineering, Bengaluru on important parameters for a fixed period and compared with standards. The results are used to critically analyze the trend of pollutants.

****