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CHAMPIONING SMART & SUSTAINABLE
Water Use and Waste Water Management in MMR

Webinar Report

10th, 11th and 12th September, 2020
2:30 to 5:30pm IST

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CHAMPIONING SMART & SUSTAINABLE Water Use and Waste Water Management in MMR

10th, 11th and 12th September, 2020

Abstract

The Population of India is likely to be stabilised by 2050 at the level of 1700 million people. The urban population projection for the year 2051 is likely to be of the magnitude of 850 million when about 50% population will live in cities. The per capita wastewater generation shall be around 98 PCD (by the conservative estimate and putting together the figures of both the classes studied) based on the average wastewater generation observed during the four studies carried out by CPCB. (Bhardwaj, 2005). With fast urbanisation & industrialisations the generation of wastewater has taken a phenomenal growth. Due to paucity of resources the wastewater is not being treated adequately before disposal leading to pollution of surface & groundwater resources. Many water bodies are already in alarming situation. Treatment of wastewater requires enormous resources, which cannot be provided without public support. A large number of small-scale industries located in urban residential areas are compounding the problem by discharging industrial effluent in sewer line.The progress towards sustainable sewage systems might come from improvement of current sewage systems. The alternatives that might have advantages over the current system will only create marginal threats to conventional sanitation in the short term. In the longer term, a transition might occur, especially if additionally supporting technologies will be available and if developing countries like ours start 'leapfrogging' to the novel systems. The speed of this transition is not predictable. However, it might be accelerated by future catastrophes, for example climate change might necessitate large investments in sanitation, and this in turn could offer the option to switch to anaerobic sanitation or individual sanitation. The threat of minerals scarcity could also accelerate change. Since wastewater contains large amount of organic matter & nutrients, it is worth to convert into energy & fertiliser. Keeping in view of future scenario of wastewater generation for the year 2050 a definite road map is needs to be prepared by all concerns. Effort needs to focus on use of wastewater for agriculture & recover energy from it as far as possible, in order to contribute to a better world.

Mumbai First and CSIR-NEERI (National Environment Engineering Research Institute) hosted a thematic Panel Discussion on Championing Smart and Sustainable Water Use and Waste Water Management in Mumbai Metropolitan Region (MMR) with the goal of identifying and discussing innovative solutions for which Mumbai First and NEERI brought together government officials, industry leaders, and experts in the field, to discuss the alternative pathways that Mumbai could adopt to ensure that the existing situation, does not magnify to a point of no return.

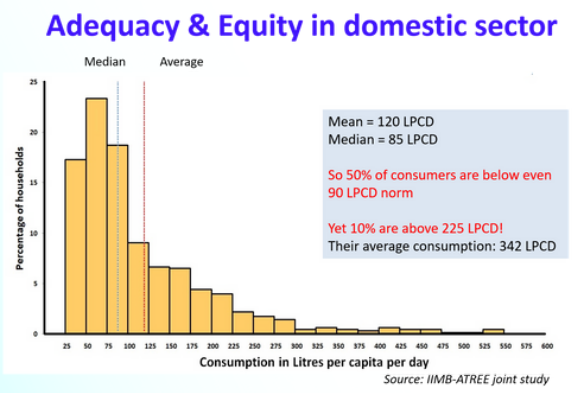
Agenda - Day 1
Thursday, 10th of September, 2020
2:30 to 5:30pm IST

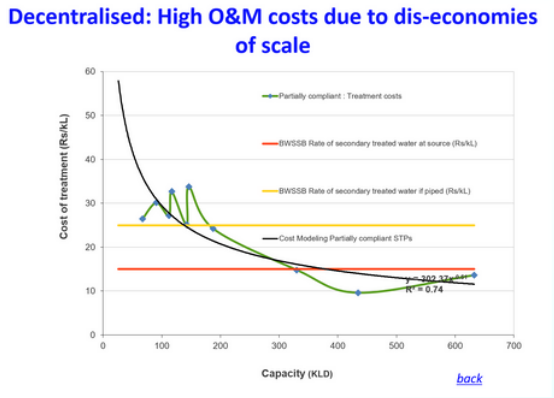
TOPIC	SPEAKER
Welcome Address	Mr. Nandan Maluste, Trustee, Mumbai First
Welcome Address	Dr. Rakesh Kumar, Director NEERI
"What do we mean by Smart and Sustainable Water/Wastewater Use, and How to get there?"	Dr. Sharachandra Lele, Distinguished Fellow in Environmental Policy & Governance, ATREE (Moderator)
The Israeli Comprehensive Approach: Large scale Reuse of treated wastewater for Irrigation	Mr. Dan Alluf, Counsellor MASHAV India, Israel's Agency for International Development Cooperation
Current Scenario, Constraints and Future plans for Sewage System in MMR	Dr. Ajit Salvi, Executive Engineer (Mumbai Sewerage Disposal Project)
Management of Unconnected Sewage/ Community Toilets management	Dr. N. B. Mazumdar, International Water, and Waste Management Expert, Sulabh International
Integrating Blue-Green Infrastructure with Grey for managing urban water security and flooding	Mr. Samrat Basak, Director – Urban Water WRI India
Real-time Water Quality Monitoring	Mr. Priyank Hirani, Program Director, Tata Centre for Development at UChicago
Q&A **Summing up / Concluding Session**	Session Moderated by Dr. Sharadchandra Lele,
Vote of Thanks	Dr. Neville A. Mehta, CEO, Mumbai First

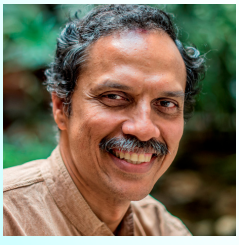
Speaker: Dr. Sharachchandra Lele
Session Topic:What do we mean by Smart and Sustainable Water/Wastewater Use? How to get there?

Session Summary:

Focusing on the normative concerns with respect to Smart and Sustainable Water Use, Mr. Lele posed certain pertinent questions about the meaning of terms like sustainability and smart. It was highlighted whether being environmentally sound is a good enough measure of sustainability of water. Water is a peculiar and a cyclic resource, in which human interference causes certain disruptions. However, usage of water cannot be unsustainable, that is, whatever water is used today is not going to affect the water that is going to fall in the next monsoon cycle, except for ground water. It is essential to think beyond the idea of sustainability when talking about water. Mixing means and goals is another concern. What do we really mean in terms of smart water management? Does smart indicate using the best technology, efficient water use or recycling and rainwater harvesting?In Karnataka water policy draft, good water governance was brought in which has dimensions not overlapping with one another. These are - Adequacy and Affordability, Equity and Justice, Sustainability and Resilience, Democracy and Quality and E - flows. Expanding on these normative concerns, we come across various intricacies like water for life and livelihood and water for other living beings, quality and e-flows for consumers of water, sustainability and resilience in terms of finance, footprint of water supply etc. Equity and Justice deals with cost, subsidies for weaker sections, fairness of supply across different sections. Mumbai in particular needs to work on fairness to source watersheds and focus on the question of what environmental impact do they cause when water is resourced from areas farther from the city, distant rivers etc.Owing to the integral nature of human behaviour, disagreement on these normative concerns is/will be commonly seen. There will be disagreement in goals and means and therefore democratic governance plays a crucial role having qualities of decentralization, public participation, transparency and accountability.







Dr. Sharachchandra Lele
Distinguished Fellow,
ATREE

Dr. Lele received his B.Tech. in Electrical Engineering in IIT Bombay and an M.S. on the Environmental Impacts of Large Dams at the Indian Institute of Science, Bangalore followed by a Ph.D. in Energy and Resources from the University of California, Berkeley focusing on forest use in the Western Ghats. He has worked on sustainable forest management and forest governance, forest hydrology and farmer linkages, urban water, water governance and pollution regulation. He recently led a major project on the impacts of climate change on water management in rapidly urbanising basins in peninsular India, and is involved in other studies on water management in Bangalore city. Sharad has served on the MoEF-MoTA Joint Committee on the Forest Rights Act, and the Elephant Task Force appointed by the Karnataka High Court. He is currently serving on the Bellandur Lake Monitoring Committee in Bengaluru, on the MoEF's Expert Appraisal Committee for Thermal Power Plants and Coal Mining, and recently worked as Member-Secretary of the Task Group for Water Policy set up by the Karnataka Jnana Aayoga (Karnataka Knowledge Commission).

Speaker: Dr. Ajit Salvi

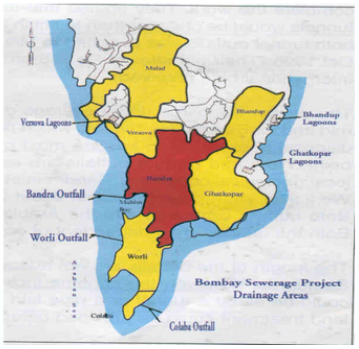
Session Topic: Current Scenario, Constraints and Future Plans for Sewerage System in MMR

Session Summary:

Having a very comprehensive agenda for the session, Mr. Salvi shared with everyone a detailed note on Mumbai's sewerage system. Mumbai is divided into several sewerage zones in order to facilitate decentralisation of sewerage collection and disposal of the same into the sea or creek. With 3850 million litres of water supply, Mumbai has covered up to 68% by the sewerage system. With the laying of a huge sewer network (2019 kms) system the goal of increased focus on recycling and reuse of sewage will be achieved. The existing sewerage system is mainly concerned with preliminary treatment, facilitating discharge through marine outfall or lagoons which is not only insufficient but also fails to adhere to the guidelines laid down by the central authority. Thus, to address this issue, construction of new plants and formulation of new discharge standards is underway. This future plan includes operation and maintenance for 15 years, asset replacement and most importantly, generating a window for 50% capacity of reuse and recycling of the treated water. Reuse of this recycled water will include non-potable purposes like car washing, gardening etc. However, Mumbai does give a difficult time in terms of availability of land, which leads to delay in acquiring permissions for construction of new sewerage plants. Some zones in Mumbai like Malad have undergone shifts in terms of population. Apart from this, maintenance of tertiary treatment plants, which also reflects inefficiency on the operation cost, is also something we are lagging behind in. Though these challenges are concrete, technological advancement will help tackle them all while at the same time, making the process economically sound and feasible. Along with this, public awareness and getting them to use the treated water also poses a challenge, which can be resolved through assurance of quality of water.

Sewerage Zones

- COLABA
- WORLI
- BANDRA
- VERSOVA
- MALAD
- GHATKOPAR
- BHANDUP



Future Plans– Approaches with Recycle & Reuse Planning

New Discharge Standards

Parameter	Unit	Limits
pH		5.5–9.0
BOD	mg/l	10
COD	mg/l	50
Total Suspended Solids (TSS)	mg/l	20
Total Nitrogen	mg/l	10
Total Phosphorous	mg/l	1
Fecal Coliform	(MPN/100ml)	<100

- Open Technology
- DBO Contract– O & M for 15 Years, Asset Replacement
  50% capacity for Recycle & Reuse

Dr. Ajit Salvi

Executive Engineer, Mumbai Sewage Disposal Project

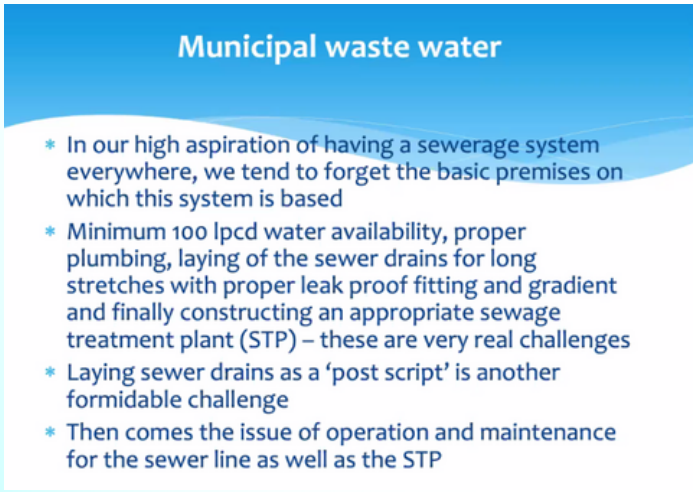
Dr. Salvi is working with Municipal Corporation of Greater Mumbai as an Executive Engineer in Mumbai Sewage Disposal Project Department. He has a long 30years of experience of Planning and Maintenance of Sewage Conveyance system, Pumping & Treatment plants. He has participated in various World Bank Aided Projects related to Sewerage. At present he is handling a mega project of STP in Mumbai. He is involved in preparation of Strategic Master Plan for Treated WasteWater Reuse from MCGM's Sewage Treatment Plants. He has published various Research Papers. As far as education he holds a BE, MBA and a Phd. He is visiting faculty in various Technical and Administrative Institutes which includes Mumbai IIT, YASHADA, Pune & AIILSG, Mumbai.

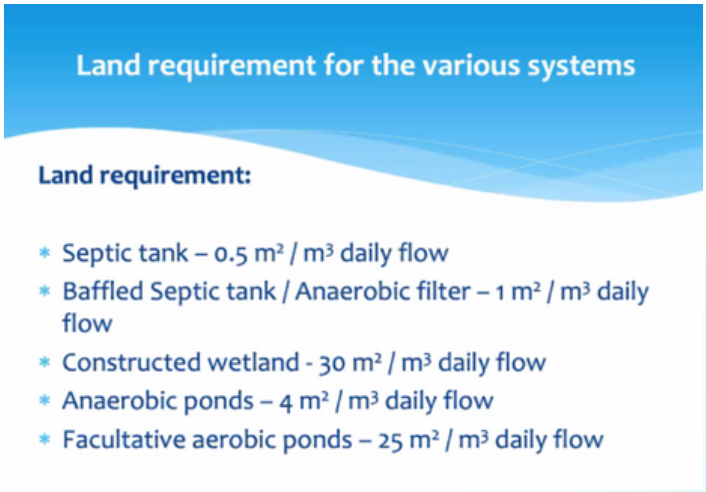
Speaker: Dr. N. B. Mazumdar

Session Topic: Management of Waste Water in Unsewered Areas: Public and Community Toilets

Session Summary:

Highlighting the importance of wastewater management, Dr. Mazumdar started off his presentation by highlighting several reasons that make waste water management an essential activity. He also shed some light on a pertinent question of whether successful implementation of efficient waste water management is feasible in a city like Mumbai where land is scarce and residential settlements are scarce. Right from installing the sewerage line to the point of maintaining it, various challenges of diverse nature arise. To solve these issues, it has been realised that the decentralisation trend may have the answers. This trend has now been acknowledged by the Ministry of Urban development, Government of India, 2013 and added a chapter on Decentralised Sewerage System and On-site sanitation in the Manual on sewerage and sewage treatment systems. It is important to note that availability of land and water are important factors in determining the choice of system of decentralisation. The way forward for establishing an efficient system to manage waste water, it is important to follow a sequence of planning, execution, operations and maintenance.





Dr. N. B. Mazumdar
International Expert, Water and Waste Management, Sulabh International

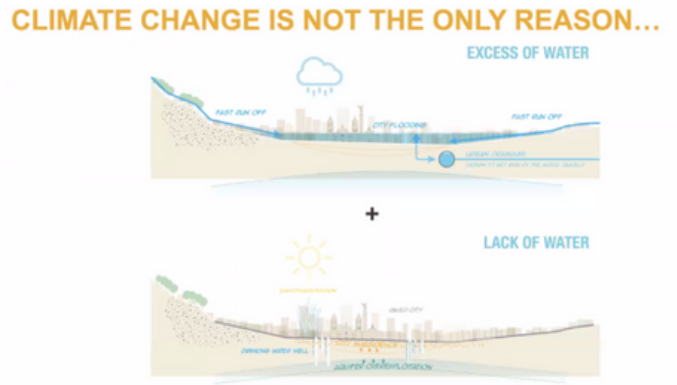
As an international waste management expert, Dr. Mazumdar has been involved with waste management and on-site sanitation since three and half decades in different parts of the world, working with international organisations like WHO, ADB, IGES (Japan), Rotary international, Government of India, PSU, Private Sector, NGO Sector and had opportunity of working with GIZ and ICLEI during preparation of the Municipal Solid Waste Management Manual and Guidelines on Usage of RDF. He is currently the Honorary Chairman, International Academy of Environmental Sanitation and Public Health and in the recent past was the Honorary Chairman, International Academy of Environmental Sanitation and Public Health. He was also instrumental in bringing DEWATS (Decentralised WasteWater Treatment Systems) to India in 1994 which resulted in the EU funded joint DEWATS project in India. He has also held prominent International positions as Consultant to the World Health Organisation in China (Environmental Sanitation, 1989) and Consultant to Rotary International in Argentina, Bolivia and Paraguay to fight Cholera (1992).

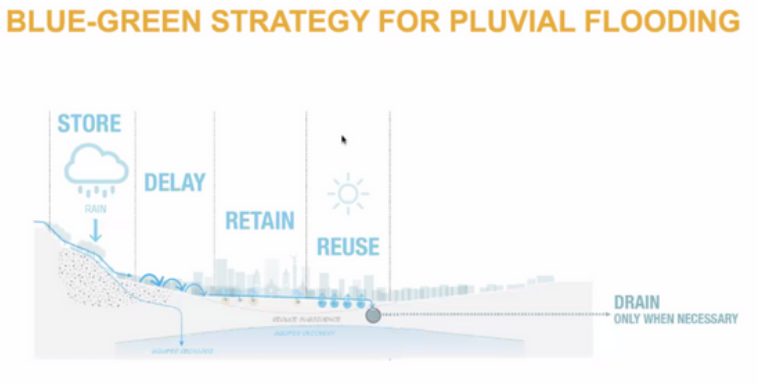
Speaker: Mr. Samrat Basak

Session Topic: Integrating Blue-Green Infrastructure with Grey for Urban Water Resilience: Mumbai

Session Summary:

Mr. Basak introduced urban water resilience and addressed its challenges through his presentation. He pointed out that the points reflected through this presentation are more or less similar for every developing city in India. Explaining the challenges faced by Urban water resilience, issues like scarcity of water, dirty water and 'too much' of water were addressed. Mumbai's strategy to deal with water logging has always been one of 'pot belly and belt'. A month prior to monsoon, water from one place is shifted to another so as to avoid water logging (loosening the belt). However, in this process, we overlook the fact that these water transporting channels are actually clogged. As flooding is often attributed to climate change, it is important to understand that there are several other reasons contributing to floods. Hydrological and geographical factors also play a very important role in a region's ability to combat flooding. It is essential for Mumbai to become a water sensitive city and respect the natural water infrastructure.Apart from this, the presentation also spoke about the importance of blue- green infrastructure and highlighted some of its best qualities like resilient, cost-effective, reversible etc. A joint benefit authority and collaborative governance can also prove to be a contributing factor in accelerating major projects of Blue – Green Infrastructure, enabling policy, planning and design.





Mr. Samrat Basak
Director - Urban Water, WRI India

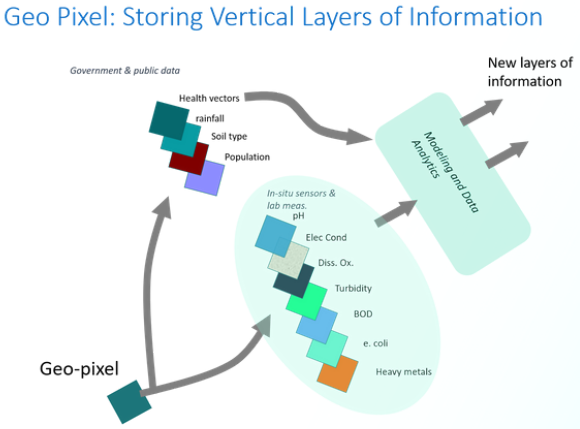
Mr. Basak is the Director of WRI India's Urban Water Program. In this role, he works with the WRI Ross Centre for Sustainable Cities team and Water Program team to execute research programs, development of tools and information, and engagement with businesses, NGOs and governments for positive change related to managing urban water and waste water in India. He has over 15 years of experience working on integrated water management projects across India, Sri Lanka, Bangladesh, Pakistan, Nepal, Kenya, Nigeria, Senegal, Ethiopia, Egypt and Saudi Arabia through his earlier employment with ERM (Environmental Resources Management). As a thought leader in corporate water management, his work helped to drive sustainable business growth as well as managing business related water risks in a water-finite world. Samrat has assisted numerous companies across food and beverage, power, manufacturing, chemical, real estate sectors as well as a number of financial institutions and investors with water risk assessments, risk mitigation and water strategy innovation.He holds a master's degree in Hydrogeology from the University of Reading, United Kingdom and a second master's degree in Applied Geology from the Indian Institute of Technology, Kharagpur. He was the recipient of the prestigious Felix Scholarship, as part of his masters program in the UK.

Speaker: Mr. Priyank Hirani

Session Topic: Real time Water quality Monitoring

Session Summary:

Mr. Hirani spoke about water to cloud, a programme developed at the University of Chicago – with an aim to make the audience aware of how a technological solution on collecting, curating and disseminating data can be an interesting way of working with diverse stakeholders and influencing policies based on evidence. His work has been focused on major rivers in India including Ganges, Yamuna, and Godavari.The existing water monitoring scenario is a traditional system of taking samples and testing it under laboratory conditions. However, with changing times, it is essential to adopt advanced techniques and produce real time monitoring data. Rivers are dynamic systems and collecting samples at one point of time do not provide concrete results. Moreover, it's time consuming. There are several alternatives that can be adopted in place of traditional monitoring system – like using stationary and non- stationery sensors to take the laboratory to the field. Water to cloud system uses non-stationary sensors to collect relevant data about the river in real time.This technology helps in prediction and helps in planning efficient actions in order to improve water conditions.



Mr. Priyank Hirani
Program Director,
Tata Centre for Development,
University of Chicago

Mr Hirani received his BTech in EEE from BITS Pilani and MSc in Circuit Design from Imperial College London and worked with University College London before joining the Young India Fellowship at Ashoka University. He currently works with University of Chicago Trust's Water-to-Cloud (W2C) initiative through Tata Centre for Development as its Program Director spearheading a diverse, multinational team of experts. Through a novel approach involving cyber physical sensor networks and cloud-enabled data dissemination capabilities, his team has created visualisation about river water quality to influence policy making and to drive decisions over the last four years. He is passionate about leveraging technology to democratise access to such data through open-access digital platforms. Priyank received the 2017 Changemakers Young Achiever Award from Quality Council of India for his contribution to nation building. He was part of the founding cohort of UNLEASH, a global innovation lab to engage youth to address Sustainable Development Goals and has been recognised as a Global Shaper by the World Economic Forum.

Speaker: Mr. Dan Alluf

Session Topic: The Israeli Comprehensive Approach: Large Scale Reuse of Treated Wastewater for Irrigation

Session Summary:

Taking us through the story of Israel's water, Mr. Alluf made the audience aware that more than half of the state receives less than 100 mm of precipitation annually. Despite having regions that do not see rainfall for decades, Israel water storage is quite impressive and is touted as a miracle. This is achieved through 4 major aspects – efficient policy, nationalisation of water, singular body controlling water supply, optimum use of water. Half of the water in Israel today is reused and recycled and does not directly come from precipitation. Sewerage water is treated, purified and reused in agriculture. It is important to note that reused sewerage water and drinking water is channelized in two different pipeline networks, by colour coding the pipes. Israel truly is the leader in reusing sewage water, purifying almost 90% of the sewerage water. India and Israel have also put in collaborative efforts in order to prioritise water as one of the most important aspects of mutual cooperation. This led to initiatives like Jal Shakti. Additionally, there has also been a MoU undertaken between Uttar Pradesh of India and Israel to implement a large scale project in Bundelkhand in order to conserve, reuse and utilise water in the best way possible.

Mr. Dan Alluf
Counsellor MASHAV India,
Israel's Agency for International Development Cooperation

Mr. Alluf has over 15 years of managerial experience as an Expert in Agriculture & Water management in both Private and Public sectors across global markets (India, EU, Turkey, CIS, Africa & Israel). Currently, he represents Israel's Agency for International Development Cooperation in India, heading the G2G Agricultural & Water activities. He specialises in irrigation solutions with hands-on experience in Viticulture, Orchards & Open field crops. He also leads the "Indo-Israel Agricultural Project" (IIAP), across India which aims at benefiting farmers via the establishment of 40 Centres of Excellence, advanced-intensive farms introducing Israeli agro-technology & knowledge tailored to local conditions. His goal is to ensure that each CoE is a full spectrum of value chain solutions from Nursery, Canopy and Water Management to Post Harvest. He is an M.B.A. Graduate of Technion - Israel Institute of Technology in Business Administration and holds a B.Sc. from the Hebrew University (Faculty of Agriculture) in Plant Science, Agriculture Economy & marketing.

Agenda - Day 2
Friday, 11th of September, 2020
2:30 to 5:30pm IST

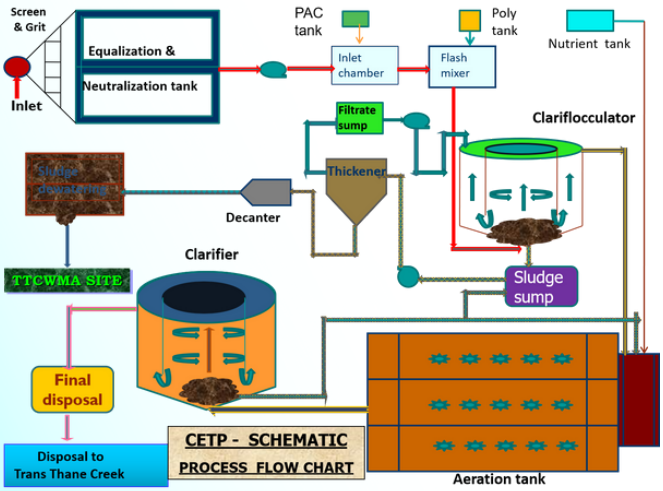
TOPIC	SPEAKER
Introduction to the Session	Mr. Nandan Maluste, Trustee, Mumbai First
Current Performance Scenario and Future plans for CETP	Mr. J. John, Director, Common Effluent Treatment Plant (CETP), Thane Belapur
Sustainable Liquid Waste Management- Urban India context	Dr. Ritesh Vijay, Senior Principal Scientist, CSIR-NEERI
Issues of access to water and essential services, Its Implications on public health, especially in vulnerable communities in Mumbai, MMR	Ms. Lubaina Rangwala Senior Manager at World Resources Institute
Integrated Water Management	Ms. Meesha Tandon, Subject Specialist (Urban, Water, and Climate Change)
Q&A **Summing up / Concluding Session**	Session Moderated by Ms. Meesha Tandon
Vote of Thanks	Dr. Neville A. Mehta, CEO, Mumbai First

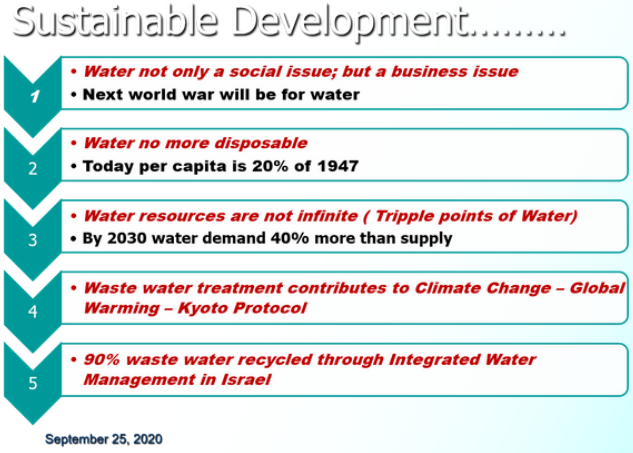
Speaker: Mr. J. John

Session Topic: Current Performance Scenario and Future Plans for CETP

Session Summary:

CETP was set up in 1983 at Pali in Rajasthan. By 1991, the government began to incentivise CETPs and that kicked off the setting up of more plants around India. Earlier, the Thane-Belapur belt was one of the largest industrial hubs in Asia and the CETP was brought in by the Industrial Association to support the small scale industries in the area. This resulted in the setting up of a 12MLD plant in 1997 and an additional 15MLD was added in 2006. This eliminated the technical constraints that the small scale industries were facing and they were given an option to treat their effluents currently. There are certain success factors behind CETP. It is supported by a Board of Directors who bring with them experience in technical and managerial fields. CETP works on the Principle of Mutuality and the BoD is elected to their respective positions. The CETP has also been proactive in capacity building and therefore conducts third party performance evaluations regularly. They also adopt the best technology when it comes to upgrading the system. CETP also has well qualified and trained employees who run the day to day activities of the plant. This CETP has the conventional treatment system with Pre-primary, Primary, Secondary and Tertiary treatments. There are also certain areas where automation has been introduced to improve efficiency within the plant. CETP also promoted environmental awareness among school and college students, especially those college students who are studying environmental studies and visit the CETP plant to improve their technical knowledge as well as take part in internships. CETP also has some challenges. The nature of effluents that we receive are promiscuous in nature because the natures of industries in this area are different. Certain entrapped gasses during the transit of the effluents also present a problem because unwanted reactions are a possibility. The plant is vulnerable to shock loads for both volume and strength. The increasing cost of energy is also a substantial challenge as 50% of their costs go towards energy.





Mr. J. John
Director, CETP

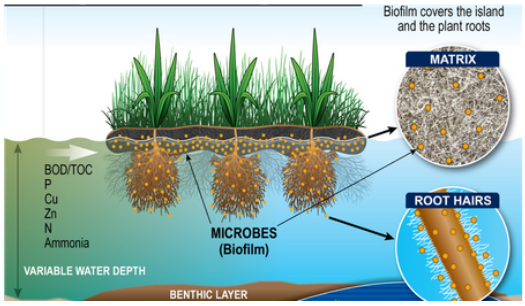
Mr. John is the Director of the BoD of Common Effluent Treatment Plant (Thane – Belapur) Association of Trans Thane Creek Industrial Area, Navi Mumbai. He is currently, also the Technical Director in the BoD of TTC – Waste Management Association (TSDF), Navi Mumbai for Hazardous Waste disposal and 'wealth from e-waste'. He holds a degree in Science, Chemical Engineering and Business Management with Advanced Diploma in Industrial Safety & a diploma in Industrial Pollution Control. Mr. John has more than 35 years of work experience in the Chemical sector in the Manufacturing, Process Development, Factory & System Management with Tata Enterprises. In the capacity of Corporate Head of Environment, Health & Safety, he is also actively involved in setting up trade effluent treatment plants for all Units across India ensuring Statutory Compliance.Additionally, Mr. Johan is also very involved in community service activities and is involved with organisations that work with underprivileged.

Speaker: Dr. Ritesh Vijay

Session Topic: Sustainable Liquid Waste Management – Urban Indian Context

Session Summary:

We are fortunate that we have surface water all over the MMR region but we unfortunately do not have the correct solutions for wastewater and sewage. Speaking of reservoirs and lakes, we have a number of lakes and small water bodies in the MMR region and 80 percent of these bodies have either mesotrophic or eutrophic issues. Therefore, the water quality does not meet water quality standards and waste water discharge into these water bodies is a big concern. In total, the MMR region generates almost 4000MLD of Sewage wastewater. Currently, only about 30% of wastewater gets treated across the country which leads to spread of waterborne diseases and impacts the aquatic flora and fauna. It also leads to odour issues. The latest sewage treatment processes include ASP (Activated Sludge Process), MBBR (Moving Bed Biofilm Reactor), SBR (Sequencing Batch Reactor) and SAFF (Submerged Aerobic Fixed Film Reactor). Depending on the needs and requirements of the city, an LCA needs to be conducted before deciding on the kind of treatment that best suits the city. The Government of India is not talking about the Decentralised Sewage Treatment plants and systems. The technologies that can be used in that case are, constructed wetlands are a good way to go. NEERI is working on a technology known as Phytorid-SWAB Technology which introduces both Filter Media and Plants to treat wastewater. Therefore, it is a system that includes both aerobic and anaerobic treatments in one. Mumbai has about 60% of its waste collected but that means that 40% still reaches the larger water bodies and beaches without being treated at all. NEERI has technologies where the drains can be used to treat the water passing through it and the same can be implemented in large cities as well. One of the major issues we need to address where MMR is concerned is the impact of urbanisation on mangroves. There is a lot of sewage and effluent discharge that happens near the mangroves which causes the decline of the water quality and increases sedimentation and siltation while also blocking the natural navigational channel. However, one good point to note is that the mangroves in Mumbai are increasing in size and area covered (not to the landward side, but to the seaward side), which is a big concern and challenge which we need to look into as the water channel keeps getting smaller.



Dr. Ritesh Vijay
Senior Principal Scientist,
CSIR-NEERI - Nagpur

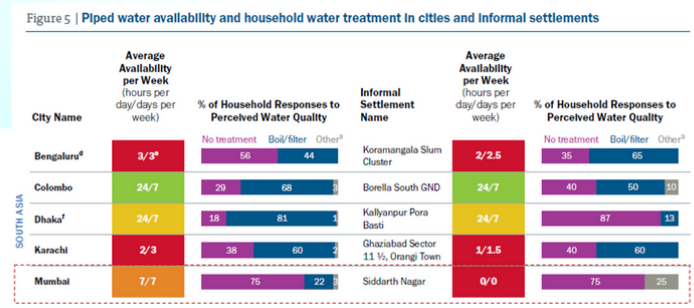
Dr. Vijay is currently the Senior Principal Scientist and Head at the Centre for Strategic Management at CSIR-NEERI. He has received his B.E. in Civil Engineering from SGSITS, Indore, his M. Tech in Environmental Engineering from DAVV, Indore and his PhD from VNIT, Nagpur. He has 20 years of experience working in the field of Strategic Urban Management with specialised expertise in Decentralised Sewage Treatment. He is widely published with over 70 publications at reputed international and national journals and has delivered addresses and chaired several international conferences and symposiums.

Speaker:Ms. Lubaina Rangwala

Session Topic: Issues of access to water and essential services, its implications on public health, especially in vulnerable communities in Mumbai, MMR

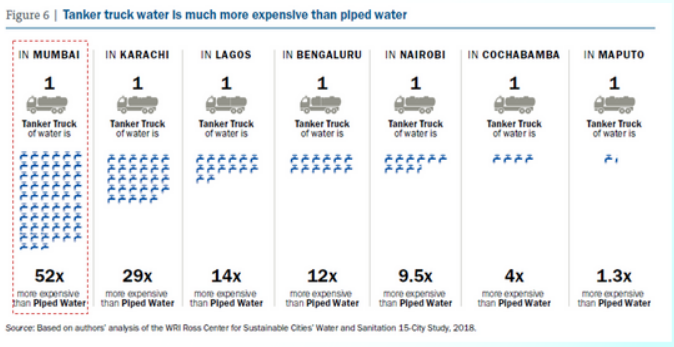
Session Summary:

WRI released a report titled *Unaffordable and Undrinkable - Rethinking Urban Water Access in the Global South* is geared towards more equal cities in the Global South. It looks at the 3 indicators of water supply, namely, safe, reliable and accessible. It found that in Mumbai City, an average city has 7 hours a day of access per day but when we look at the slums specifically, some people have no access to water at all. 75% of citizens do not treat their water at all (in both slums and otherwise). This leads to a heavy reliance on tankers for water supply and the burden of poor water quality falls to the poor in the city. In fact, water from tankers in Mumbai is 52 times more expensive than piped water and this causes an economic strain on the poor in Mumbai. This directly impacts and increases inequity. That brings up an interesting question, why is this the case in Mumbai? The issues don't just stem from technical or knowledge barriers but are also largely legal, policy and political barriers. We have both notified and non - notified slums. The notified slums have some access to services but the non - notified ones do not. Mumbai has the largest slum population in the world and nearly half of them are non-notified. This is tied up to cutoff dates. The predicted numbers show that around the world, 5.7 billion people are likely to face water scarcity for at least one month every year by 2050 and 350 million more people will be exposed to deadly heat in cities by 2050. This causes extreme public health concerns. The public health crisis in India directly stems from a lack of safe, reliable and affordable water supply and children are at the forefront of this crisis with increased exposure to diarrheal illnesses, increased incidents of malnutrition and increased child mortality. The lack of access to safe water also puts residents at risk of waterborne diseases like cholera and unsanitary conditions of living, leakages and spillages from tankers and in collection areas become breeding grounds for mosquitoes and therefore, vector borne diseases. In fact, the dire situation has been highlighted recently with residents who have limited or no access to safe drinking water who have remained most exposed and vulnerable during the COVID-19 pandemic when the safety measures included keeping oneself and one's surrounding sanitised and clean is paramount.



For households with access to piped water, intermittent service is common, which lowers water quality.

75% households in Mumbai city do not treat water in their homes



Ms. Lubaina Rangwala
Senior Manager - Sustainable Cities, WRI India

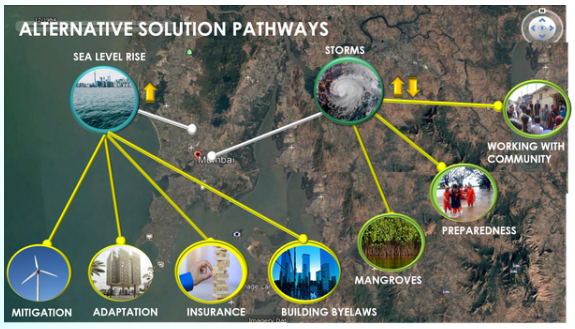
Ms. Lubaina is an Urban Planner and Architect from Mumbai, with over 14 years of work experience in India and the United States of America. She has worked with the World Resources Institute in India over the past 8+ years, and currently holds the positions, Lead Urban Development and Resilience at WRI India's Ross Centre for Sustainable Cities. She led the development of the Urban Community Resilience Assessment tool at WRI, and has since, worked on urban climate resilience in Indian cities with a focus on vulnerable communities and local institutions. In her capacities as a researcher, she has led and co-authored several publications at WRI India and on external platforms.

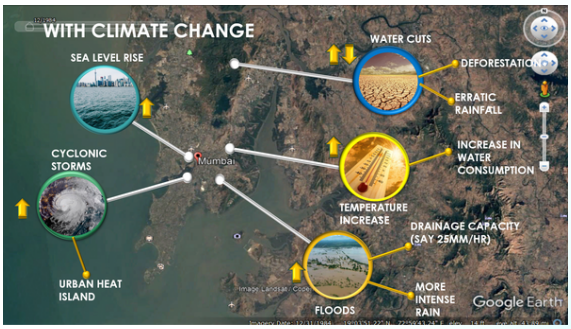
Speaker: Ms. Meesha Tandon

Session Topic: Integrated Water Management

Session Summary:

Mumbai will need around 6500MLD by 2041 and it plans to meet this water requirement by building dams, rainwater harvesting, water recycling, etc. There is also likely to be a 40% increase in water requirement for industrial and commercial uses. The government also plans to look at urban forestry and how it can be used to treat water. While the grey infrastructure is important and planning is underway for it, it is important to look at the alternative pathways and where the water management is concerned, there are many. IWRM is a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment. The few key elements that it proposes are: The catchment should be the unit for planning. All aspects of water be it waste water, recycled water, ground water, storm water, etc are all a part of one single loop with inflows and outflows from a single system. It does not only limit itself to the water sector but also looks at land use, transport, waste management, biodiversity and most importantly, community. Mumbai is dependent on 7 lakes for its water supply. In terms of waste water, it has a significant capacity to treat waste water but there is still a large amount of waste that gets disposed of without being treated. Currently, almost 3000MLD of treated wastewater is currently being discharged into the sea and that is water that could have been used for many other purposes. Therefore, the water flow in Mumbai is linear and the closing of the loop needs to be a priority. With Climate Change, Mumbai is set to face even more challenges like cyclonic storms, sea level rise, increased flooding and urban heat islands which will directly impact water supply, deforestation, drainage capacities, etc. The alternate pathways available to Mumbai are, for sea level rise and erratic storms, some of the actions that can be taken include, mitigation, adaptation, climate insurance, building bye laws, mangrove restoration, increasing disaster management preparedness and working with the community. From the perspective of floods and water cues, the alternative pathways include improved early warning systems, catchment afforestation, urban agriculture, pre-design drainage, blue-green sponges and urban foresters.





Ms. Meesha Tandon
Subject Specialist
(Urban, Water Climate Change)

Ms. Tandon is an Architect Planner who specialises in water resource management. She has over 15 years of work experience in urban development (incl. Smart Cities Mission), climate change, WRM, sanitation, WASH and other sectors; on projects supported by international funding agencies, state and local governments. Her forte lies in inter-sectoral integration and her extensive experience with BoP communities, urban local bodies and international organisations provides her an understanding of local as well as global perspectives. Her expertise lies in policy planning, advocacy, capacity building and working with vulnerable communities towards sustainable development. She has extensive experience in undertaking training and capacity building programs for government officials, vulnerable communities and youth. She has also advocated urban development, water and climate change related issues at several national and international platforms. She has been finalist, UK Alumni Awards (Social impact, India, 2018) and finalist, World Water Challenge (KIWW, 2018). She also heads her NGO working towards sensitisation of youth on aspects related to climate change and sustainable development. Presently she is working as an independent consultant/advisor, educational entrepreneur in climate change and as a member of UN Habitat P4CA (Planners for Climate Action) working groups.

Agenda - Day 3
Saturday, 12th of September, 2020
2:30 to 5:30pm IST

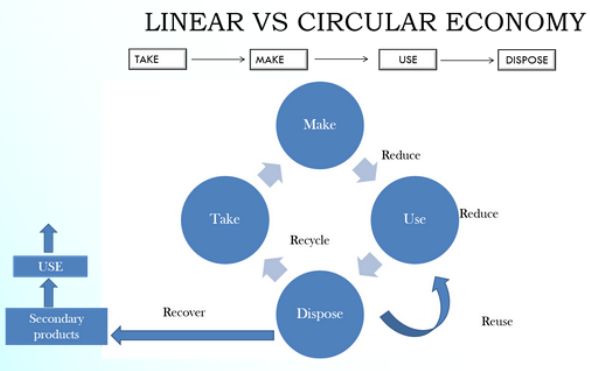
TOPIC	SPEAKER
Introductory Remarks	Mr. Nandan Maluste, Trustee, Mumbai First
Introductory Remarks / Moderator	Dr. Nitin Goyal Principal Scientist Incharge Mumbai Zonal Centre, CSIR-NEERI ,
Innovative Solutions: Circular economy in Wastewater Sector	Mr. Rudresh Sugam, National Technical Advisor, Sustainable Urban Development- Smart Cities Project, CURE India / National Long-Term Technical Advisor, Kochi Smart City Project, Ernakulam, Kerala, India
Emerging challenges with respect to effluent treatment & current Regulations and Policies- Challenges	Dr. Y. B. Sontakke, Joint Director (WPC) Maharashtra Pollution Control Board
Innovative Technologies: Treatment Methodologies	Prof. Sanjiv Sambandan, OPENWATER
Recycle and reuse of treated wastewater for Mumbai City	Mr. Anil Kumar Managing Director – WATER India Royal Haskoning DHV Consulting Pvt. Ltd.
'Innovative Technologies: Smart Water Utilities'	Mr. Fredrick Royan, Vice President - Sustainability and Circular Economy ATLAS for Frost & Sullivan,
Q&A/ Summing Up / Concluding Remarks	Session Moderated by Dr. Nitin Goyal
Vote of Thanks	Dr. Neville A. Mehta, CEO, Mumbai First

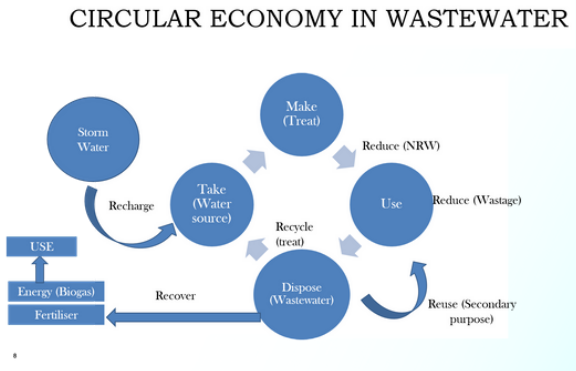
Speaker: Mr. Rudresh Sugam

Session Topic: Innovative Solutions: Circular Economy in Wastewater Sector

Session Summary:

In essence, the Circular Economy in the Wastewater sector is a model that is divergent from the linear economy model where we take the resource from the source, process it and find a way to reuse it. India withdraws a lot more groundwater which causes a rapid depletion of our resources. In fact, we withdraw more than China and the US combined. A study on the feasibility of circular economy in the wastewater sector in India in which 8 critical factors were identified that could influence the sector. They include: 1. Water Situation and Water goals (scarcity of the resource in a particular area, pollution levels, goals for water, etc.) 2. Supporting policies and regulations (India does have supporting policies but it is not properly regulated - more data is required to improve this) 3. Access to technology and finance (There are a number of technologies to choose from and the right choice needs to be made. For finance, the confidence does not exist in the private sector to invest money into the sector. Therefore, the government will have to take on the cost, at least initially) 4. Scale of Intervention (The debate here is Centralised vs Decentralised units. Depending on the conditions at a local level, the right scale of intervention needs to be arrived upon) 5. Management, Strategy and Institutional Framework (Multiple institutions are involved where wastewater is concerned and if something goes wrong, fingers are pointed at one another. Additionally, there is a distinct need for a single window access point for permits as well to make the process efficient.) 6. Public Perception (Across the world, people are not too happy reusing water. But that is a perception that needs to be actively changed. Will need time and accurate information) 7. Phases of Deployment (Several Industries are seasonal due to a lack of water supply. They are willing to use treated water. But we need to build trust for a regular supply of this treated water.) 8. Participatory Approach (So many institutions, users, utilities etc. face a problem of perception, price, cost of recovery, etc. It is essential to bring them all together and ensure a participatory approach to build trust amongst one another. Both the users and the private sector needs to come together for the system to be truly secular.He also through his research said that though in India PPP is advised for enabling the circular economy but more than that capacity building and institutional reform of public agencies is strongly advised.





Mr. Rudresh Sugam
National Technical Advisor,
Smart Cities Project,
CURE India

Mr. Sugam is currently working as a National Technical Advisor with the Sustainable Urban Development – Smart Cities Project, which is a joint venture of GIZ and MoHUA where he assists the Kerala Government in identifying sustainable solutions for water, wastewater, solid waste and urban development issues. He also supports the Kerala state-wide sanitation project on Integrated Wastewater and Septage Management Guidelines development . He has more than 10 years of working experience in the water and sanitation sector. Previously, he has worked as a Senior Programme Manager with the Water Team at Centre for Science and Environment (CSE) and as a Senior Programme Lead at the Council on Energy, Environment and Water (CEEW) where some of his focus areas included Circular Economic Pathways for Wastewater Management, Water Governance, Collective Action for Water Security and Sustainability, Developing Water Secured Cities by Adopting Multi-dimensional Approach, Identifying Challenges and Opportunities in the Urban Water Sector in India and Understanding the Water-Energy-Climate Change nexus. He has done Master's in Water Resources Management from TERI University and major project work from Yale University. He has published several research reports, articles and peer reviewed papers and presented at various national and international forums

Speaker: Dr. Y.B. Sontakke

Session Topic: Emerging challenges with respect to effluent treatment & Current Regulations and Policies- Challenges

Session Summary:

The environment "Panchamahabhuta" which stands for five physical elements include Earth, Land, Water, Fire and Air. The idea is that the 4 elements synthesise perfectly. However, that is no longer the case. Human activities have interfered causing imbalance and now the responsibility of maintaining the balance falls onto legislators and regulators. MPCB is one of the regulators and on of their major concerns is improving the quality of water in Maharashtra. They do this by taking legal actions including Directions and Bank guarantees in case of non-compliance. Additionally, we promote common infrastructure facilities for waste management like CETP, CHWTSDF, CBMWTSDF, etc. Additionally, the role of environmental monitoring and surveillance falls to them as well. They also constantly working towards increasing public awareness and correct information dissemination. MPCB's goal is to make the Mithi River in Mumbai pollution free by 2030. They are also urging all local bodies to step-up and provide the required treatment facilities in their respective localities. Plastic waste management is also a big focus. By bringing about bans on single use plastic, thermocol, etc. they have managed to bring the usage down but it has not completely vanished from use because the poorer sections of the society still use it. It is continually being worked on to improve awareness and reduce use. Maharashtra has 4 facilities to dispose of Hazardous waste - 98% of the waste reaches these facilities and is disposed off safely. They are still struggling with e-waste as well. Too many people are involved in the process which causes difficulties in managing the sector. MPCB plays a major role in increasing awareness about the latest rules and regulations to both organisations and the general public and a major concern for them at the moment is the dissemination of the correct information. They are establishing eco clubs in schools and colleges and are also providing fellowships to PhD and M-Tech students. They are providing additional funds to research scholars as well.

Status of Sewage Treatment along Polluted River Stretches

ULB	Numbers	Sewage Generation MLD	Sewage Treatment Capacity in MLD	Gap in Treatment Capacity in MLD	Actual Treatment in MLD	Gap in Treatment	Capacity of Proposed STP
Municipal Corporation	17	2365.25	1810.90	554.35	1537.93	827.32	998.26
Municipal Council	42	325.93	150.50	175.43	99.64	226.29	315.9
Nagar Panchayat	4	6.7	0.0	6.70	0	6.70	3.0
Gram Panchayat	27	30.77	0.00	30.77	0	30.77	0.00
Total	90	2728.65	1961.40	767.25	1637.57	1091.08	1317.16

- The gap in sewage treatment in local bodies along polluted river stretches will be fulfilled by 2023.
- Nagar Panchayat will meet the target by Dec. 2020 through septage management.
- Gap will be meet through temporary measures till the completion of STPs and sewerage network.

Dr. Y.B. Sontakke
Joint Director (WPC), MPCB

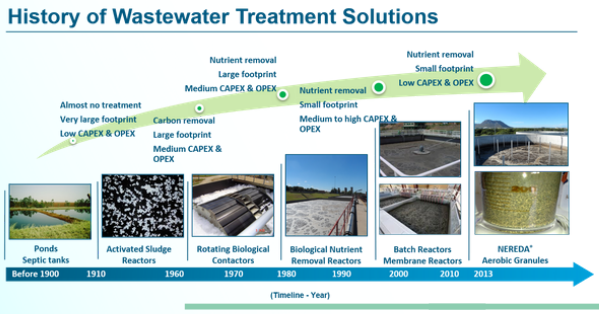
Dr. Sontakke holds a masters degree in Environment and a PhD in Environmental Toxicology Studies. In the past, he has worked as Environmental Scientist and Executive Officer in the field of pollution control (Air, Water, and Noise) at Dr. Ramazini Research Institute of Occupational Health Services, Pune before joining the MPCB (under Ministry of Environment, Govt. of Maharashtra), as Sub-Regional Officer in 1997 where he worked his way up to the position of Joint Director (Water Pollution Control) from 2014. Over the years, Mr. Sontakke has spearheaded a number of campaigns, presented at international conferences and has been a part of several symposiums and training programs. Mr. Sontakke also has a number of legal contributions that include his participation in the framing of rules for Noise Pollution, Hazardous Waste, Maharashtra Plastic carry Bags Plastic Waste (Management & Handling) Rules, E-Waste (Management & Handling) Rules, The Manufacture, Storage and Import of Hazardous Chemical Rule Amendment.,etc.

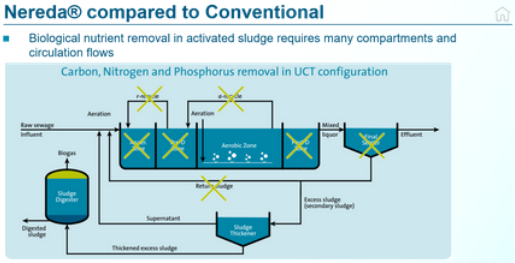
Speaker: Mr. Anil Kumar

Session Topic: Recycle & Reuse of Treated Wastewater (Used Water) in Mumbai

Session Summary:

Emphasising on the Mumbai specific strategy to recycle and reuse of water, He emphasised the relevance of using the word 'used water' as opposed to "waste waster" as it has a potential of creating a positive impact on people's mind, as opposed to the term waste water. Demystifying the definitions, it is seen that Indirect Potable (Drinking Water) Reuse is Augmentation of raw water supply with reclaimed water. This mix typically receives additional treatment before entering the distribution system, whereas Direct Potable (Drinking Water) Reuse is Introduction of reclaimed water directly into a drinking water distribution system without intervening storage (pipe-to-pipe). It comes as no surprise that the latter one is challenging and involves more technology. Policies have been in place to achieve this recycle and reuse goals. The Government of India encouraged reuse of water through The Draft National Water Policy of 2012. Apart from this, the state government of Maharashtra took up certain initiatives in November 2017. For Mumbai, the expansion of settlement is rapid. This creates a tension on its infrastructure. There are only 7 sewerage joints, which are divided into Island City, Western and Eastern Suburb. In this, the maximum water demand in Zone 2, 3 & 4 is about 60% (2400 MLD), making it difficult for the authority to manage waste water generated on such a huge level. Similarly, in zone 2, 3, and 4, the density of population is very high in these areas. Slums, industrial locations are also located in this area. For a population of 19 million, Mumbai's water supply is 3890 MLD and all its water sources are far away from the city. This makes the process of transferring water very expensive. There is a water deficiency of 700 MLD in the city. With respect to existing wastewater treatment facilities in the city, around 2700 MLD of sewage water is generated, out of which 2286 MLD is treated. The plants have some preliminary treatment on this water. The current system is dependent on sea outfall systems with some minor treatment systems. These investments are taking up place, to upgrade the current system. However, the collection of sewage water is a challenge. The current coverage is 88% of sewerage and it requires more investment. Mr. Kumar suggests that if the water is reused within the city, the long distances of transferring water and excessive cost can be reduced. Land use, getting clearance on projects, several regulations, public acceptance and attitude etc. are various other challenges that are faced.





Mr. Anil Kumar
Managing Director
WATER India Royal Haskoning
DHV Consulting Pvt. Ltd.

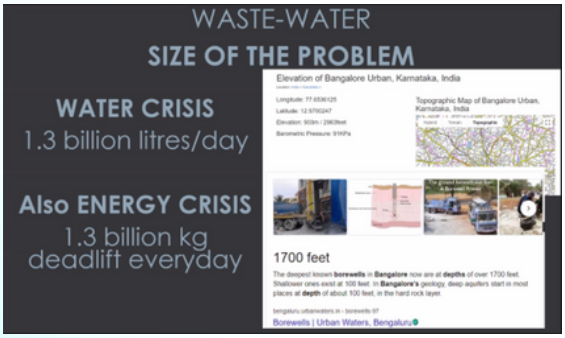
Mr. Kumar has twenty-five years of experience in diverse technical, commercial, operations and corporate roles in water and infrastructure. He has achieved significant milestones in large multi-site service organisations in India, Middle East, Asia & U.K. He has extensive knowledge and understanding of the water infrastructure investment in India and Asia for the private and government sector. He has a strong record of success in the leadership of complex programs and program management with multi-sectoral teams in Government Institutions and Companies. His experience includes strategic planning and projects experience of managing projects and multi-billion-dollar capital delivery programs into conveyance systems, water, utilities, wastewater, flood resilience and environment. Prior to Royal Haskoning DHV, he has worked in CH2MHill (Now Jacobs), MWH & Halcrow UK. His education background includes BE (Civil) from Bangalore University, M.Tech. (Environmental Engg.) from IIT Delhi & PBM (MBA) from IIM Kolkata. He is also pursuing PhD in Water Resources from IIT Delhi.

Speaker: Mr. Sanjiv Sambandan

Session Topic: Innovative Technologies:Treatment Methodologies

Session Summary:

The process of evolution has followed a particular theme in this country. Namely, Miniaturisation, Privatisations and finally decentralisation. The same can be seen in sectors like the telephone, media channels, energy, etc. A mix of decentralisation and centralisation is what is going to work best for a country like India. When it comes to water, this decentralisation has still not happened. People are still very dependent on centralised facilities because we have the idea that the providing of water and treatment of water is still the responsibility of the government. Especially where the treatment of wastewater is concerned. This leads to the government facilities being overwhelmed and it is not the fault of the government because a large amount of the wastewater is discharged into nature by irresponsible citizens or industries. For example, the Bellandur lake in Bangalore has a lot of pollution that is caused by surrounding industries. Therefore, the merit of decentralised systems are very much supported by the current situation. But that brings up the next question. What kind of a decentralised system would be best? The broad treatment options are, membranes/filters for separation, chemicals for coagulation/adsorption or electrocoagulation/electronic alum. The challenges in the decentralised system include: the importing and storing of membranes and chemicals needed, expenses incurred to replace them which included expertise and finally, the permission needed to dispose of these membranes and chemicals. This is possible at scale but it is not going to reach individuals at a community level. From the point of view of goals for waste water management, they are zero waste and circular economies. Therefore, it is to reduce waste and ways to use the reduced waste that will inevitably be incurred. As a user, we will look for systems that are easy to use, scalable if needed, easy to maintain and have a low cost of capital and maintenance. Additionally, having technology that automates a large part of the process and by providing incentives for use could play an important role. By meeting all these demands, it is possible to encourage local wastewater management. Open Water provides an option for Hassle-free wastewater treatment. We use no membranes, no synthesised chemicals, it has a plug and play feature, has zero water wastage and is both modular and scalable. This technology has field trials in both ground and domestic and industrial settings and samples.



Mr. Sanjiv Sambandan
Professor,
ECE Department, IISc

Prof. Sanjiv Sambandan is an Associate Professor in Applied Physics at the Indian Institute of Science, Bangalore. He also holds a lectureship at the Department of Engineering, University of Cambridge, UK. He obtained his BTech in Electrical Engineering (Energy Systems) from the Indian Institute of Technology, Kharagpur in 2002 and his PhD in Electrical and Computer Engineering from the University of Waterloo in 2006. From 2006-2010 he was with the Electronic Materials and Device Lab, Xerox PARC, California, USA. He is the founder and director of openwater.in, a wastewater treatment startup.

Speaker: Mr. Fredrick Royan

Session Topic: Innovative Technologies: Smart Water Utilities

Session Summary:

The Global Risks Report 2020 of the World Economic Forum (WEF) for the first time has environmental risks in its Top 5 Risks – Climate action failure, Biodiversity loss, Extreme weather, Human-made environmental disaster and Natural disasters. With a lack of political consensus, there is an urgent need for the other stakeholders such as industry and financial institutions to partner and collaborate across industry value chains under the framework of the Sustainable Development Goals in building a Circular Economy. The future of water has a place crucial for Sustainability and Circular Economy which includes shifting, sourcing, transmission, distribution and usage of water towards a sustainable way. Water as a Service comprises reuse and recycled water, wastewater to energy, energy positive wastewater treatment plant and nutrient recovery. It is estimated that global water requirement is set to increase to 40% by 2030. Localised / regionalised supply chain models, alternative sources and raw materials, resilience of assets to natural/physical hazards, pandemics would ensure adequate risk and resilience behaviour with a focus on preventive vs reactive maintenance. Understanding the digitised times, digital strategy to encompass 4 P's – Policies, Processes, Platforms and People for a successful customer journey in the future of water is essential. Sensors, smart meter/grid, AI & machine learning, block chain, asset optimisation, demand response, automated trading, active water management, etc. can help achieve the necessary digital transformation. The Smart Water Network is a framework being adopted by utilities to achieve key operational and sustainability outcomes. The Smart Water Networks Forum (SWAN) is the leading hub for the smart water sector. A non-profit, SWAN brings together key players in the water sector to accelerate the awareness and adoption of data-driven technologies in water and wastewater networks worldwide. Strategic Imperatives in terms of achieving Smart and Sustainable Water Services include the Increasing appetite and urgency among utilities both in developed and some developing countries for efficiency improvement targeted by smart enabled solutions and backed by innovative business models; Digital transformation of a water utility is crucial to enhance resilience and asset value for better financing and long term sustainability of operations; customer focused digital strategy aimed at both understanding addressable needs and enhancing interaction backed benefits will be crucial in defining its success; digital skills gap needs to be urgently addressed with specific and customised training solutions targeting the various roles and specific functions within a water utility; and Corporate vision and strategy towards Water as a Service (WaaS) will be key to align with the future of multi-utility services for households.

Sustainability Indicators of UK Water Utilities

Greenhouse gas emission reduction strategies will involve investment in smart technologies driving energy efficiency improvement and sourcing/producing renewable energy"

Key Indicator	Sub Indicators	Units	Performance 2015–2016	Performance 2016–2017	Progress
Response to climate change	Total energy use	(GWh)	4445.4*	4487.5*	
	Total Renewable energy generation	(GWh)	763.6*	904.7*	
	Greenhouse gas emissions—water	*($KgCO_2e$) per megalitre of treated water*	319.78	294.52	
	Greenhouse gas emissions—sewerage	*($KgCO_2e$) per megalitre of treated water*	301.2	273.3	

Mr. Fredrick Royan
Vice President
Sustainability and Circular Economy ATLAS

Mr. Royan has been analysing the global water market for over 15 years and is the Global Leader and Vice President of the Sustainability and Circular Economy practise at Frost & Sullivan. He led the launch of the Smart Water Program in 2010 and has since focused on shaping the Global Water Research Program around digital transformation and together with his team of analysts has published authoritative reports on Smart Water Grid and related segments. He has a Masters in Environmental Protection and Management from the University of Edinburgh secured as a Shell Centenary Chevening Scholar and has also been conferred the Frost & Sullivan Fellowship. He is a member of the Executive Council of the Smart Water Networks(SWAN) Forum and leading the regional SWAN India Alliance initiative.

Organisers

Dr. Kumar (born in 1964) obtained M.Tech. in Environmental Science and Engineering from IIT-Bombay and Ph.D. in Environmental Engineering from RTM Nagpur University. Before assuming the charge of Director of the CSIR-National Environmental Engineering Research Institute (CSIR-NEERI)on 23rd May 2016, he was Chief Scientist and Head of CSIR-NEERI Mumbai Zonal Centre. He has a vast experience in all fields of environmental science and engineering, especially air pollution control and management, urban air quality monitoring, emission inventory and modeling, environmental impact assessment, environmental audit, climate change and health.Dr. Kumar has given a notable contribution in developing technologies for reuse and recycling of domestic and industrial wastewater, which brought a paradigm shift in the country. His efforts have always been for upliftment and application of Science and Technology for sustainable development. His goal is to provide science and technology oriented solutions for the benefit of society and industry.Dr. Kumar has ten patents on pollution control devices including two international patents, and published more than 100 papers in national and international Journals and 90 papers in national and international conferences.

Dr. Rakesh Kumar
Director,
CSIR - NEERI

Dr. Neville A. Mehta
CEO,
Mumbai First

Dr. Mehta is a multifaceted leader with an intensive record of Global diversified strategic management. After being a successful entrepreneur, he turned towards his passion for humanitarian projects by leading the philanthropic initiatives and programs at Lions Clubs International. As Chief Executive Officer He worked across India, South Asia, Africa & Middle East with multiple humanitarian & disaster relief projects, government & corporate partnerships spread across 69 countries.In partnership with Bill & Melinda Gates Foundation, he facilitated the “Measles- Rubella” Campaign across 13 states/union territories with the Government of India. He also worked with Carter Foundation to eradicate river blindness & trachoma in Africa and with the United Nations in the implementation of Millennium Goals & Gender Equality.A PHD in Social Welfare & Humanity he was acknowledged as the Brand Ambassador for the “Swachh Bharat Abhiyan”. He is on the Advisory Board of the National Institute of Event Management of India and the Food Security Foundation of India. Dr Mehta also authored a book on “Drug Awareness” and hosted a world conference called HOPE 92 on drugs and AIDs awareness.

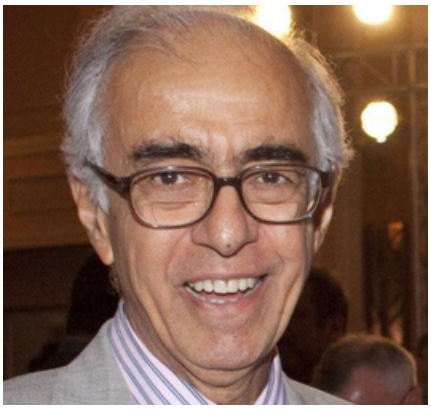
Mr. Maluste, Honorary Secretary & Treasurer, has been a part of Mumbai First since the late 1990s. Over four decades, he has had a varied career in India, the United Kingdom and the Gulf as a public accountant, management consultant, journalist, advertising executive, entrepreneur, angel investor, board member of companies, trusts and societies, researcher and consultant in government, investment and private banker. Apart from speaking regularly at professional, industry and academic events, Nandan has presented at the Parliament's Standing Committee on Finance. He has been published in R&D Management (Oxford), World Affairs (New Delhi), Business India (Mumbai), etc. and has been interviewed for the press, TV and radio, and addressed live audiences on three continents. He is a graduate of Manchester Business School, England and a Fellow of the Institute of Chartered Accountants in England & Wales. He is also an alumnus of the Indian Institute of Technology, Bombay and the Cathedral & John Connon School

Mr. Nandan Maluste
Trustee,
Mumbai First

Dr Nitin Goyal
Principal Scientist Incharge,
Mumbai Zonal Centre,
CSIR-NEERI

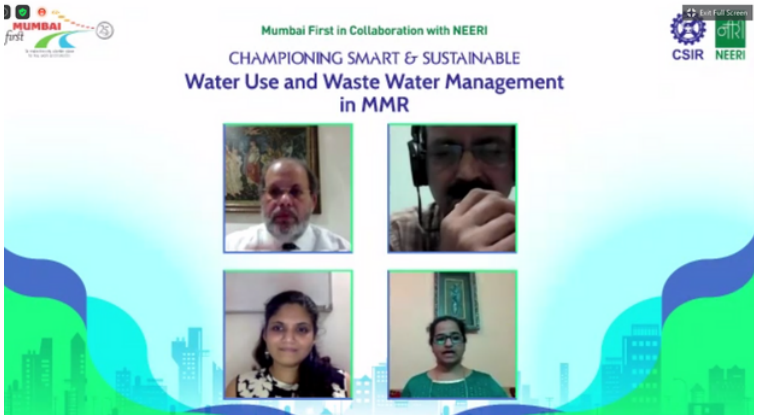
Dr. Goyal holds B.E. (Civil), M.E. and PhD (Environmental Science and Engineering) degrees. His primary area of research is Measurement and Chemical Characterization of Aerosols/Particulate Matter in Ambient Air. He has designed and developed an indigenous low-cost instrument for sampling of fine particulate matter (PM2.5) source emissions as well as ambient air. He was also invited to Desert Research Institute, Reno, Nevada, USA as a guest researcher to study chemical characterization of fine aerosols. He has about ten years of teaching experience in the area of Environmental Engineering where he has taught courses like environmental impact assessment, air pollution measurement and control, water and wastewater engineering, environmental management, etc. to students at UG and PG level. He has worked on several projects in South-East Asian countries on environmental and social impact assessment studies, source apportionment and elemental mass balance studies. He was also a team member on a biomass gasification project sponsored by MNRE (GOI) at CESE, IIT Bombay. He is currently working on air quality management studies with several State Pollution Control Boards in India.

Mr. Nayar believes in the dictum “think local and act Global“. Despite his busy schedule as Founder and Chief Executive of Concast (India) and Director of several other companies, he still finds time to promote several other social and business initiatives. Narinder has been actively and passionately involved with the Mumbai Transformation Programme, which is spearheaded by the Hon’ble Chief Minister. As Chairman of Mumbai First, Narinder was instrumental in arranging a study together with McKinsey on how Mumbai could be transformed into a world-class City over the next 10 years. Following this study, several initiatives have been taken by the Maharashtra Government including constituting a Citizens’ Action Group of which the Chief Minister is Chairman and Narinder is the Vice Chairman. In addition, Narinder is also an active member of the Empowered Committee headed by the Chief Secretary to monitor various ongoing projects in Mumbai. He has led a team of experts from Mumbai to Singapore for discussions with Urban Renewal Authority (URA) and to study the measures adopted in Singapore for long term planning. Based on the Singapore experience, Narinder strongly advocated the need for a 40-year Vision document for the Mumbai Metropolitan Region. Currently, his focus is on environmental issues in the MMR, especially the consequence of Climate Change and sea water temperature rise. With this in view, Mumbai First organized a conference title "Climate Crisis: Action for Tropical Coastal Cities" that brought together experts from coastal cities around the world to share experience, knowledge and best practices and suggest to the Maharashtra Government what proactive steps need to be taken in Mumbai



Mr. Narinder Nayar
Chairman,
Mumbai First

Day 1 Panel



Day 2 Panel

Day 3 Panel

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