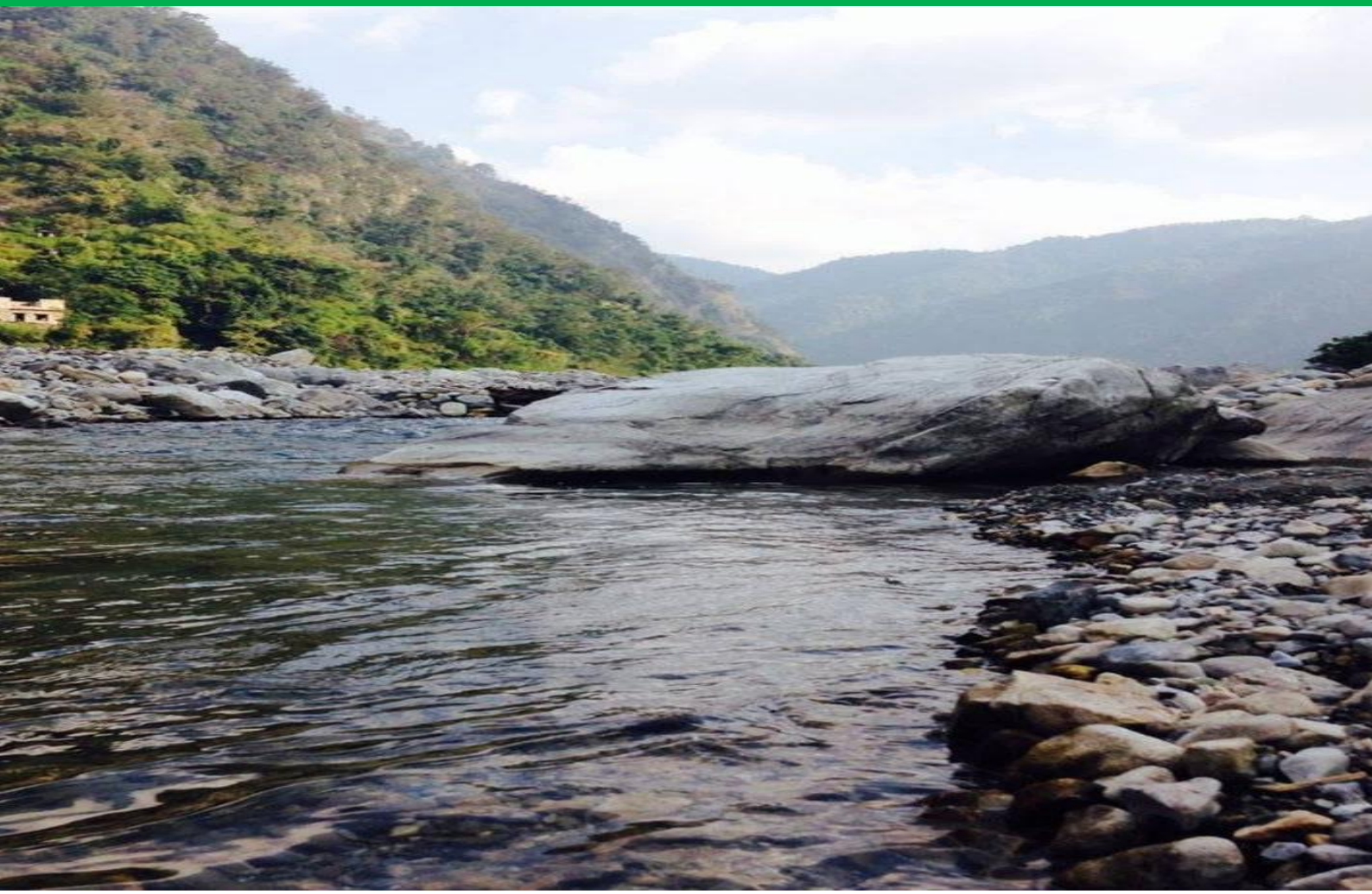
# Achieving Sustainable and Healthy Water Through Efficient Systems

27th November 2020

## DEHRADUN CITY WORKSHOP
## A REPORT



HEINRICH BÖLL STIFTUNG INDIA

National Institute of Urban Affairs

Development Alternatives

# ACKNOWLEDGEMENT

We are thankful to Dr. Ashish Kumar Srivastava (IAS), Shri. Ravindra Kumar, Shri. S.K. Sharma, Shri. H.K. Pandey, Smt. Neelima Garg, Shri. V.C. Purohit, Shri. S.C. Pant, Shri. Yashbeer Mal, Shri. Deepak Malik, Shri. Namit Ramola, Shri. Krishana Pallava Chamola, Shri. Sandeep Kashyap, Shri. Manish Semwal, Shri. Rajendra Pal, Shri. Abhay Pal, Shri. Prashant Nautiyal, Dr. Suresh Kumar, and Shri. Abhay Singh from the city of Dehradun for giving us an opportunity to contribute to achieving the developmental goals of the city in the area of water and wastewater management and for co-developing the agenda of the Dehradun city workshop.

We acknowledge the support extending to Development Alternatives by NIUA, Mr. Hitesh Vaidya, Mr. Depinder Kapur, Dr. Mahreen Matto and Mr. Rahul Sachdeva for knowledge sharing.

We thank Mr. Lokesh Ohri and his team from Been There Doon That for being our knowledge and outreach partner and supporting the facilitation of the workshop in Dehradun city.

We would like to extend deep thanks to Ms. Smita Singhal, Mr. Tharun Kumar, Mr. Abhijit VVR, Mr. Parth Chaudhary and Mr. Divanshu Kumar for being part of this workshop and contributing towards the agenda of this discussion for sharing knowledge about the new-age solutions and systems thinking approach and creating possible opportunities for all stakeholders in achieving the efficiency and circularity of urban water systems.

We feel pride and pleasure in expressing our gratitude towards Heinrich Böll Stiftung India for supporting and being with us for last three years during our journey in the study conducted in Indian cities, especially, Dehradun.

We feel that this workshop helped in bringing new ideas and strategies to address the water and sanitation situation in the city of Dehradun in an integrated and systemic manner. We hope to continue our association with all the stakeholders going forward.

# Contents

# List of Pictures

# Executive Summary

Indian cities face extreme water stress which stands at more than 54% on an average. Most of the cities face acute water loss in the system caused by ancient and dilapidated infrastructure, illegal connections, pipe and joint leakages, and lack of metering systems. The cities are also not equipped with new technologies and solutions that can help them achieve resource circularity. Indian cities are moving from surface water to ground water for their use, without commensurate recharge leading to higher depletion and increasing energy intensity of the urban water system. As an example, in Dehradun city, which is endowed with good rainfall and surface water sources, currently 80% of the drinking water is extracted from the ground.

This report discusses the workshop conducted by Development Alternatives Group for the city of Dehradun in association with the National Institute of Urban Affairs (NIUA), Been There Doon That and supported by the Heinrich Böll Stiftung aimed at understanding innovative technologies in the water and wastewater treatment space. The workshop is a culmination of two years of research on water and energy flow studies in Dehradun and other cities. Dehradun is one of the oldest cities in India and the most populous city in the state of Uttarakhand. It faces numerous challenges in achieving safe and equitable water system management. The city faces a lack of adequate water conservation and monitoring system, multiple and overlapping water supply infrastructure and water losses leading to a higher than national average Non-Revenue water. The city also faces challenges with respect to sewage and waste water management, with large parts of the city still unconnected or inadequately addressed, and the waste water treatment not covering the full city nor the treated water being reused.

Dehradun Nagar Nigam has initiated various interventions under various national and state schemes such as Smart Cities Mission, AMRUT, etc., to address the identified problems. However, these issues require integration of innovative solutions into the system for efficient operation. Dehradun aims at achieving 100% water metering in all residential and commercial establishment and storm water drainage data collection and monitoring by intelligent poles. The issues are however quite complex calling for innovative solutions that are efficient and cost-effective. The challenges of dilapidated infrastructure, economics of traditional solutions, ULB staff capacities, procurement systems must be dealt with. Integration of new age technologies with real time data tracking, awareness on WASH practices, and knowledge on the entire water system value chain - water conservation, storage, supply and waste water treatment and re-use to be disseminated.

During the discussion, key challenges of the city were discussed in detail which were found to be in the water supply system, wastewater treatment and reuse, and capacity building and stakeholder participation. The discussion revolved around issues of quality and adequate supply, grey water management, non-revenue water, maintaining existing schemes, mindset of people about user charges, issue of lack of last mile connectivity of sewers and tap water to households, leveraging on topography of Dehradun to reduce power consumption, water efficiency and energy efficiency, and moving towards non-network sewage connection and management. Subject matter experts and solution providers put forth their recommendations and solutions which can be feasibly integrated to the city systems to achieve its aspiration. Several new age technologies, nature based solutions, business models, best municipal practices, and resource circularity interventions were discussed.

The workshop is complemented with a radio campaign stressing the importance of judicious use of water and reuse of treated wastewater in association with Red FM Dehradun and a perception survey among citizens to understand the general awareness on water and wastewater system in the city.

Chapter 1

# Background

## 1.1 Context

With an increasing population in cities, estimated to reach 590 million by 2030, the demand for water is ever increasing. According to a report by the World Resources Institute (WRI, 2015) more than 54% of India is under high or extreme water stress. Non-revenue water in cities is estimated to be around 32% and with 70% installed capacity of sewage treatment, only 35% is treated. According to the NITI Aayog (Composite Water Management Index-2019), about 2 lakh people die every year due to inadequate water, sanitation & hygiene; 820 million people (58%) have less than 1000 $m^3$/ capita water availability; and 70% of our water is contaminated. Traces of the Novel Coronavirus found in sewage water of infected population have brought to the fore the risks of diseases spread through water systems. Untreated or inadequately treated sewage water entering water bodies poses high risk to human health through potable and non-potable consumption. The humongous quantity of wastewater generated creates significant potential for treatment and reuse. Researchers tested the treated wastewater from the municipal WWTPs from which the virus was found in an untreated sample, and found no viral genome, thereby validating the efficacy of wastewater treatment systems. The integrated management of water systems that addresses safe water supply, safe management of sewage and water security must therefore be a priority agenda of local governments.

## 1.2 Need for an Integrated Systemic Approach

It is important to understand that the challenges of each city differ with the context and a universal solution cannot be applied. Each city requires a tailor-made solution. The key challenges in urban water supply include ; 1) Rapid unplanned growth, 2) Non-circularity of treated waste water or not treating waste water, 3) Inefficient water distribution system with plagued distribution losses, 4) limited metering leading to NRW, 5) Low household connection coverage, 6) Poor pricing strategies, 7) Siloed institutional arrangements, and 8) Institutional capacities, both financial and human resources.

The existing water supply priority follows the order engineering, water science, social mobilisation, financial realisation, ecological factors. Whereas it is to be noted that to achieve a sustainable water system, it is important to prioritise the ecological factors and provide suitable and efficient engineering solutions after considering all other related parameters.

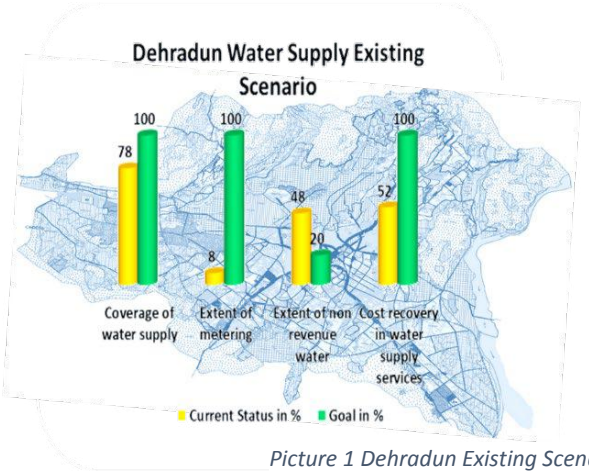
A systemic approach to look at the issues will bring in a value addition to the urban water and wastewater system management. It will help in comprehensive understanding of the functioning of the interconnected elements of the system, enhance capacity to integrate designed to fit smart and efficient solutions, enhance streamlined coordination among actors of the value chain, and enhance tracking and monitoring mechanisms for continuous system improvement. Resource equity can be maintained through participatory, transparent and accountable governance system. Achieving an integrated system allows city to efficiently identify pain points, areas of interventions, required customized solutions and opportunities for stakeholder engagement.

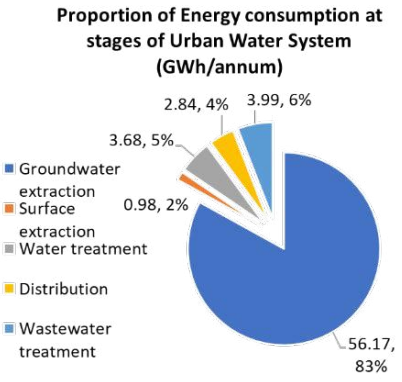
# Dehradun City Workshop

A virtual discussion was organised by Development Alternatives Group on 27th November 2020 for the city of Dehradun, the most populous city is Uttarakhand. This dialogue was conducted in association with the National Institute of Urban Affairs (NIUA), Been There Doon That, and was supported by the Heinrich Böll Stiftung. It aimed at understanding the technological, institutional and governance challenges faced the city and innovative technologies in the water and wastewater treatment space. It also focused on how collaborations can be leveraged to complement each other's aspirations and provide support to meet the challenges in achieving sustainability through efficient water systems.

## 2.1 Key Issues of Dehradun City

The city of Dehradun faces numerous challenges in providing a safe and adequate water supply, managing wastewater generated and checking non-revenue water. Currently, the city faces water shortage especially during summer. Dehradun Nagar Nigam in coordination with Jal Sansthan has enhanced its water supply coverage to 78% with an average continued supply of 6 Hrs a day. The city has 70% coverage of toilet facility. Though the city has adequate sewage treatment capacity and sewage collection efficiency of 51% on the basis of ongoing projects, only 30% of the city is connected to sewerage network. With only 8% of the water connections metered, the non-revenue water in the city stands very high at 40%.




*Picture 1 Dehradun Existing Scenario*

The Smart City plan as well as the Dehradun Nagar Nigam have initiated various interventions to address these problems. However, these issues require integration of innovative solutions into the system for efficient operation. The challenges of dilapidated infrastructure, economics of traditional solutions, ULB staff capacities, procurement systems must be dealt with. Integration of new age technologies with real time data tracking, awareness on WASH practices, and knowledge on the entire water system value chain - water conservation, storage, supply and waste water treatment and re-use can help city to overcome its current situation.

**Considering the ground conditions, the challenges faced by the city of Dehradun under water and wastewater system are as listed below:**

- Lack of last-mile connectivity of water and sewage connections.
- Unsustainable water consumption by citizens and fixed user charges.
- The existing water transmission and distribution system have outlived their design period life and have become insufficient to cope with increased demands of the city.
- Old and dilapidated infrastructure leading to high NRW.
- Lack of metering system at the consumer end and non-implementation of volumetric tariff leading to inequitable usage, losses and decreased revenue for government water agencies and municipality.
- Mis-match in water quality and water consumption, as it was noted that the city residents use drinking quality water for non-potable activities like car washing, cattle washing, gardening, etc,.
- Lack of third eye enforcement, strict rules and regulation laying out penalty for misuse and wastage of water resources on consumers as well as authoritative department.
- Lack of underground infrastructure mapping system leading to disrupted network system resulting from departments working in silos and damaging the existing water pipelines for new projects.
- Increased violations like unauthorised connections, thefts and vandalising of public infrastructure.
- 80% of the water extracted from ground making water a highly energy intensive sector in Dehradun.
- Lack of regulations for conserving rainwater and stormwater.
- Lack of citizen awareness on reuse of treated wastewater and ULB capacity development.
- Lack of infrastructural policing.

## 2.2 Priority Issues Discussed and Solutions

**Issue 1. Online monitoring and tracking of water systems**

Solution a) Automation of all water infrastructures (WTP, STP, FSTP) including valves and pipelines to monitor these systems for checking any malfunctions such as leakage, unauthorised connection, etc,.

Solution b) Determine plant utilisation rate and understand equitable distribution of resources

Solution c) Study data and gain insights on the functioning of the infrastructure for better management and energy efficiency.

**Issue 2. Wastewater Treatment and Reuse**

Solution a) Sewage and Faecal Sludge Management (combination of centralized and decentralized treatment, monitoring, smart metering, data collection and analysis, reuse of treated water)

Solution b) Septic Tanks and Management (on-site treatment, septic tank cleaning and management services, collection & transportation solutions for faecal sludge, reuse of sludge and wastewater)

**Issue 3. Capacity Building and Stakeholder Participation**

Solution a) Capacity building of ULB and line department officers on new technologies and material flow analysis and lifecycle analysis of water infrastructures.

Solution b) Awareness generation and participation of citizens and other stakeholders

## 2.3 Enabling Response to Challenges

The workshop brought the challenges of water and wastewater management faced by the city on the forum for discussion. The variety of new age solutions and case studies presented provided an opportunity for a lively exchange. The discussions also brought forward the key barriers to testing, piloting and deploying new age innovative solutions and service providers in the traditional space occupied by large scale infrastructure approaches of the city.

During the discussion, it was understood that, currently, the city is reorganising its water supply infrastructure to ensure 100 % metering at the consumer ends. Initiatives have been taken to check NRW under different schemes. However, one such factor often not considered under these schemes are transferring or reorganising old and dilapidated systems with new projects. The failure of which leads to high NRW. Hence emphasizing the importance of zonal segregation, infrastructure segregation, and transfer of old infrastructure to new infrastructure. Considering the high energy consumption in the production/extraction of groundwater, the city has also adopted a hybrid ESCO model in-order to remotely monitor its nine pumping stations which has 38 boosting pumps which will lead to 10% energy saving annually.

Considering the ground conditions, various solutions were discussed for issues identified such as energy efficient and compact systems addressing land scarcity, resource circularity, leakage and online monitoring systems, resource resilience and capacity building. Apart from technological and institutional challenges, the discussion also focused challenges in governance in trying to identify and planning water infrastructure which require advocacy, general engagement with wide range of stakeholders, RWAs, citizens, academia, etc,. The city has to adopt a holistic and participatory approach with all stakeholders involved in every stage from conceptualization of a project through implementation, operation and maintenance.

**Key opportunities that the new age solutions for water and waste water management offer are:**

- Small scale, decentralised and customisable solutions with lower capital and operational costs
- Agile service providers with faster ROIs and new payment models making solutions and services affordable to the city and citizens
- Dynamic data provision for tracking, monitoring and improving the system over time.

All solutions that were discussed were indigenous, developed in India at labs and research institutes and start-up incubators.

**While addressing the management system capacity issues, the barriers that need to be addressed in bringing the deploying the solutions on ground are:**

- Information, comparison and selection of solutions.
- Procurement system design for piloting projects.
- Mechanisms for PPP models with start-ups and new age service providers.

## 2.4 Summary of Solutions Discussed

Once the challenges were clearly laid down by the city, innovative and cost-effective technologies were discussed which could enable the city to have an efficient water management system.

The solutions discussed were decentralised, compact, containerised/mobile, and plug and play systems. The solutions discussed used various technologies such as vermiculture, electro-coagulation, electro-oxidation, biomimicry, and tethered sensors, etc.

The systems are characterised by low or no energy requirement as they run on solar power, gravitational flow, etc. The capital and operational cost for these systems stood at minimum compared to conventional systems and has faster ROIs.

From the discussion, it was understood that data availability is an important factor to effectively operate and manage these units. And therefore tracking and monitoring systems that provide dynamic data to operators and mangers were discussed Solutions to automate the operation and monitoring the WTP, ETP and STPs were shared. These solutions give insights to operators, managers, and decision makers on understanding the functioning, utilisation rate, areas of improvement, and methodology changes required for effective operation.

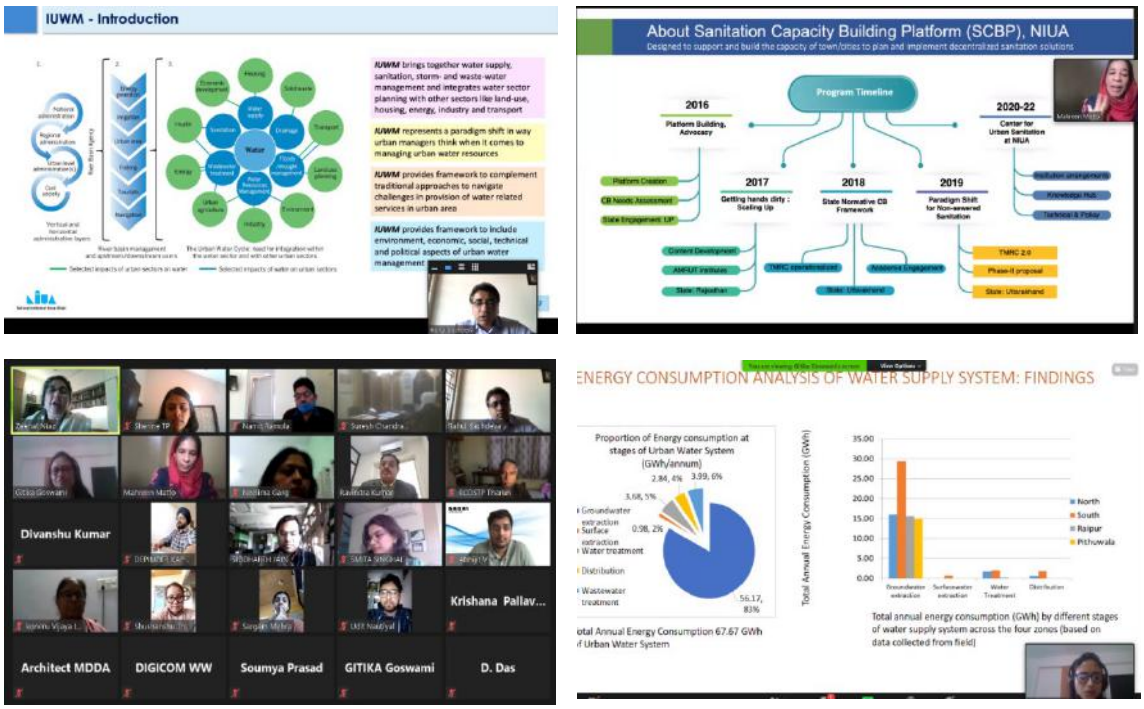
Solution providers also introduced a new business model of “use and pay” where the city could pay per litres of water treated. Such models could go a long way for cities like Dehradun. With urban design and aesthetics in mind, solutions that enable landscaping over the treatment `system were also discussed. The importance of adopting circular consumption model and capacity building of the municipal officials were also emphasized during the discussion.

Read more about the technologies discussed in Annexure 3.1.

### Way Forward

The workshop conducted for Dehradun city was a knowledge enriching session for all the participants. During the discussion, it became clear that the future of urban water infrastructure is Integrated Urban Water Management, an approach that encourages not to look water supply in isolation but in coordination with related sectors like sanitation, stormwater and rainwater conservation and wastewater reuse integrated with other urban sectors like land use, housing, industries, transport and nutrient and energy management. The key principles of IUWM under water sector are encompassing alternative water sources like stormwater, wastewater, matching water quality with water use, integrating municipal water value chain, conserving water at source and accounting for non-urban users. IUWM promotes simultaneous planning of urban infrastructures with decentralised approach for new interventions in parallel to the existing centralised systems. For a decentralised system to be sustainable, the system should be of the scale 15000 sqm with a population of not more than 500. The importance of sensitizing and training the field officials on the emerging technologies were also discussed. In order to help the city to adopt a feasible solution and achieve its goals and aspirations, we are looking forward to having;

- Continued dialogue with city officials to facilitate integration of efficient solutions to their system
- Workshops and training for municipal capacity development for material flow and life cycle analysis of the resource
- Social media campaigns and awareness programmes through various platforms
- Continued engagement with solution providers
- Documentation and publication of the learnings, findings and best practices with relevant communities and stakeholders.




*Picture 2 Dehradun City Workshop*

# 3. Annexures

## Annexure 3.1–Solution Providers and Technologies

### a) Solinas Integrity Private Limited

Solinas build inline inspection robotic technologies for critical pipeline infrastructure to detect existing defects and also prevent failures, maximising the lifespan of assets. Solinas serve O&G, Petrochemical, Power plants, Water, Sanitation and Process Industries. Solinas won National Bio Entrepreneurship Award 2019 and was also featured in widely respected outlets such as Forbes, LinkedIn, Yourstory, Singapore International Foundation & other media houses.

**Products**

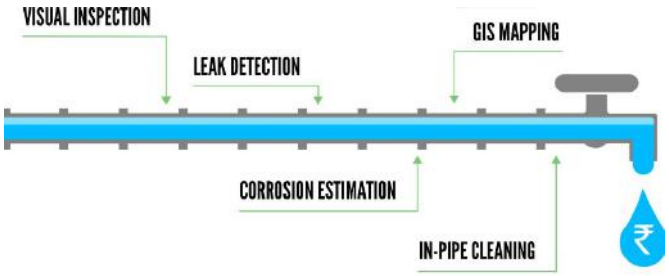
**Endobot**
Endobot helps water utilities to identify leaks and defects in underground water pipelines and reduce non-revenue water. It helps in preventing undesirable excavations and costly pipeline replacements.

**HomoSEP**
Septic tank inspection and cleaning robot to prevent manual scavenging.

**Features**

- Visual inspection
- Leak detection
- Corrosion estimation
- In-pipe cleaning
- GIS mapping
- Septic tank inspection and cleaning

*Picture 3: Tethered Robots by Solinas, Endobot (left, HomoSep(right )*




*Picture 4: Application of Endobot & HomoSep*

**Highlights**

- **Reduced Manual intervention**: The technology is a tethered robot aimed at inspection, maintenance of water pipelines and cleaning septic tank. It carries multiple sensor payloads for detection of leakages, estimate the corrosion, GIS mapping and sedimentation at an early stage thereby reducing NRW and increasing revenue

## Faclon Labs Pvt Ltd

Faclon Labs has developed powerful & flexible IoT platform with features that are customized & configured to redefine operations and decision intelligence. The technologies at Falcon helps in giving insights to operators, managers, and decision makers on understanding the functioning, utilisation rate, areas of improvement, and methodology changes required for effective operation of the utility under consideration. Faclon Labs was the Global finalist at Dubai Electricity and Water Authority (DEWA) Future Utility Cup, 2016. Faclon's solutions were featured in forums like Money Control and SWARAJYA Magazine's Smart Cities Series.

**Product**

**Smart resource management with I/O sense Technology**

**Features**

- Water supply analysis
- Storage management
- Intelligent pumping
- Dynamic water balance
- Automated metering
- Automation of pumps and valves
- WTP, ETP and STP Digitization

*Picture 5: Faclon Lab's water management system software*

**Highlights**

- Real time monitoring
- Automated report
- One-click Automation
- Dashboards for complete visibility
- Secure cloud data storage
- Hierarchical structure
- E-mail and SMS alerts
- Scalable and inter-operable software

## b) INDRA Water Pvt Ltd (INPHLOX Water System Pvt Ltd)

INDRA Water makes economical, compact & smart water treatment systems for recycling domestic & industrial wastewater for non-potable reuse applications. Founded in 2017, INDRA water is already recipient of several accolades including Winner of Urban Works Innovation Challenge 2018 by Columbia University & RMZ Corp, winner of global 2019 urban water challenge at world water week, and recently the Millennium Alliance Award 2020 under WASH sector.

**Products**

**INDRA Flow series**

Indra Flow Series is an Electro-Coagulation (EC) based system designed to remove pollutants from residential, commercial, municipal or industrial wastewater. Flow Series provides a low energy, chemical free alternative to chemical coagulation and other membrane or biological enzyme based processes.

**INDRA Activated Flow series**

Indra Activated Flow Series is a treatment system which combines our pioneering 'Sludge Activated Flocculation' (SAF) technology and 'Activated Treatment' process with the Flow Series system to treat effluents with very high content of COD, BOD, TDS, turbidity, coloration and harmful chemicals from industrial wastewater streams.

**INDRA Electrox series**

The 'Electrox Series' is our most advanced industrial wastewater treatment system. It combines Activated Flow Series with Electro oxidation technology to achieve multi-stage controlled wastewater treatment. The Electrox Series is extremely effective in treating wastewater with very high content of organic carbon and oxygen demanding substances. It also effectively deals with a host of other pollutants present in the industrial wastewater effluent stream.

**Features**

- Less sludge production
- Electro-coagulation, electro-oxidation technology
- Less footprint
- Plug and play
- Module capacity 5-200 KLD
- 40% savings on operational costs, 35% savings on lifecycle cost
- 95% water recovery with zero chemical
- Meets CPCB and state norms


*Picture 6: Comp plant by INDRA Water*

**Highlights**

- **Reduced sludge production** : Produces 60% less sludge compared to conventional system. The sludge produced is stored in a separate storage unit after disinfection which can later be used as manure/fertilizers.
- **Pay as you use business model** : INDRA water is coming up with a new business model where in the client has no capex but paid in form of water treatment bill in terms of the amount of water treated.
- **Decentralised approach**: Containerised and compact solution with standardised plant capacity specially designed for regions facing land scarcity or difficult geographical terrains.

## c) Absolute Water Pvt Ltd

Absolute Water Pvt. Ltd. provides green water recovery system that converts raw sewage into drinking water quality as per WHO standard. We provide organic waste water solutions for Institutions, Industry, Municipal Authorities, and Commercial properties. Founded in 2013, Absolute Water has received several accolades including Aqua Foundation's Excellence award 2019, Action for India- Best Indian Social Enterprise Award, 2019. We were selected by the Prince Charles Sustainability Markets Initiative in collaboration with the World Economic Forum, as the top 100 in the World for treating water pollution in a green manner.

**Products**

**Bio-Filter Green STP**

Specially bred worms are introduced in this technology. Once the worms have broken down the micro-pollutants present, the filtration system additionally uses completely organic and inorganic media, such as woodchips, pebbles and sand. The resultant water is suitable for agricultural, ground water rejuvenation, river replenishment and horticultural use. On advanced treatment, the treated water can be used for toilet flushing, laundry, washing maintenance, AC tower cooling, etc.

**Water Recovery System**

Water Recovery System is a further advanced treatment to the above, with a very high recovery (> 85 %) of water. The specially designed Membrane not only filters out various contaminants but also the harmful bacteria, Viruses & other Pathogens without any sludge generation. Treated potable water quality is WHO and BIS standard.

**Features**

- No sludge generation, the product is nutrient rich humus
- No reject for non-potable treated water, 15% reject for drinking water, but the reject is converted into nutrient rich liquid fertiliser.
- Minimal electricity consumption and works on solar power as well.
- Low operation and maintenance cost and unskilled labour can operate
- Smart footprint, civil or modular space according to space availability
- No odour and noise
- No chemicals
- High ROI and shortest stabilization period

*Picture 7 Civil based Bio-STP by Absolute Water(left), Modular Unit(right)*

**Highlights**

- **Reduced Sludge production**: Produces no sludge. The treatment by-product on replenishment is converted into rich humus fertiliser
- **Decentralised model**: Containerised and compact solution for regions with land scarcity or difficult terrain. Also provides mobile bio-filter STP system to fulfil urgent wastewater treatment. Civil based units are also designed where space is no constraint and where larger communities water needs are fulfilled

## d) ECOSTP Technologies Pvt Ltd

ECOSTP's unique patented technology treats sewage in a decentralised, self- sustainable way in underground chambers without power, chemicals or human intervention. Using Biomimicry, regenerative innovation inspired by nature, the ECOSTP utilises functional principles and strategies of microorganisms and ecosystem found in a cow's stomach. ECOSTP Technology was discussed in the 8th World Water Forum (Brasilia, 2018) and subsequently selected as a Best Practice case study for United Nations SDG Sustainability Asia Pac report.

**Product**

**Cow's Stomach Engineering STP**

The technology is 4 staged process in which cows stomach bio-mimicry is adopted. Just like how the ruminant stomach in a cow turns grass into milk. We biologized the same method to convert "bad" water to "good" water using exactly the same ruminant stomach process. The 4 stages are primary sedimentation chamber, up flow baffled reactor chamber, attached growth biological filter with high surface area, and plant bio-filter.

**Features**

- No power required
- No moving parts
- No chemicals, odours, noise
- One unit treats 8 KLD-1 MLD
- No operation and maintenance cost
- Less sludge production, biproduct is digestate used as a manure


*Picture 8: ECOSTP project(left) and technology process(right)*

**Highlights**

1. **Less or no maintenance & reduced sludge production**: The technology works on gravitational infiltration and hence require no maintenance or operational skill and cost. The sludge produced is too low that it has to be emptied only once in two years.
2. **Promotes usage of local resources**: ECOSTP provides design, consultation and other technical assistance. The STP is constructed with local resources and labour reducing the construction cost.
3. **Aesthetics**: The land used for underground STP could be landscaped into a garden, playground, etc., in accordance with the client's interest.

# Annexure 3.2 - Agenda

Date:27th November 2020

Venue: Virtual Meeting

Time: 11 am – 12:45 pm

| 27th November 2020 | |
|---|---|
| 11:00 AM–11:05 AM | **Introduction to the Webinar and Welcome** – Ms Zeenat Niazi, Vice-President, Development Alternatives (DA) |
| 11:05 AM–11:15 AM | **Inaugural address** & **Dehradun's Strategy as a smart city for Urban and Wastewater Management** – Dr. Ashish Kumar Srivastava (IAS), District Magistrate District Dehradun & CEO Dehradun Smart City Ltd |
| 11:15 AM–11:25 AM | **Special Address - Integrated Urban Water Management, achieving SDGs and building a resilient city –** Shri Rahul Sachdeva Sr. Programme Manager NIUA |
| 11:25 AM–11:35 AM | **Challenges faced and Expectations from Dehradun-** Mr Namit Ramola Executive Engineer Jal Sansthan, Dehradun |
| 11:35 AM-11:45 AM | **Expert inputs on Sustainable urban water and sanitation management in human settlements –** Dr. Mahreen Matto, Senior Programme Manager, NIUA |
| 11:45 AM–12:35 PM | **Discussion Forum: –** *Conversations with technology providers addressing decentralised and new age technology and business models solutions for urban water and sewage management*<br>1. Solutions for tracking and management of water and wastewater and sewage to address challenges of costs, revenues, infrastructure reach, energy.<br>2. Challenges in engaging – from the city authorities and the service providers – pilots, finance, land, tendering processes etc.<br>3. Institutional capacities and citizen participation |
| 12:35 PM - 12:40 PM | **Key respondent for final comments:** Shri Rahul Sachdeva Sr. Programme Manager NIUA |
| 12:40 PM - 12:45 PM | **Vote of Thanks and Concluding Remarks -** Ms Zeenat Niazi, Vice-President, Development Alternatives |

# Annexure 3.3 – List of Speakers

| Speaker | Name of the organisation | Address and Contact |
|---|---|---|
| Dr. Ashish Kumar Srivastava (IAS) | Dehradun District Magistrate and Dehradun Smart city CEO | Saatvik Tower, 777, Kaulagarh Road, Rajendra Nagar, Dehradun, 248001, Email: ceo-dscl@uk.gov.in, ashish.mzu@gmail.com |
| Mr. Ravindra Kumar<br>Ex MD UPJN | Water Supply Expert Consultant, Dehradun Smart City | Saatvik Tower, 777, Kaulagarh Road, Rajendra Nagar, Dehradun, 248001, Email: ravindra.kumar@repl.global |
| Ms. Neelima Garg<br>General Manager | Jal Sansthan | B block, Jal Bhavan, Nehru Colony, Dehradun, Uttarakhand 248001, Email: neelima-garg@hotmail.com |
| Mr Namit Ramola<br>Executive Engineer | Jal Sansthan | B block, Jal Bhavan, Nehru Colony, Dehradun, Uttarakhand 248001 Email: eemdjus@reddiffmail.com |
| Mr. Depinder Kapur<br>Senior Domain Expert-Sanitation Capacity Building Programme | NIUA | 1st and 2nd Floor, Core 4B, India Habitat Centre, Lodhi Road, New Delhi, Delhi 110003<br>Email: dkapur@niua.org |
| Dr. Mahreen Matto<br>Programme Manager-Sanitation Capacity Building Programme | NIUA | 1st and 2nd Floor, Core 4B, India Habitat Centre, Lodhi Road, New Delhi, Delhi 110003,<br>Email: mahreen@niua.org |
| Mr. Rahul Sachdeva- Sr Programme Manager- | NIUA | 1st and 2nd Floor, Core 4B, India Habitat Centre, Lodhi Road, New Delhi, Delhi 110003,<br>Email: rsachdeva@niua.org |
| Ms. Smita Singhal<br>Director | Absolute Water Pvt Ltd | M-58, 3rd floor, M block Market, Greater Kailash 2, New Delhi – 110048, Email: smitasinghal@absolutewater.in |
| Mr. Tharun Kumar<br>Cofounder | ECOSTP | ECOSTP Technologies (P) Ltd, Brigade Real Estate Accelerator Program, Brigade Gateway Campus, Malleswaram - Rajajinagar, Bangalore 560 055, India, Ph: Email- tharun@ecostp.com |
| Mr Divanshu Kumar<br>CEO | Solinas Integrity Pvt Ltd | Solinas Integrity Pvt. Ltd.<br>IITM Incubation Cell, Module 2, D Block, Third Floor Phase II, IIT Madras Research Park, Kanagam Road, Taramani, Chennai - 600113, Tamil Nadu, India. Email: divanshu@solinas.in |
| Mr. Abhijit VVR<br>Cofounder | INDRA Water | D5/36, Bhumi World - Industrial Park, Pimplas Village Mumbai Nashik Highway, Bhiwandi, Mumbai, Maharashtra 421302, Email: abhijit@indrawater.com, contact@indrawater.com |
| Mr. Parth Chaudhary<br>Sales and Marketing Head | Faclon Labs | 105 E, Marwah Industrial Estate,<br>Krishanlal Marwah Marg. Andheri East,<br>Mumbai – 400072, Email: reachus@faclon.com |

# Annexure 3.4 – List of participants in addition to speakers

| | Name and Designation | Organisation | Contact Details |
|---|---|---|---|
| 1 | S.K Sharma<br>Chief General Manager | Jal Sansthan | cgm-js-ua@nic.in,<br>sudhirksharma10@yahoo.com |
| 2 | H.K Pandey<br>General Manager | Jal Sansthan | |
| 3 | V.C Purohit<br>Managing Director | Pey Jal | eevcpurohit@gmail.com |
| 4 | S C Pant<br>Superintending Engineer | Pey Jal | eescpant18@gmail.com |
| 5 | Manish Semwal<br>Executive Engineer, south Dehradun | Jal Sansthan | eesouth-ujs-uk@nic.in |
| 6 | Rajendra Pal<br>Executive Engineer | Jal Sansthan | |
| 7 | Yashbeer Mal<br>Executive Engineer - Water Works (North div) | Jal Sansthan | eenorth-ujs-uk@nic.in |
| 8 | Deepak Malik<br>Executive Engineer | Pey Jal | dmalik.ce@gmail.com |
| 9 | Sandeep Kashyap<br>Executive Engineer | Pey Jal | |
| 10 | Abhay Singh<br>Jr. Executive Engineer | Jal Sansthan | |
| 11 | Krishana Pallava Chamola<br>Project Manager | Smart City | |
| 12 | Lokesh Ohri<br>CEO BTDT | Smart City | lokeshohri.reach@gmail.com |
| 13 | Prashant Nautiyal<br>Water Engineer | MDDA | |
| 14 | Sargam Mehra | BTDT | sargam_mehra@yahoo.com |
| 15 | Ghanshayam Rai | BTDT | ghanshu8@gmail.com |
| 16 | Udit Nautiyal | BTDT | uditnatiyal80@gmail.com |
| 17 | Shreyansh Kala | BTDT | sk.shreyanshkala@gmail.com |
| 18 | Sana Mehra | BTDT | sanamehra71@gmail.com |
| 19 | Shushanshu Thapa | BTDT | thapas.1008@gmail.com |
| 20 | Abhay Mishra | DEAL | abhai.abhiti@gmail.com |
| 21 | Ayush Joshi | Do No Thrash (DNT) | joshiayush@outlook.com |
| 22 | Dr. Suresh Kumar | WII | suresh.wii@gmail.com |
| 23 | Gautam Talukdar | WII | gautam@wii.gov.in |
| 24 | Dinesh Pundir | WII | |
| 25 | Saumya Prasad | NSI / DNT | prasadsoumya@gmail.com |
| 26 | Raman Kumar | NSI | cyornis@gmail.com |
| 27 | Manju Siliwal | WII | |
| 28 | Anuranjan Roy | WII UNESCO Centre | anuranhajn@wii.gov.in |

## About Development Alternatives

*Delivering eco-solutions for people and the planet*

Development Alternatives (DA) is a premier social enterprise with a global presence in the fields of green economic development, social empowerment and environmental management. It is credited with numerous innovations in clean technology and delivery systems that help create sustainable livelihoods in the developing world. DA focuses on empowering communities through strengthening people's institutions and facilitating their access to basic needs; enabling economic opportunities through skill development for green jobs and enterprise creation; and promoting low carbon pathways for development through natural resource management models and clean technology solutions.

## About Been There Doon That

We are a community dedicated to preserving the Doon Valley and help citizens connect with their heritage. We organise walks regularly and update information on the same on our Facebook page and our WhatsApp groups.

## About Heinrich Boll Stiftung

The Heinrich Böll Stiftung is a German foundation and part of the Green movement that has developed worldwide as a response to the traditional politics of socialism, liberalism, and conservatism. We are a green think-tank and an international policy network, our main tenets are ecology and sustainability, democracy and human rights, self-determination and justice. We place particular emphasis on gender democracy, meaning social emancipation and equal rights for women and men. We are also committed to equal rights for cultural and ethnic minorities. Finally, we promote non-violence and proactive peace policies. To achieve our goals, we seek strategic partnerships with others who share our values.

**Development Alternatives**
B-32, Tara Crescent, Qutub Institutional Area, New Delhi -110016. India.
Tel.: +91 11 2654 4100, 2654 4200
Email: mail@devalt.org, Website: www.devalt.org