Examples of Water Quality research programmes in India

Dr. Neelima Alam, Scientist E, Technology Mission Division, DST

International Workshop on Science, Technology, Innovation and Management for Water Sustainability (STIM-WS), at CSIR-NISTADS

19th April, 2017

Water Technology Initiative: Mandate & Objectives

- **Water Technology Initiative (WTI)**

  Developmental research for development and assessment of homegrown solutions related to drinking water quality, quantity and recycling

- **Technology Mission: WAR for Water**

  Application Research on convergent technological solutions for meeting the challenges of water scarcity in different social contexts

- ***Leveraging Bilateral/Multilateral Cooperation*** *for addressing water challenges.*

Water Technology Initiative

Technologies deployed

Drinking water and waste water treatment at Buja Buja

Technological solutions to address multiple local water challenges

Technology developed & Commercialised

Arsenic Filters for Domestic and Community in West Bengal-*Laterite Arsenic Filter technology commercialised by IIT Kharagpur to Vas Bros. Enterprises Private Limited*

Rain Water Harvesting in Chirawa, Rajasthan

Check dams for ground water recharge in Koraput, Odisha.

Linkage to Swastha Bharat

Water filtration system at Singtam Sr. Sec School, East Sikkim, Sikkim

Rain Water Harvesting in Hmunpui, Mizoram

सत्यमेव जयते

Convergent technology solutions through Enterprise mode..

Buja Buja Cluster

- **Water Issues-Low per capita availability, Salinity, sea water intrusion, Iron, TDS**

•Technology: Membrane Technology for drinking Water.
Coagulation and Chlorination for domestic use.
Settlement and Flocculation for Waste Water treatment.

- **Waste Water treatment Plant –to reuse it for irrigation and to recharge the Ground water table.**

- **125 kilo liters per day(KLPD) domestic water**
- **75 KLPD drinking water**
- **1 MLD treated wastewater**
- **12170 beneficiary population**
- **3000 families (drinking and domestic water)**
- **2000 farmers (treated waste water to irrigate)**
- **Sustainability-Each household pays an amount of Rs 60-90 per month for O&M.**

Similar Approach adopted in Mamsapuram and Thirupattur.

Convergent technology solutions through Consortia mode with R &D Ins and State Councils

River Bank Filtration Technology in Uttarakhand…

Implemented by UCOST and UJS

RBF well at Augustmuni

Regional Significance-**In case of River Bank Filtration, the production of water from near-riverside wells was not favoured in the hills of India due to the belief that the aquifer thickness was insufficient to yield sufficient quantity of water.**

•30-60 KLPH safe water at each place.

• Costs 1/10 of conventional system.

• Needs 20% area as opposed to normal treatment systems

• 25% of the cost borne by Uttarakhand Jal Sansthan (UJS).
• Beneficiary population-61,159

• Govts of Assam, Bihar, UP and WB requested services of UJS to replicate RBF technology.

• EU included RBF technology as part of SAPH PAANI programme for replication in EU countries.

Use of fast and economical overburden drilling with excentric bit, Percussion drilling method technique found to be suitable for construction of production wells in high-energy fluvial environments typically encountered at RBF sites in hills in India, were adopted, leading to good yield of water free from turbidity.

Field level initiatives in consortia with R &D Ins and Community Demonstration of affordable Arsenic Removal Technology in rural areas of UP, WB and Bihar

- Challenge
  - Cost effective user friendly system for Arsenic Removal
- Options
  - **Adsorption- Zero-Valent Iron**
- Network
  - IIT-Bombay, local community, NGO's
- Deliverables
  - **52** new Arsenic removal plants installed.
  - Generates 25 times less sludge than other processes
  - Cost -Re 1 per KL, quite less compared to other processes
  - Capable of consistently delivering drinking water< 10 ppb.
  - Beneficiaries- **1870 families spread over 4 clusters in 46 sites.**

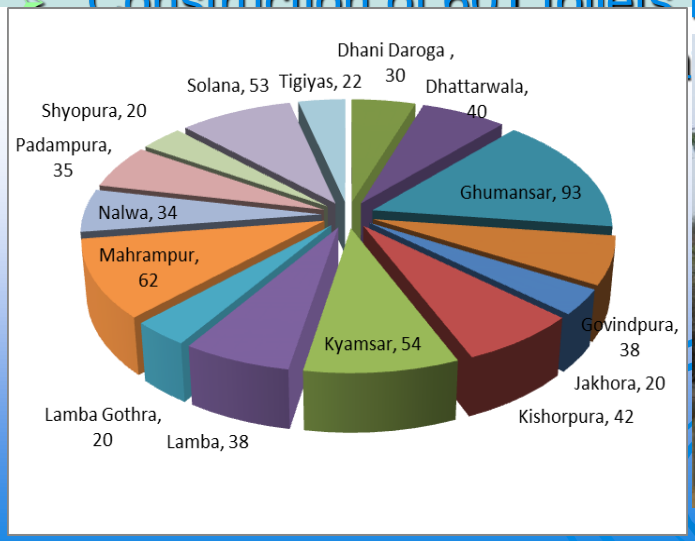
Rain Water Harvesting: Chirawa

- 685 Rain water harvesting tanks prepared, 137 lac liter

  water storage capacity at household level. Almost 7500

  family members are drinking safe water.
- 4 ponds helping in increase of ground water by pouring more than 700lacs liter water undertaken in village Kishorpura, Mahrampur, and Govindpura..
- Construction of 601 toilets for poorest of the poor. It

Rain Water Harvesting Tanks at Chirawa



Complete Pond Site at Vill: Kishorpura

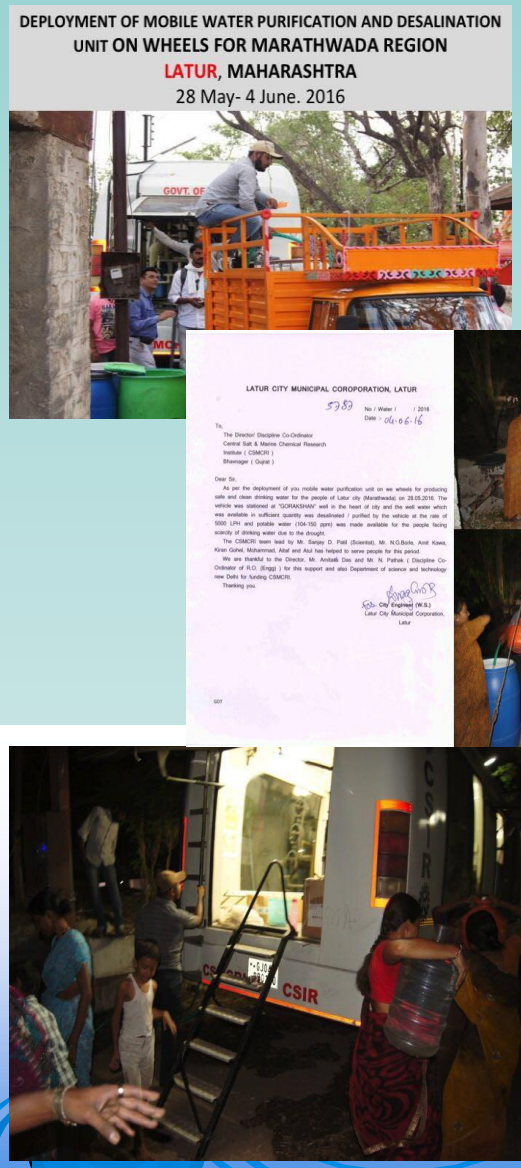
Water on Wheels

- This mobile unit is equipped with indigenously developed RO membrane technology capable of purifying and cleaning turbid/suspended particles as well as desalting excess unwanted dissolved contaminated salts (also arsenic, fluoride and nitrate) that could be present in that water and are harmful for human health.

- DST has supported quick deployment and demonstration of a mobile water purification unit developed by CSIR-CSMCRI for producing portable water for drinking water demonstrated in Latur City—a city in the Marathwada region that is facing severe scarcity of drinking water during this drought period.

- The treated water was made available for drinking to the common people of Latur.

- Through this deployment 40,000-50,000 liters of water per day water was made available and was distributed to the people in the city for 10 days in the months of May-June 2016



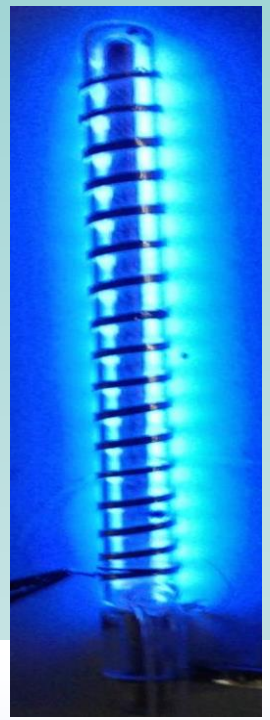
Deployment of a mobile RO unit in Latur Marathwada for providing portable water from a contaminated well with support from WTI, DST

Portable Water Purification System

- **A prototype has been developed as Dielectric Barrier Discharge (DBD) based plasma system for portable water purification** at CEERI, Pilani **which will be able to produce UV radiations in the germicidal wavelength and disinfect the impure water.**

- **Approx cost-8 inch tube** Mercury Free Plasma UV (MFP-UV) **Lap Rs. 250**

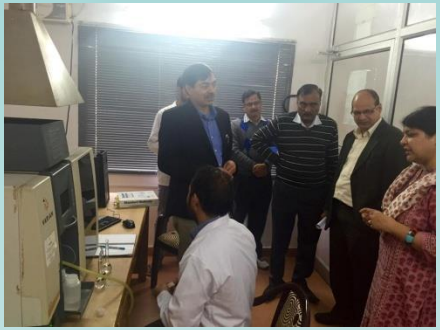
- **Technology has been successfully transferred for commercialization to Turners Pvt. Ltd. Jaipur.**



Dielectric Barrier Discharge (DBD) based plasma system for portable water purification

A Portable water purifier system

NABL Accreditation to a Water Quality lab established by DST in Dehradun



दून में जल गुणवत्ता जांचने के लिए हाईटेक लैब शुरू

जल संस्थान

टेक्टूल | वरिष्ठ संवाददाता

दून में जल की गुणवत्ता जांचने के लिए हाईटेक लैब शुरू हो गई है। यह लैब उत्तर भारत की पहली ऐसी लैब है, जिसमें पानी की गुणवत्ता जांच छब 17 वैश्विक मानकों पर की जाएगी। विज्ञान एवं प्रौद्योगिकी मंत्रालय की वरिष्ठ वैज्ञानिक डा.नीलिमा आलम ने बुधवार को लैब का निरीक्षण किया।

दिलाराम चौक स्थित वाटर वर्क्स में राज्य स्तरीय जल गुणवत्ता परीक्षण एवं अनुश्रवण प्रयोगशाला है। पिछले एक महीने के भीतर इस प्रयोगशाला को हाईटेक किया गया है। जल संस्थान, यूकॉस्ट, डीएवी कॉलेज के साथ ही वाटर टेक्नोलॉजी इनिशिएटिव की ओर से लैब को हाईटेक किया गया है। अब पानी की गुणवत्ता की सभी तरह की जांच राज्य में ही हो पाएगी। यह उत्तर भारत की एकमात्र ऐसी लैब भी बन गई है, जिसमें पानी की गुणवत्ता के वैश्विक मापदंड की सभी 17 तरह की जांचें यहां होंगी। इसे राज्य की दूसरी 26 जल गुणवत्ता लैबों का रेफर सेंटर भी बना दिया गया है। वाटर वर्क्स स्थित लैब के निरीक्षण के लिए पहुंचीं वैज्ञानिक डा.नीलिमा ने भी लैब के स्तर को तारीफ की। उन्होंने कहा कि यह वाटर टेक्नोलॉजी इनिशिएटिव की बड़ी उपलब्धि है कि जल संस्थान, यूकॉस्ट और डीएवी कॉलेज ने मिलकर इस स्तर की लैब तैयार की है।

इस मौके पर जल संस्थान के सचिव प्रशासन इंजीनियर एलके अदलखा, यूकॉस्ट के वरिष्ठ वैज्ञानिक अधिकारी डॉ. डीपी उनियाल, लैब समन्वयक के साथ डीएवी कॉलेज और यूकॉस्ट से जुड़े डा.प्रशांत सिंह समेत कई लोग मौजूद रहे।

दून में जिलाराम चौक स्थित वाटर वर्क्स में जल की गुणवत्ता जांचने के लिए हाईटेक लैब शुरू हो गई है।

मौके पर ही जांच रिपोर्ट

अमतौर पर जल गुणवत्ता की कई रिपोर्ट आने होती हैं, जो लिखे लैब में ही रोपण हो पाती है। लेकिन दून लिया हाईटेक लैब में ऐसी आधुनिक लिट भी हैं, जिनसे जल जांच पर ही जांच कर मौके पर रिपोर्ट जारी की जा सकती है।

वैज्ञानिक अधिकारी डा.डीपी उनियाल, लैब समन्वयक के साथ डीएवी कॉलेज और यूकॉस्ट से जुड़े डा.प्रशांत सिंह समेत कई लोग मौजूद रहे।

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वरिष्ठ वैज्ञानिक ने किया लैब का निरीक्षण

जागरण संवाददाता, देहरादून: भारत सरकार के विज्ञान एवं प्रौद्योगिकी मंत्रालय की वरिष्ठ वैज्ञानिक डॉ. नीलिमा आलम ने वाटर वर्क्स स्थित जल संस्थान की लैब का निरीक्षण किया। साथ ही इस दौरान जल संस्थान ने पानी की गुणवत्ता जांचने के की हाईटेक लैब शुरू करने का भी दावा किया है। हालांकि, अभी जल संस्थान को हाईटेक लैब के लिए एनएबीएल प्रमाण पत्र जारी नहीं हुआ है।

जल संस्थान के अनुसार पिछले एक महीने में जल संस्थान ने पानी जांचने के मानकों में वृद्धि की है। जल संस्थान, यूकॉस्ट, डीएवी कॉलेज के वाटर टेक्नॉलाजी इनिशिएटिव की ओर से लैब को हाईटेक किया गया है। यह उत्तर भारत की एकमात्र ऐसी लैब भी बन गई है, जिसमें पानी की गुणवत्ता की वैश्विक मापदंड की सभी 17 तरह की जांच यहां हो पाएंगी। इसे राज्य की दूसरी 26 जल गुणवत्ता लैबों की रेफर सेंटर भी बना दिया गया है। वाटर वर्क्स स्थित लैब के निरीक्षण पर पहुंची भारत सरकार की वैज्ञानिक डॉ.नीलिमा भी लैब के स्तर पर सहमत नजर आईं। इस मौके पर जल संस्थान के सचिव प्रशासन इंजीनियर एलके अदलखा, यूकॉस्ट के वरिष्ठ वैज्ञानिक अधिकारी डॉ. डीपी उनियाल, डॉ. प्रशांत सिंह मौजूद रहे।

NABL Accreditation has been awarded to a state level Water Quality Laboratory set up in Dehradun under WTI support established by Uttarakhand Jal Sansthan, Uttarakhand Council of S&T and DAV College, Dehradun in a unique partnership.

Recycling of Waste Water by Improved Moving Bed Bio Film Reactor (MBBR)

- Two 1.5 MLD Wastewater treatment plants demonstrating innovative MBBR Probiotics Technology has been established at SVECW, Bhimavaram
- **Conservation of fresh water through sewage water treatment.**

Waste Water Treatment plant at Vishnu Educational Society Centre at Bhimavaram.

DST-Intel Collaborative Research on River and Air Quality Monitoring in PPP mode

- For developing the online River Water and Air Quality monitoring (WAQM) systems in the frontier areas of sensor technology, data communication and data analysis, the Department of Science and Technology, Govt. of India (DST) and Intel (R) have collaborated to jointly initiate “Collaborative Research on River Water and Air Quality Monitoring” soliciting research proposals from Academic/Research Institutions.

- It aims to develop key technologies for sensing, communication and analysis of large-scale data collected from autonomous networks of perpetual/long-lived sensor nodes, followed by integration and deployment for water and air quality monitoring in real-time. The program is bing administered by the binational Indo-U.S. Science and Technology Forum (IUSSTF).

Indo-UK Collaboration on Water Quality Research in India and UK

- **Recognising the importance of clean water and Mission's focus on safe and potable water, India (DST) and UK (NERC & EPSRC) has jointly agreed to launch a collaborative research programme on improving Water Quality.**

- **India and UK will be mounting a joint research initiative with a committed investment of 4.2 million £ from each side, having special thrust on addressing threats due to emerging contaminates (PPCP) and online river water quality monitoring and sensor technology.**

International interactions..

New INDIGO Programme on Waste Water Management

- **Research Collaboration between India and select EC countries.**
- **9 projects supported on waste water treatment and water purification.**
- **Research programme on reuse of marginal quality water for agriculture, integrated waste water management modelling, decision support system for waste water, membrane based separation process, recovery of minerals from sewage mixed industrial effluents and advanced microbial quality monitoring initiated..**

Bilateral Collaborations Capacity Building (WARI)

- **Water a globalised issue and hence Global partnerships and collaborations are key essential.**
- **Important to adopt global best practises in Indian context.**
- **Research professionals in Water area need capacity building**
- **Water Advanced Research &Innovation fellowship program (WARI)- an Indo US bilateral capacity building exercise for students and researchers in the area of Water quality and Water resources in collaboration with Univ of Nebraska, Lincoln.**
- **WARi a transformative and dynamic programme developed to foster long term technology partnerships between India and USA.**

Bilateral interactions..DIWALI

- A Bilateral Indo –Dutch alliance established under the Dutch India Water Alliance for Leadership Initiative (DIWALI) concept. Project supported to establish a STP plant demonstrating a Dutch Technology New Urban Sanitation System under the aegis of DIWALI.
- DIWALI was envisaged as a platform where all stakeholders from both countries (academic institutions and industries) could participate and form a consortium for designing solution for water challenges to meet the utility price envelop of countries similar to India and for tapping business opportunities in global markets.
- Parallel to formulation of concept note, an elaborate exercise was taken up to develop joint Indian-Dutch Innovative technological solutions bringing together best available expertise from both countries. 9 innovative water treatment concepts were developed as listed below:

i. New urban sanitation – infiltration

ii. Mineral mining

iii. Renewable purification wind energy

iv.Water greenhouse

v.Water farming

vi. State-of-the-art desalination

i. Renewable purification solar power

viii. Small scale drinking water production

ix. Recycling greenhouse

Indo French Joint Initiative for Networking Proposals

- **A Bilateral Indo-French Joint Initiative launched for Networking proposals in the area of Waste water treatment and Natural water treatment systems.**

- **Bilateral Workshops and Diplomatic Meetings expressed the strong urge of the French and Indian governments to reinforce scientific collaboration to address prevalent and emerging challenges in water.**

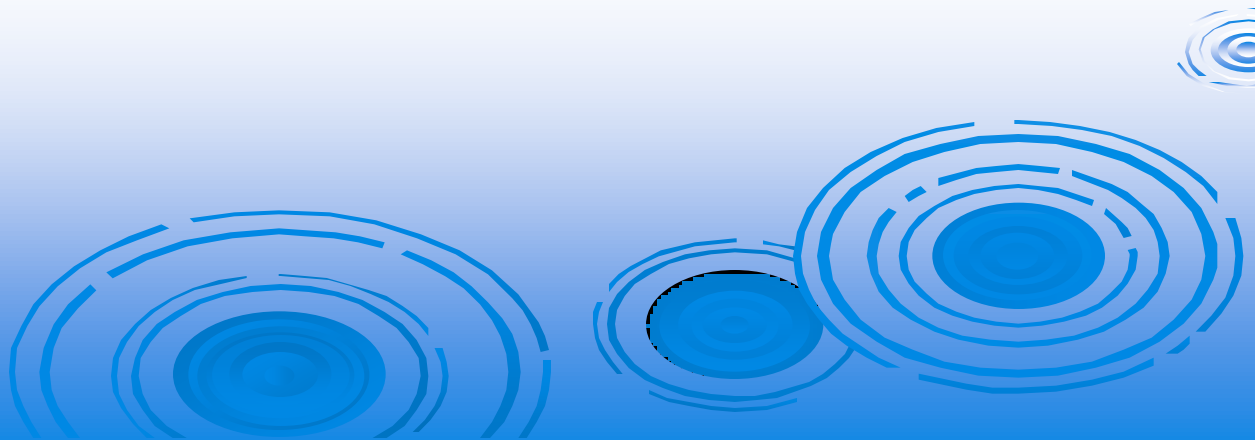
- **The French Embassy in India and the Indian Department of Science & Technology (DST) have joined hands for Indo-French Scientific Networking Programme in the field of water. In the areas of :**
  - **Waste water treatment (Industrial/ Domestic)**
  - **Natural water treatment systems.**

Objectives Envisaged:

- **Form dedicated networks of Indian and French research groups & industries to address identified water issues.**
- **Strengthenand expand the quality and potential of water research in both countries by building greater interaction between France and India.**
- **Build stronger relationships between industry and academic communities in France and India coupled with better knowledge exchange, to form the basis for future collaborations, research projects, and joint endeavor related to Water technology, research & innovations.**

Outcomes..

- addressed **19** water challenges in **25** clusters enrolling **15** solution providers/ NGOs/ consortia involving States, R&D institutions & NGOs, directly benefiting **235** villages from **23** states. This has led to development of **28** convergent solutions for water challenges through 300 R&D projects supported.



Thank you very much for your time and attention