International Centre for Clean Water

ANNUAL REPORT 2022

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HIGHLIGHTS OF THE YEAR

Technology Development

Membrane distillation technology has been developed in the lab to produce 5 litres per hour of pure water from brackish water or brine

Real-time monitoring with Internet of things (IOT) connectivity has been sustained with additional sites of community drinking water kiosks

Separation of iron & copper ions from the saturated solution of an electroless process was achieved in the lab

Scaling up Startups for the community

Sustainable desalination: Three more units of Capacitive De-ionization technology were implemented with CSR funds from Indian Oil Corporation in southern India taking the number of such units to 33 since 2019

Vayujal – Two units of 450 litres per day atmospheric water generators were field validated,one with and one without solar power, with financial support from Xylem.

Capacity Building

52 BSc students from Stella Maris College were trained in water sample collection, quality analysis and data interpretation with geo-tagging as part of a 2-credit course

8 MSc students were mentored for two months on sustainability related projects involving water

22 interns were trained in data analytics, computer modelling and simulation

30 Corporate executives were trained in cooling water chemistry as part of an initiative with Buckman to help them reduce cooling water losses

Analysis and Validation

Over 2000 water samples were analyzed during the year for water quality. The number of quality parameters measured has crossed 150, and 12 new methods were developed for analysis

Technologies validated include – inline Ozone generator, multi-parameter field water test kits, membrane-based bioreactors, and sewage treatment plants

A DSIR project on validation of drinking water technologies has been taken up, which is expected to provide a ready reckoner for end-users on selection of appropriate technology for their use.

Hydroinformatics and Digital Innovation

An AquaMAP-funded project was started in the town panchayat of Nallampatti, Erode District, Tamil Nadu for creating a digital platform for water-health-agri nexus for policy advisory support.

Ecosystem support

Technical inputs for tender documents were provided and audit of existing systems were done for Andhra Pradesh Education &; Welfare Infrastructure Development Corporation for their safe drinking water programme to all government schools

Began exports of arsenic purifiers to Cambodia through joint venture with Saraya Japan with an initial shipment of 300 household units in partnership with Alt Tech Foundation and Global Water Works, 23 sessions of WoW AF an online action forum for water management was conducted in mission mode.

Cohort-3 of Akamai Trust's Flagship Accelerator with three start-ups and a fourth cohort of 5 start-ups has been shortlisted emphasizing Akamai's continued support for socially relevant Start-Ups in the water space.

A second music video "Monsoons" was released on Earth Day (22-Apr). The video, which celebrates monsoons and the need to conserve rainwater, features Pandit Ajoy Chakrabarty, celebrated sisters Rajnai-Gayatri and dancers from Kalakshetra, Chennai.

TEAM

Governing Board

V. Kamakoti
Chairman – ICCW

T. Pradeep
Professor - Incharge

Prof. Manu Santhanam
Member

Prof. Ligy Philip
Member

Dr Tiju Thomas
Member

Prof Sarit Das
Member

Dr Rajnish Kumar
Member

We welcome,

Prof V Kamakoti, who took over from Prof Bhaskar Ramamurthi as Chairman in Feb 2022, as a consequence of taking over the position of Director, IIT Madras

Prof Manu Santhanam, who took over from Prof Ravindra Gettu in March 2022, as a consequence of taking over the position of Dean IC & SR, IIT Madras

Prof Saritkumar Das, who joined our Board in August 2022

We thank Prof Bhaskar Ramamurthi and Prof Ravindra Gettu for their support and encouragement during their tenure.

Worldwide Collaborators

PROF. R. GRAHAM COOKS
Purdue University,
West Lafayette

PROF. MARC ANDERSON
University of Wisconsin,
Madison

PROF. P. M. AJAYAN
Rice University,
Houston

PROF. SEERAM RAMAKRISHNA
National University of
Singapore

PROF. A. K. GHOSH
Bhabha Atomic Research Centre
Mumbai

PROF. THOMAS TUNDAT
University of Alberta,
Edmonton

PROF. ALOK DHAWAN
Indian Institute of
Toxicology Research

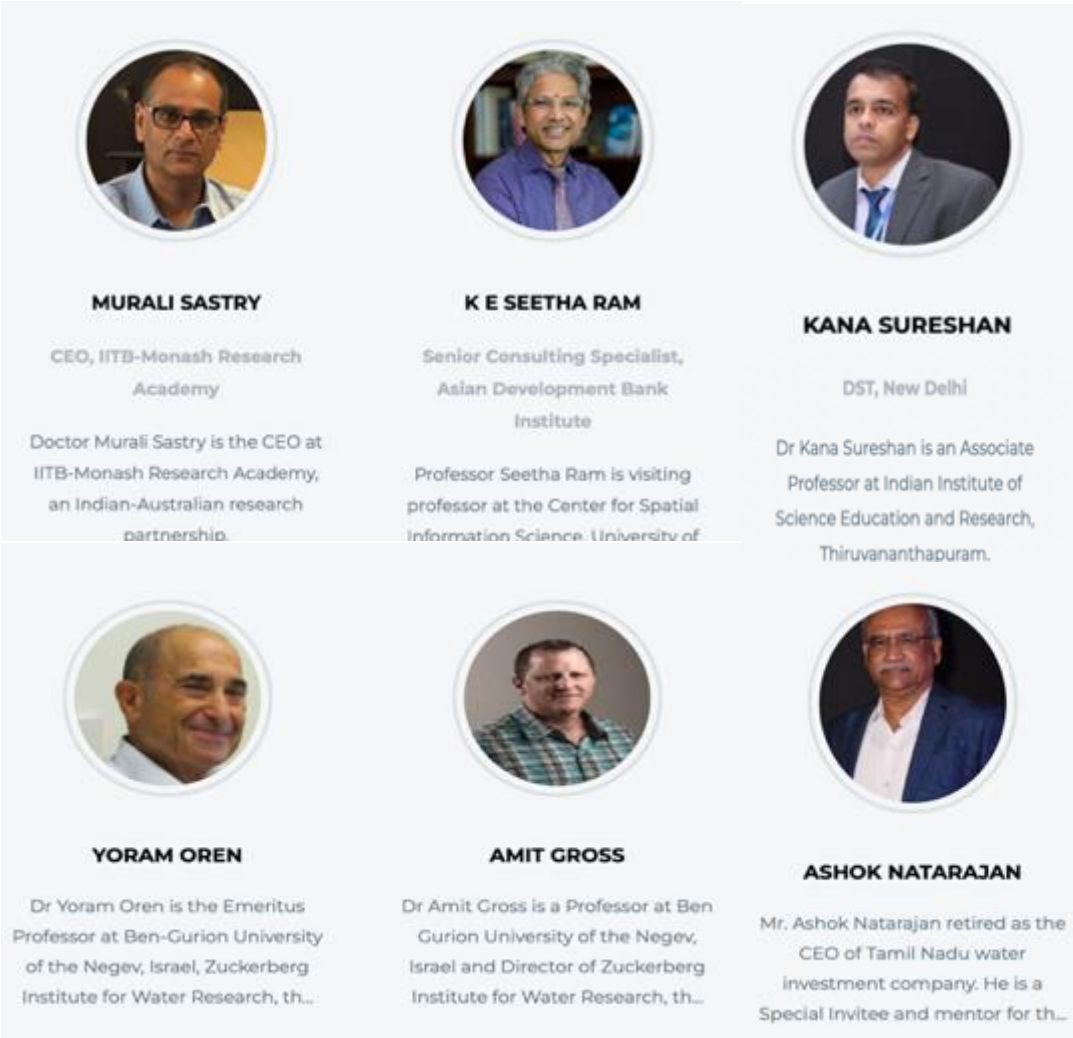
PROF. ANDREA IRIS SCHAEFFER
Karisruhe Institute of Technology,
Germany

PROF. HAIWON LEE
Hanyang University,
Korea

PROF. TONY CASS
Imperial College,
London

PROF. CATHERINE NGILA
University of Johannesburg,
South Africa

Advisory Board



We welcome Mr. Ashok Natarajan on to our Research Advisory Board.

Mr Natarajan retired as CEO of Tamil Nadu Water Investment Company. He has developed many water supply projects from concept to implementation through a model aimed at reducing life cycle costs. He is also an advisor to state and central governments in water management and NRW reduction.

Our People

Nandakumar E
CEO

Dr. Abirami D
Principal Scientist,

Dr. Kamalesh C
Principal Scientist

Dr. Ganapati N
Principal Scientist

Cowlagi Sripati
Expert Engineer

Dr. Rabiul Islam
Scientist

Dr. Vidhya S
Scientist

Nagarjuna T
Asst. Project Manager

Pooja Shenvi
Outreach Coordinator

Arohan Paul
Digital Innovator

Mareeswaran
Engineer

Siva T
Jr. Engineer

Bharini Ch
Administrator

Bhuvana A R
Analyst

Sathish
Analyst

AWARDS AND ACCOLADES

On 18th August 2022, **H T PAREKH Foundation** won the prestigious award at the National CSR Awards 2020, under two categories i.e. the **Corporate Award for Excellence in CSR** and the **CSR Award for Contribution in National Priority** for supporting the International Centre for Clean Water (ICCW), an initiative of Indian Institute of Technology Madras (IIT-M) Research Park, the research and innovation-driven Centre of Excellence, providing affordable solutions to rural communities for clean drinking water.

Prof. T. Pradeep receives the **VinFuture Prize for Innovators from Developing Countries** from Professor Thục-Quyên Nguyễn and Professor Albert P. Pisano, Co-chairs of the VinFuture Pre-screening Committee at the Hanoi Opera House, Hanoi, Vietnam on December 20, 2022.

Prof. T. Pradeep receives the **Prince Sultan Bin Abdulaziz International Prize for Water** from H.E. Eng. Abdulrahman A. Al Fadley, the Saudi Minister of Environment, Water and Agriculture at the United Nations Office, Vienna on December 13, 2022.

VALUE STREAMS

To bring focus on addressing high-priority issues affecting water availability and quality, the activities of the Centre were integrated into three value streams:

Innovation: To research & develop sustainable disruptive technologies, validate them in the lab and field, and enable their commercialisation.

Impact: To consult in water management, implement emerging technologies and generate social impact with capacity building and behaviour change support.

Ecosystem: To network with academia, industry, governments, NGOs, startups, and individual citizens to address complex problems requiring multi-stakeholder engagement.

Innovation begins with **Research** into sensors, materials and processes, through **Analysis and Validation** of technologies to **Hydroinformatics –** connecting water data to health and socio-economic indicators.

Research:

Real-time information on water has become vital for its management and efficient use.

This drives innovation in materials and techniques to detect traces of contaminants instantly and relay this information real time to a dashboard for decision making

Additionally, sustainable ways of removal of these contaminants with maximum water recovery, minimum energy consumption and safe disposal of the removed contaminants continues to be a challenge.

Analysis & Validation:

Emerging technologies, in sensing and purification, need thorough validation against stringent protocols in lab and field conditions before they are put to commercial use.

Once commercialised, they need further validation for any undesirable side effects such as noxious gas release, leaching etc.

Hydroinformatics:

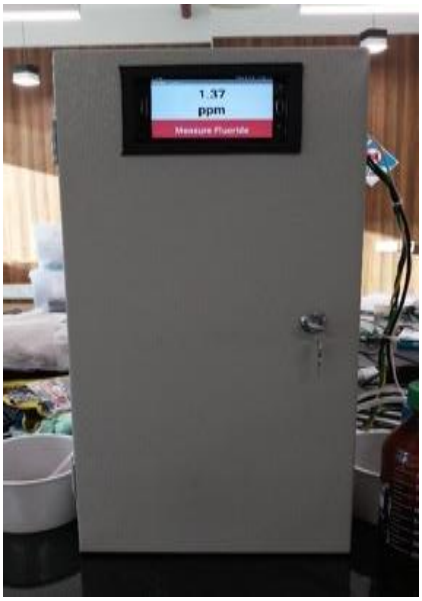
The benefits of research, analysis & validation will be realised only if we are able to meaningfully interpret and correlate the vast amount of data generated for greater learning and social impact.

Water affects our lives in so many ways. Hydroinformatics brings clarity through dashboards and predictive models connecting the points where water availability and quality touch our lives, enhancing our capacity to manage water better today and in the future

Low-cost sensors for online Fluoride monitoring

Fluoride is among the top two toxic contaminants of water in India along with arsenic. However a certain minimum amount of ~ 0.7 mg per litre is essential to prevent tooth decay. WHO has recommended a limit of 1.5 mg/litre as safe for drinking water. There are many fluoride treatment systems, and an accurate online colorimetric sensor that informs whether the fluoride level is within the levels or not will be extremely useful in management of the treatment plants. Such a sensor has been developed and validated. The sensor cabinet can accommodate additional sensors such as pH, TDS, nitrite, nitrate, arsenic etc.

This unit will enable "real-time" monitoring and control of fluoride and other parameters in water treatment plants – retrofits or kiosks. IOT connectivity will further enable data analytics, predictive water quality.



IIT MADRAS FOUNDATION

Sponsor: Nalini and Ramakrishnan (IITM 1974)

Online Colorimetric Water Quality Monitoring Unit

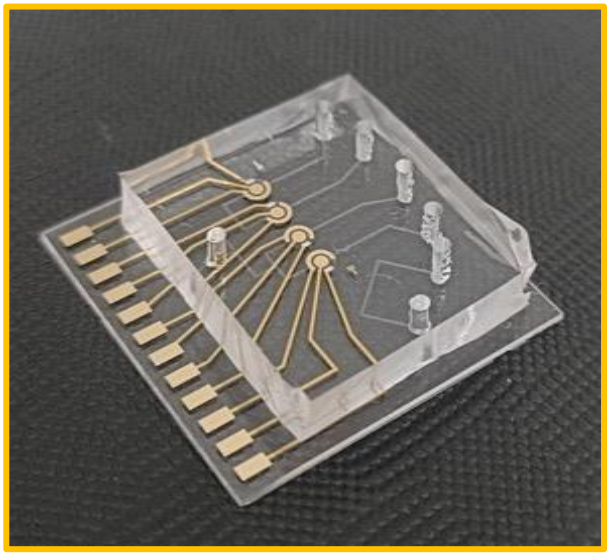
A lab-level prototype has been developed and demonstrated for fluoride testing (shown above). Lab-to-field transition of the technology is planned in 2023 along with extending the same for additional parameters.

This unit overcomes the drawbacks of commonly used potentiometric sensors that are costly and have a limited life span.

Simultaneous Multiparameter Sensing

Functionalized microelectrode arrays combined with ion concentrators for the electrochemical sensing of groundwater and wastewater contaminants

ICCW has been working with the EES (Energy Environment and Sustainability) laboratory of Seoul National University (SNU), South Korea, to develop microfluidic electrochemical sensors to enhance the sensitivity of targeted heavy metal ions such as As^{3+}, Mn^{2+}, Fe^{3+}, Cd^{2+}, Pb^{2+}, etc., by several-fold. The image depicts a fabricated device.



Microelectrode arrays embedded Microfluidic Concentrator Device

Sponsor
Department of Science and Technology, Government of India (DST) &
National Research Foundation, Ministry of Science and ICT, Republic of Korea.

The devices utilise Ion Concentration Polarization in conjunction with voltammetry for the concentration of the ions and their subsequent detection. The data obtained is being processed utilizing data analytics to group the analytes of interest and to avoid interference from other entities in the solution.

Rapid assessment of multi-parameters of water quality with high accuracy will be possible to strengthen real time monitoring of water quality parameters in municipal supply and industrial applications.

Standalone Solar Powered Membrane Distillation Unit for Portable Water Production

The underlying drawback of RO (reverse osmosis), the de facto desalination technology, is that it utilizes high power, has high maintenance costs and large reject volumes. Membrane distillation (MD), a thermally-driven process which can desalinate seawater, hypersaline brines as well as industrial wastewater using low-grade heat.

The principle is to heat water to 60-80^{o}C and allow it to pass through a hollow fibre membrane that is designed to be hydrophobic. Only water vapour can pass through the membrane, which is aided by applying vacuum. The vapour is condensed to generate clean water.

A prototype has been developed delivering 3.5 litres per hour by optimising the membrane and process parameters. The next step is to reach 5 litres per hour (100 litres per day) using solar power and efficient condensing technologies. To develop a system capable of delivering 100 litres per day (~ 5 litres per hour) of drinking water at an affordable cost, with almost zero reject

Sponsor GRUNDFOS

Commercialisation of this technology requires power consumption to be reduced to affordable levels. When connected to roof-top solar water heaters in residential complexes, membrane distillation can provide clean drinking water at marginal extra cost.

Analysis and Validation

Ozone90 – a product that generates ozone in water lines from DG Takano, Japan, was validated for the generation of ozonated water and its efficacy against *E. Coli*, fungal toxins and pesticides.

Ozone 90 generates nanobubbles in water which when attached to a tap helps to disinfect effectively resulting in reduced water usage.

As no additional disinfectant is required the used water can be recycled effortlessly.

MBBR Horizon Plasto Tech, Madurai

Two mega litre capacity municipal sewage treatment plant

The plant was visited by the ICCW team to evaluate the technology comprising Membrane based Bio-reactor and isolated multi-baffle progressive aeration in the aerobic bioreactors

Detection of gases from pilot scale water treatment plant for odour removal

Kamdar Exports, Maldives

Evolved gases from the water treatment plant were detected to address the odour issue and the technical assessment was shared in the form of a report with further recommendations to remove the odour.

Validation of Field Water Test Kits

Field water test kits provide a great service by enabling rapid testing of water quality at an affordable cost. However, their dependence on skilled usage and higher margin of error has been a deterrent. A number of companies - established ones and startups - are entering the fray to develop, low-cost kits with greater accuracy and automatic data capture to the cloud with geo-tagging.

Two such kits were validated.

1. Foundation for Environmental Monitoring (FFEM)
2. ELICO

ffem

Analysis and validation of the concentration of 17) key water quality parameters based on APHA protocol

ELICO's Portable Multi-Parameter Water Quality Analyzer (e-Jal)

ELICO
Connecting Science & Lab

Analysis and validation of 23 parameters in compliance with APHA protocol

The validation provides the companies with confidence to market their product and generate social impact through engagement of a wider population in water quality measurement in the field empowering citizens towards water stewardship

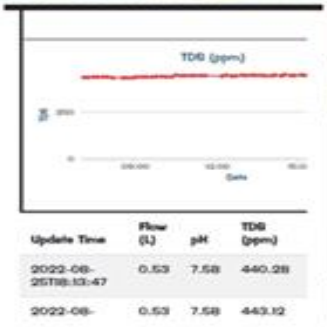
Digital Twin of a village to understand the Water-Health-Agri nexus

A health study of village in Tamil Nadu showed a higher than (double) the national average incidence of diabetes, cancer and CVDs among the community. The hypothesis is that indiscriminate use of fertilisers and pesticides could be contaminating the water and soil sources, which gets into the crops produced leading to the health issues.

Sponsor:

AquaMAP Centre for Water Management and Policy, IIT Madras.

Water and soil samples from different parts of the village have been analysed along with health statistics and fertiliser and pesticide usage. Sensors have been deployed in a few places to monitor in real time, the water level and relevant water & soil parameters.



Update Time	Flow (L)	pH	TDS (ppm)
2022-08-25T18:13:47	0.53	7.58	440.28
2022-08-	0.53	7.58	443.12

A Hydroinformatics platform has been built based on these data and a correlation is being evolved for predictions.

Over the next few years, the model will be refined to establish cause & effect and build consensus among stakeholders.

The model is being designed for simulating possible solution approaches, which will encourage donors to support pilot implementation.

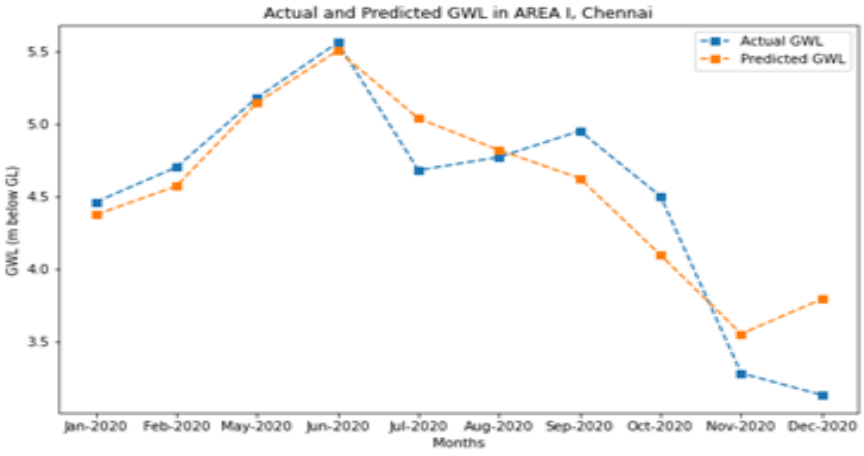
Evidence from these pilots could help in policy inputs for the benefits to be spread nationwide

Water 4.0: Digital Water management

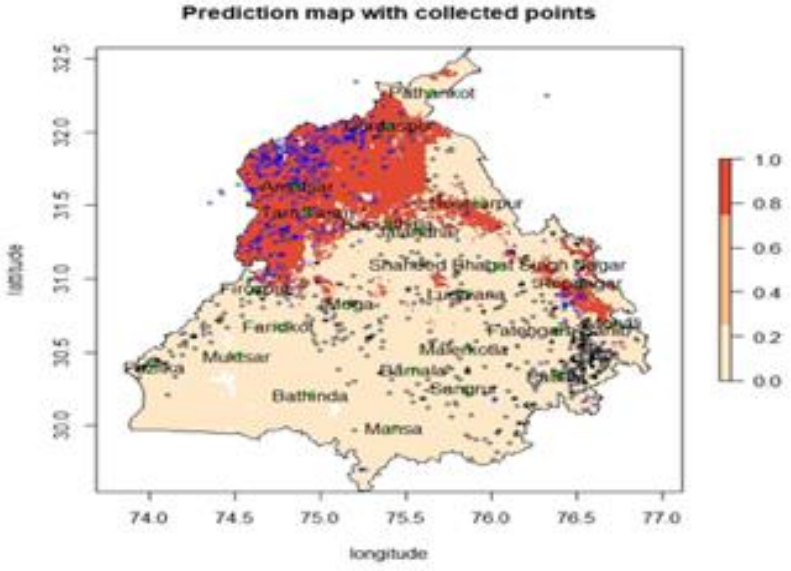
We develop tailor-made solutions for real-time and strategic decision support system platform for water governance in various scenarios -

- **Water quality**- Prediction of arsenic hotspots in Punjab using machine learning with 90% accuracy.
- **Water availability**- Prediction of groundwater level in Chennai using machine learning
- **Water supply**- Leakage presence detection in the water distribution network using machine learning.

Predictions from Machine learning



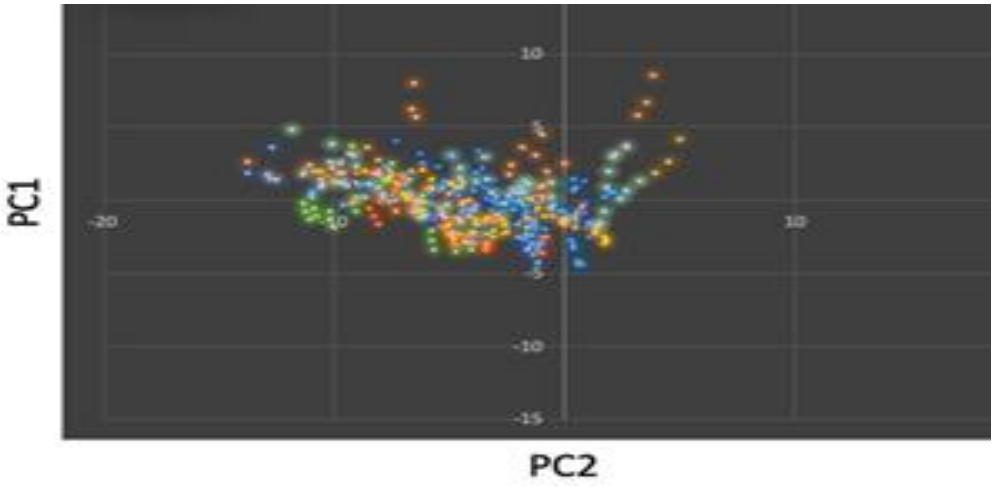
Groundwater level in in Chennai



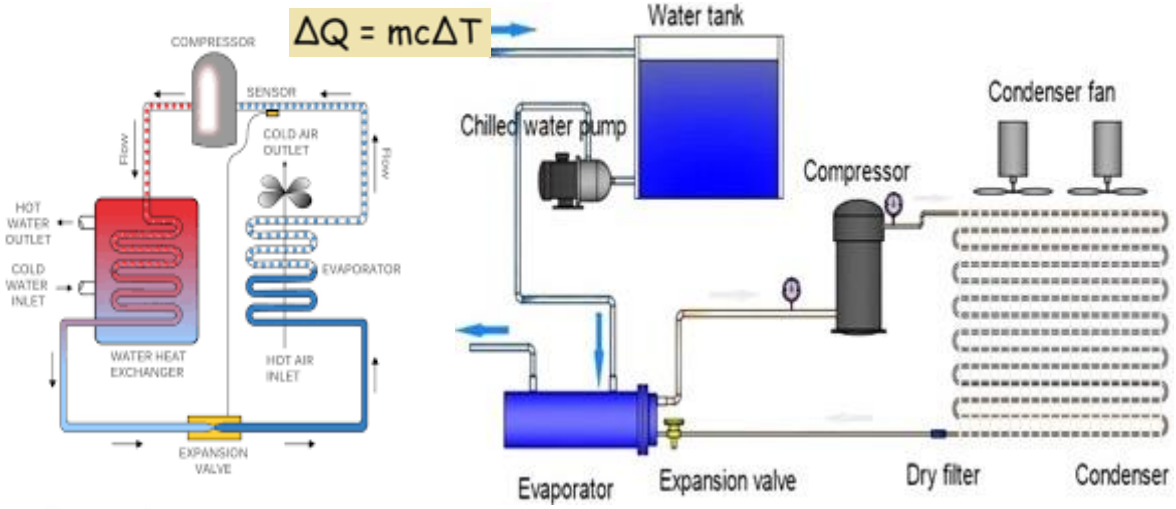
Arsenic hotspot in Punjab

Virtual prototyping platform for lab to scale-up of water technologies

Computer simulation is being used to simplify research and rapidly provide optimised designs for prototyping



1. Application of materials modelling to computational design an arsenic sensor - prediction of ion-selectivity of arsenic graphene-oxide based sensors.



2. Simulation and optimization of the membrane distillation process to minimize of energy consumption per litre of clean water output

Impact begins where laboratory innovation ends. While technology is important, management, business model creation and social engineering play a much greater role to deliver the triple bottom line of economic, ecological and social benefits. Impact is created through the strength of **Implementation** and **Outreach** activities in **Capacity Building** and **Behavioural Change**

Implementation

Emerging technologies need field validation and monitoring over time for sustained benefits. This requires a consortia approach where a Funding Agency and a Social Agency come forward to support a Start-up. ICCW has taken the mantle of a fourth Agency to bring the other three together and spearheaded implementation of sustainable clean water solutions in communities

Capacity Building

Increased awareness among the general public, students and water professionals on emerging trends in water technologies is essential for achieving success. There is a two-way learning in these sessions which helps in adapting the new technology for faster absorption. Enhanced water literacy results in greater participation in addressing the water problems

Behavioural Change

Post adoption of new technologies, communities need to own and maintain them. This needs an emotional connect and a social business model that helps the technology transform the community. ICCW has been experimenting with different approaches to behavioural change

Implementation

Capacitive Deionization (CDI) is an emerging technology for sustainable desalination. - It permeates ~ 80% of inlet water, retains essential minerals and consumes less energy. CDI is especially effective in removing Fluoride. The entire unit can run on sola power

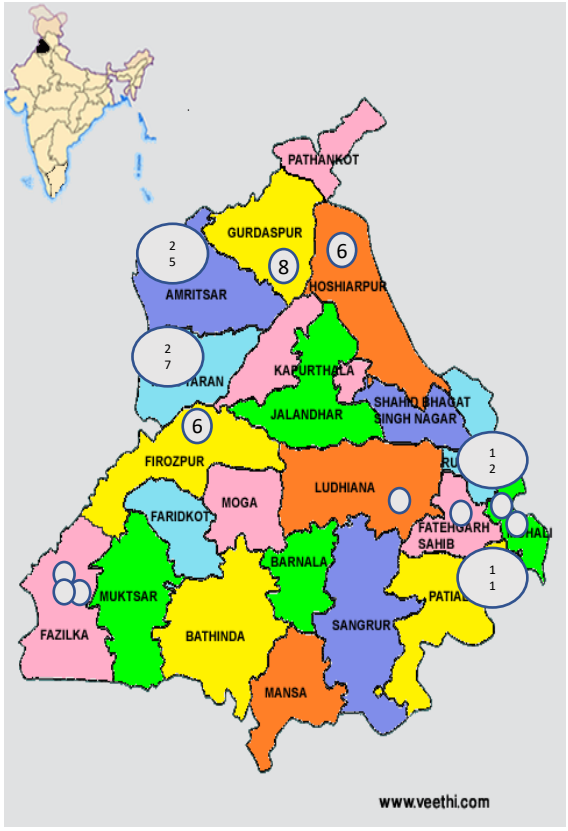
33 CDI units installed during the past three years benefiting 30,000 people with a potential water savings of 35 million litres per year

The Technology is provided by InnoDI Technologies

Sponsors for these projects have been

1. Indian Oil Corporation
2. National Stock Exchange Foundation
3. Telangana Social Welfare Residential Educational Institutions Society
4. Naandi Foundation

Arsenic and Iron Removal Technology (AMRIT) is a globally recognized technology for safe and economical removal of arsenic from groundwater with no energy requirement. The specially designed nanomaterials do not allow the adsorbed arsenic to leach out enabling safe disposal



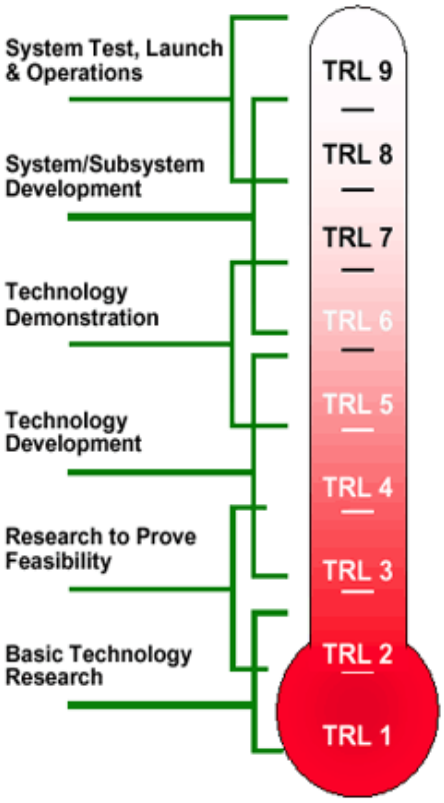
Technology by Hydromaterials Private Limited

- 97 units installed in Punjab
- 12,000+ Household units distributed
- 500 household units exported to Cambodia through MOU signed with Saraya, Japan
- 10 LPD to 1000+ KLD
- No power required. Works with gravity
- Lasts for 3 years if maintained as per instructions
- Costs less than 3p per litre
- Waste ~ 1% (backflushing)
- Can be safely disposed. Does not leach

500 KLD Community Unit

10 LPD Household unit

Field Validation of Technology



Different technologies for treating drinking water are offered by many companies but end-users are not clear about which technology fits their requirement best. There are many factors to be considered while assessing existing and emerging technologies. We need a Technology Readiness Assessment (TRA) methodology first and then a criteria of a minimum Technology Readiness Level (TRL) to recommend the right technology

A project has been initiated under the Department of Scientific and Industrial Research (DSIR) to evaluate all existing drinking water technologies through the TRA-TRL method and the ASSURED matrix framework proposed by Dr Mashelkar

Department of Scientific and Industrial Research
Ministry of Science & Technology
Govt of India

Helping Industries Achieve "NET ZERO"

Industrial water management has assumed great significance in recent years because of depleting groundwater levels and increased discharge of industrial effluents. Industries in several geographies are prohibited from withdrawing groundwater and forced to recycle more or buy water from external sources

A comprehensive study of the water availability and requirement of an industrial unit will identify opportunities to reduce water wastage and increase recycling or reuse. There are many emerging technologies including real-time monitoring that can help in timely decision making preventing huge losses. Savings in water usage also bring savings in energy usage and enable the industrial unit to contribute to social good in the community where they are located

ICCW has partnered with ITIFY and FluxGen to conduct comprehensive water audits followed by specific interventions to bring about water and energy savings.

Eleven audits were performed during the year for hotels and manufacturing industries

Capacity Building

Students Internship for MSc students from Stella Maris college and Amrita Vishwa Vidyapeetham

Two months' Project-based internships were provided to MSc students with dedicated mentoring by senior ICCW personnel.

Ambernath Organics Pvt. Ltd.

Sponsor: Ambernath Organics

The topics for the projects were:

"Literature review on experiments to detect various microplastics in drinking water".

"Computational design of reduced graphene oxide nanomaterial sensor for forever chemicals".

"Computational design of reduced graphene oxide based selective sensors for pesticides".

"Literature review on removal of bromide from oil and gas wastewater".

"Development of durable carbon nanomaterial coatings for electrochemical sensors".

"Toxicology of disinfectants and disinfection byproducts in drinking water"

"Sustainable ways to reuse the textile wastewater".

"Exploring food chemistry for household sensing applications".

Certificate program for BSc students

Providing hands on experience in water quality testing and analysis for BSc students of Stella Maris college students on water quality analysis using FTKs

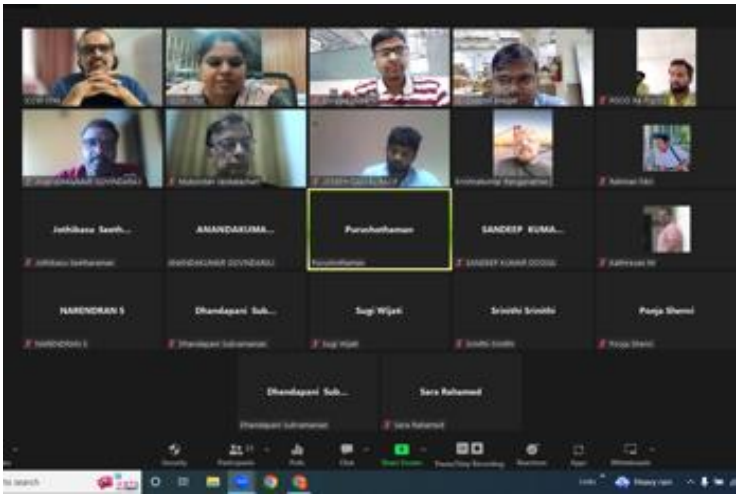
Sponsor: Ambernath Organics

A total of 81 students have been trained on collecting samples with geo-tagging, analysis of different parameters and interpreting the results to assess the water quality of Chennai city and its neighbourhood. The students spent 15 hours each and earned tow credits in their course, which gave them invaluable practical insights into water chemistry and its applications

Corporate Training Programmes

ICCW's partners multinational corporates through consortia memberships. Consortia members benefit through knowledge sessions arranged through our academic and professional networks. Members also leverage ICCW's network to educate customers about their technology and expand the reach.

With one of our Gold Consortia members Buckman, a Two-day online training on Cooling Water Chemistry was organised. Over 30 participants from different corporates benefited from the webinar which is being followed up with a site visit.



ICCW has also been closely involved with CII-SR in judging water conservation projects, Kaizens and sharing knowledge on water sustainability

Continual Engagement with Communities

With a view towards continua engagement with multi-stakeholder communities, two initiatives have been carried forward.

1. WaterTalks – Monthly Expert Speak on a topic with real-life case studies
2. WoW AF – Fortnightly informal sessions where anybody can share their knowledge or success stories

Monthly Water Talks have featured academicians, civil servants, independent consultants, startups and industry professionals. All sessions are archived on YouTube

World of Water Action Forums (WoW AF) is held online in different cities – Bengaluru, Chennai, Hyderabad and many others wanting to start their own.

The forum has encouraged ordinary citizens to come forward, learn and contribute to their city's water conservation and share knowledge and success stories that motivate others

Behavioural Change

Water is Life. Two-thirds of our bodies and two-thirds of our planet is made of water. Wherever we look for life in the cosmos, we look for signs of water. However, on this planet, we are taking water for granted and in many parts of the world it is viewed as a right.

While that may be so, there is nobody from outside who will provide us this right. It is our collective responsibility to ensure that we use water sensibly and preserve it for future generations, not just for humans but for all the planet's biodiversity.

To bring about this mindset, continual interaction is required at different levels. Behavioural change is slow and needs to be catalysed.



Every community solution has been backed with behaviour change initiatives and communications on the benefits of the new technology through interactive events

To bring about an emotional connect while educating, special music videos with celebrities and documentaries with experts have been produced and circulated. More interactive events – games, carnivals, contests are needed to raise the level of consciousness around water

Ecosystem for Water comprises water treatment companies, water consuming organisations, governments, NGOs, funding organisation. There is a lot happening in the world today on water treatment and conservation. ICCW is a platform where anyone can come with an idea or a problem and leave with a product or a solution. We have identified three areas to contribute to the ecosystem – Start-ups, Corporates, Governments

Startups

During the past four years we have met many Startups in the water sector driven by passion to make a social impact. There were many who chose water as an are to build a profitable business. We have realised that it is important for a Start-up to balance both i.e create a financially viable business model that maximises social impact around water

Corporates

From inception, we realised that mega corporations in the business of water have a crucial role to play in global water security. Out Consortia membership level gives corporates an option as to how much they can involve with us for overall benefits

Governments

Governments are the largest investors in water and have the ultimate responsibility in ensuring adequate quantity of appropriate quality water to all consumers. Addressing priority areas as defined by central and state governments is the only way to maintain water security now and in the future

Water for Life Conference

ICCW contributed to the Water for Life Conference held at IIT Madras through sponsorship from our Gold Consortia Member - Xylem

During the conference, ICCW chaired a session on Start-ups, where five Start-ups shared their journey – the challenges they faced and the successes they earned.

ICCW's consortia member Xylem co-sponsored the Water for Life Conference

Panel Discussion - Vayujal, Solinas, Hydromaterials, NGEN and Greenviroment

The session gave students and budding entrepreneurs a glimpse of the opportunities for building businesses around water.

It also gave the academics and corporate attendees an opportunity to reflect as to what more they can do to help the start-up ecosystem

Flagship Accelerator Program

Start-ups in various stages of evolution need financial, technical and business mentoring support to succeed. While it is not always possible to guarantee success of a startup considering that they are trying to disrupt status quo, one can always reduce the risk of failure by following a structured methodology

In partnership with Akamai Technologies India Corporate Social Responsibility Trust, an accelerator programme was launched

ffem

AgroMorph ... get sustainable

smartterra

aaree

SOLINAS

Digital Paani

Jaljeevika

After 3 cohorts, 7 Start-Ups have been mentored to build their Business Models with Social Impact.

Through fortnightly mentoring and four milestone reviews in a year, the Start-ups have learnt how to discover customers, validate their business models, track social impact thereby becoming successful ventures.

Akamai

Sponsor
Akamai Technologies India Corporate Social Responsibility Trust,

Gold Consortia Members

Xylem

We thank Xylem Inc, who joined our Consortia last year for their interest in globalizing emerging technologies in arsenic remediation and atmospheric water generation. Both the technologies came out of Pradeep Research Group at IIT Madras. Technologies that are developed for the Indian market can be effectively deployed in African and Latin American countries. Even in advanced countries, these technologies can provide a cost effective and ecologically sustainable alternative

Aquaworks, Marmon Water Inc

We thank Aquaworks, a part of Marmon Water Inc for their continued collaboration in the past three years. We look forward to their continued support for new product development, emerging technologies and joint validation projects.

Buckman Laboratories

Our sincere gratitude to Buckman Laboratories for their tremendous support, contribution to the centre's ecosystem, collective effort for capacity building & improving sustainability in industrial water management

We look forward to strengthening our relationship with our Gold Consortia members in the new year with projects and startups that address global challenges in microplastics, forever chemicals, trace element contaminants, and other priority areas in line with the UN Sustainability Goals

NEW PARTNERSHIPS

With Dr Lior Asaf, Israel-India Water Attaché and Mr Neeraj Gahlawat during their visit on 21 Jul, 2022

With Shri Chandrabose J, MD, and team from KMML during their visit on 7 Oct, 2022

With Shri Deevan Reddy MD and Shri Gopinath of APEWIDC on 31 Oct, 2022

Mr. Arthur Kravchenko VP Innovation & Strategy Global Director
Visit on 21 Nov, 2022

Tel Aviv University Delegation visit on 8 Dec, 2022

With the Taiwan Delegation on 8 Nov, 2022

With Dr. Sam Chigome, BITRI on 19 Dec, 2022

Mr Narain Madhavan &
Mr Siva Natarajan from
Xylem on 10 Nov, 2022

FINANCIALS (in INR)

Income

2021 - 2022

Direct Revenue	20,61,74,995
Grants Received	97,55,768
Interest Income	4,60,556
Other Income	(3,503)
Total	21,63,87,816

2020 - 2021

Direct Revenue	12,97,11,927
Grants Received	1,64,53,893
Interest Income	13,84,720
Other Income	4,55,387
Total	14,80,05,927

2019 - 2020

Direct Revenue	1,02,88,428
Grants Received	-
Interest Income	239
Other Income	30,48,582
Total	1,33,37,249

Expenditure

2021 - 2022

Direct Expenditure	18,50,07,952
Employee Costs	1,32,87,807
Operating Expenses	7,37,756
Administrative Expenses	1,98,03,419
Work-in-progress	-
Total	21,63,87,816

2020 - 2021

Direct Expenditure	13,51,31,064
Employee Costs	1,30,64,113
Operating Expenses	5,38,479
Administrative Expenses	2,11,11,097
Work-in-progress	(6,68,296)
Total	16,91,76,458

2019 - 2020

Direct Expenditure	31,25,400
Employee Costs	85,63,609
Operating Expenses	4,45,283
Administrative Expenses	2,21,06,213
Work-in-progress	-
Total	3,42,40,505

ACKNOWLEDGEMENT

VISITORS

- Dr. N. Arumugan, Head-R&D, SRF ltd. on 13 Jan, 2022
- Mr. Rajaneesh Dasgupta, Trustee & Director General Association of Infrastructure Industry (INDIA) on 25 Jan, 2022
- Col. P Srinivas, Military Hospital, Secunderabad on 1 Feb, 2022
- S. Kumaravan, TCS, Chennai , 9 Feb, 2022
- Dr. L V Subbarao, Secretary to the Vice President of India, 13 Apr, 2022
- Lokesh Reddy, CTO Road Pilot Technology Pvt. ltd., 26 Apr, 2022
- Susil Kumar Sharma, Advisor, MIET, Meerut, 28 Apr, 2022
- Tomas Lofvenberg, CEO, Aqua-Qube, Sweden, 14 May, 2022
- Dr. Soumyajit Roy & Dr. Pei Liang, IISER , Kolkata, 16 May, 2022
- Dr. R. Bindu, Minister for SJD, Kerala, 30 May, 2022
- K. Chandram, CEO, The Chennai Angles, 13 Jun, 2022
- Hari Srikanth, Professor, University of South Florida, USF, 1 Jul, 2022

VISITORS

- Ms. Mallika Sreedharan, CEO, AquaMAP, 13 Jul, 2022
- Dr Lior Asaf, Israel Water Attaché, 21 Jul, 2022
- Mr Vadivel & Team, Ultramarine Pigments, 25 Jul, 2022
- Mme. Karlene Maywald, Water Ambassador for South Australian Govt along with Mr Mark Carey, M.D, Hydrodis, 26 Jul, 2022
- Ms. Jenaan Lilani Bhargava, COO, Villgro, 26 Jul, 2022
- Ms. Claris Chan - SHE Lead, Buckman Digital Water, Singapore, 9 Sep, 2022
- Mr. Craig Kimmel – Director, Global Safety and Environment, Memphis, USA, Buckman International Ms. Jody L. Stobbe, CHMM, CSR, Global Environmental Sustainability Manager, Buckman International, 13 Sep, 2022
- Mr. Jigar Undavia, Transformation Director -Asia Pacific, Buckman Technologies, 16 Sep, 2022
- Mr. Yoshiro Kaku, NEDO - The New Energy and Industrial Technology Development Organization, New Delhi, representing METI, Govt. of Japan, 21 Sep, 2022
- Puneet Agrawal, VC, Meerut institute of Eng. & Tech, Meerut, UP, 26 Sep, 2022
- Sumana, Bollineni Hillside, Semmancheri, 26 Sep, 2022
- R. Vasuki, Chairman Food Commissioner, 3 Oct, 022
- Dr. Meena Nemiwal, NMIT Jaipur, 7 Oct, 2022
- Vineet Murarka , Banka Bioloo Ltd, 7 Oct, 2022

VISITORS

- Shri Chandrabose J, Managing Director, KMML, 7 Oct, 2022
- Mr. Ankit and Mr. Shivendru, ITC, 18 Oct, 2022
- Mr. Rajeshwar Reddy, Andhra Pradesh Education & Welfare Infrastructure Development Corporation (APEWIDC) MD and team visit ICCW along with Dr TNVV Rao, 31 Oct, 2022
- Taiwan Mission to India - Mission Director, Ms. Lihkuan Lee, Project Manager - Asian Productivity Organization & the Center of Excellence on Green Productivity (APO COE GP), China Productivity Center, Taiwan, 8 Nov, 2022
- Mr. Madhavan Narain, DGM – Innovation Xylem along with Mr. Siva Natarajan, DGM- Channel Management, 10 Nov 2022
- Mr. Raghuttama Rao, CEO & Mr. Subramanian, CMO from Gopalakrishnan-Deshpande Centre for Innovation along with Prof. Amit Sheth, Plaksha University, Mohali. 17 Nov, 2022
- Mr. Santana Krishna, GDC, 18 Nov, 2022
- Mr L Prabhakar, EVP Social Investments, ITC, 18 Nov, 2022
- Mr Arthur Kravchenko, VP – Innovation & Strategy, Marmon Water Inc., 21 Nov, 2022
- Tel Aviv University, Israel visitors – Prof. Ariel Porat, President; Prof. Milette Shamir, Vice President; Mr. Konstantin Platonov, Asia Engagement Director; Dr. Gary Sussman, Director of Research and Development, 8 Dec, 2022
- Dr. Sam Chigome, Botswana Institute of Technology, Research and Innovation (BITRI), 19 Dec, 2022

Offline-internships

- N. Mukunth, MBA student, BIM Trichy.
- T. Danavarshinee, M. Sc. Chemistry student, Stella Maris College.
- B. Bhuvaneshwari, M. Sc. Chemistry student, Stella Maris College.
- Priyadarshini, M. Sc. Chemistry student, Stella Maris College.
- Maria, M. Sc. Chemistry student, Stella Maris College.
- Jaqueline, M. Sc. Chemistry student, Stella Maris College.
- Sandria, M. Sc. Chemistry student, Stella Maris College.
- Sarita, M. Sc. Chemistry student, Stella Maris College.
- Divyashree, M. Sc. Chemistry student, Stella Maris College.
- Megha Mitra, B.S in Data Science & Programming student, IITM
- Gurudev, M., B. E. in Mechatronics Eng. Graduate from Anna University (Pavai).
- Ranjit Kumar Muduli, B.Sc. Mathematics graduate from Utkal University.
- Pranav Ramasubramanian, Manipal Institute of Technology, Manipal.
- Uroosha Rahat – MSc Chemistry, University of Allahabad & BS in Data Science
- Ragashree – B tech Civil, VIT
- Akshaya M – B tech Civil, VIT
- Hari Balan MBA BIMS
- Keshav, MBA BIMS
- Shubham, B tech
- Hannah Parvin – MSc Chemistry, Farook College, Kozhikode
- Aryan - MCTM school on “Net Zero water initiatives” – For water saving initiatives at school and home, Aryan’s project (8$^{th\ std}$)

Online Internships:

- Saurabh Kumar Singh, M. Tech Industrial Mathematics and Scientific Computing, IITM.
- Ashish Yadava, M. Tech Industrial Mathematics and Scientific Computing, IITM.
- Lokendra Singh, M. Tech Industrial Mathematics and Scientific Computing, IITM.
- Addanki Raghavendra, Chem. Eng. student from NIT Calicut.
- Snehith Adabala, B. Sc. Chemistry student, Pondicherry University.
- Shivang Chauhan, B. S in Data Science student, IITM.
- Jay Bathiya, B. S in Data Science student, IITM.
- Diya Nathwani, B. S in Data Science student, IITM.
- Harsh Singh, CS Eng. Student, UEM, Kolkata.
- Lahari Reddy, Biotech Eng. Student, IITM.
- Jagruthi Sarikonda, Biotech Eng. student, IITM.
- Renuka Kolusu, Biotech Eng. student, IITM.
- Kunal Kishore, CS Eng. student, UEM Kolkata.
- Tanishka Sharma, BS Data Science & Programming student, IITM.

Alumni

We bid adieu to several alumni of ICCW this year who played a significant role in the objectives achieved so far. They have moved on to various other employment prospects and a shout out to all those who contributed to the success of our organization. Our best wishes.

Rekha Ganesh
Administrator

Ashesh Mahto
Scientist

Ramaswamy Ganapati
Digital Innovation

Vishnu V
Jr. Scientist

Kadambari
Jr. Scientist

Rishav Kumar
Analyst

Rajesh Kumar
Jr. Scientist

THE ROAD AHEAD OF 2023

The world is moving towards digitalisation and so also the world of water and water management. We will continue to focus on low-cost sensor development that can be deployed in stationary or mobile units for rapid, accurate capture of water data with geo-tagging The hydroinformatics platform developed for a village this year will be expanded to cover more areas and parameters to facilitate predictive management of water stress and quality.

Large-scale industrial development and their impact on ground and surface water quality need to be monitored closely, which requires continuous method development in testing. More research is needed in materials that can identify and remove the new age contaminants.

Greater collaboration with our Consortia members and new partnerships with Indian and foreign companies and governments are expected to address global challenges in microplastics contamination, forever chemicals (PFAS), agricultural water management, complete recycling of sewage and industrial effluents creating circular economies and ensuring 24X7 water to as many households as possible.

There is a constant need to better manage industrial water and we hope to support the “Net Zero” of corporates and other institutions through efficient water audits and follow up interventions.

We also plan to reach out to colleges and professionals through training programmes to create awareness of emerging technologies and build capacity to manage them.

We also plan to reach out to colleges and professionals through training programmes to create awareness of emerging technologies and build capacity to manage them.

The world of startups is enriched by entrepreneurs in water space, who are out to reate a social impact. We will continue to encourage them through Grand Challenges, Incubation and Acceleration programmes. We look forward to corporates through their CSR funds or otherwise, engaging with the startups to bring about a transformational impact in water management and thereby help address the bigger challenges of poverty, economic growth and climate change.

OUR COLLABORATORS

IIT MADRAS FOUNDATION

ITiFY

SARAYA

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