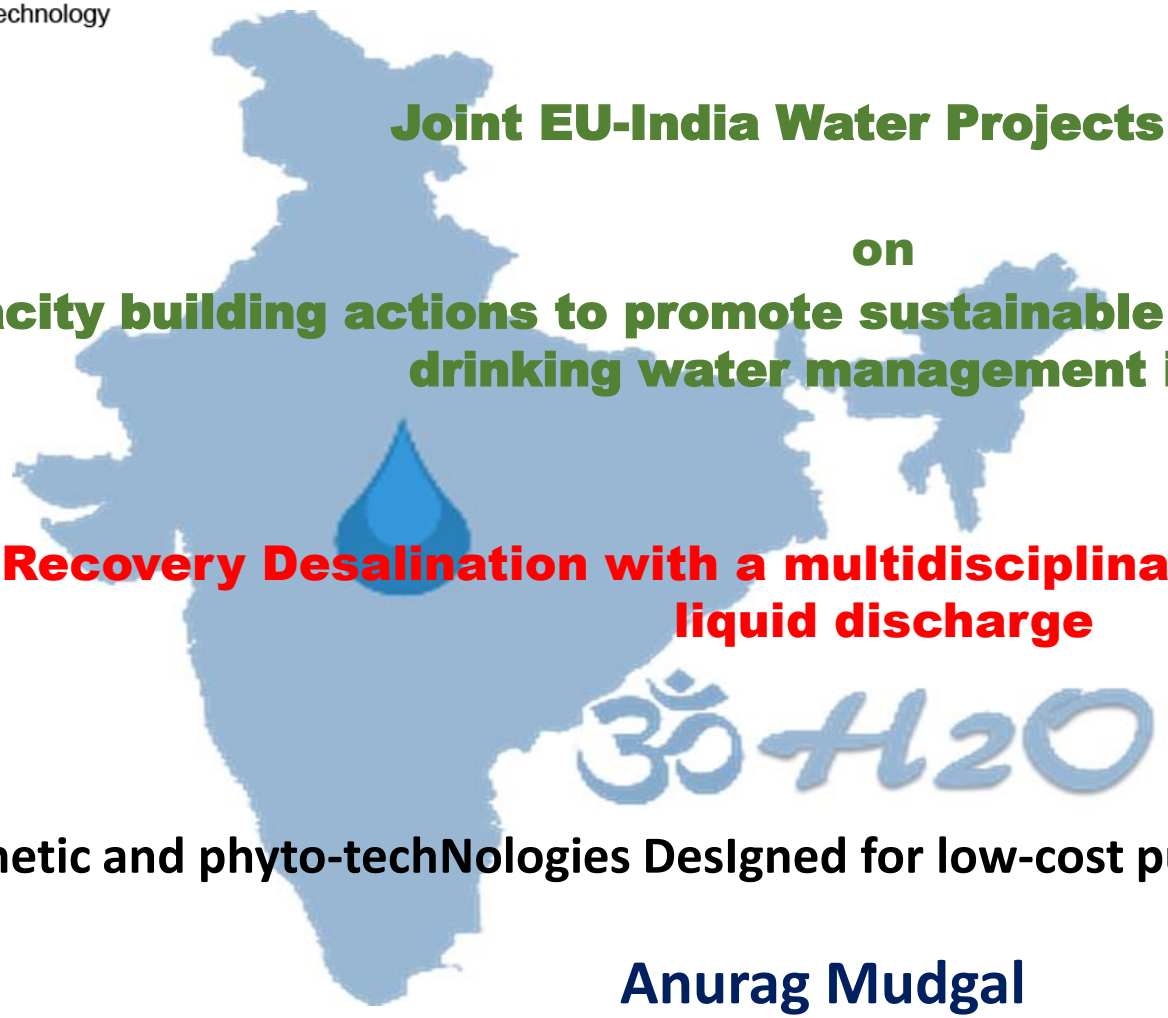
DEPARTMENT OF BIOTECHNOLOGY
Ministry of Science & Technology

INDIA-H_2O

Joint EU-India Water Projects Webinar

on

Capacity building actions to promote sustainable waste water treatment and drinking water management in India



High Recovery Desalination with a multidisciplinary approach to achieve zero liquid discharge

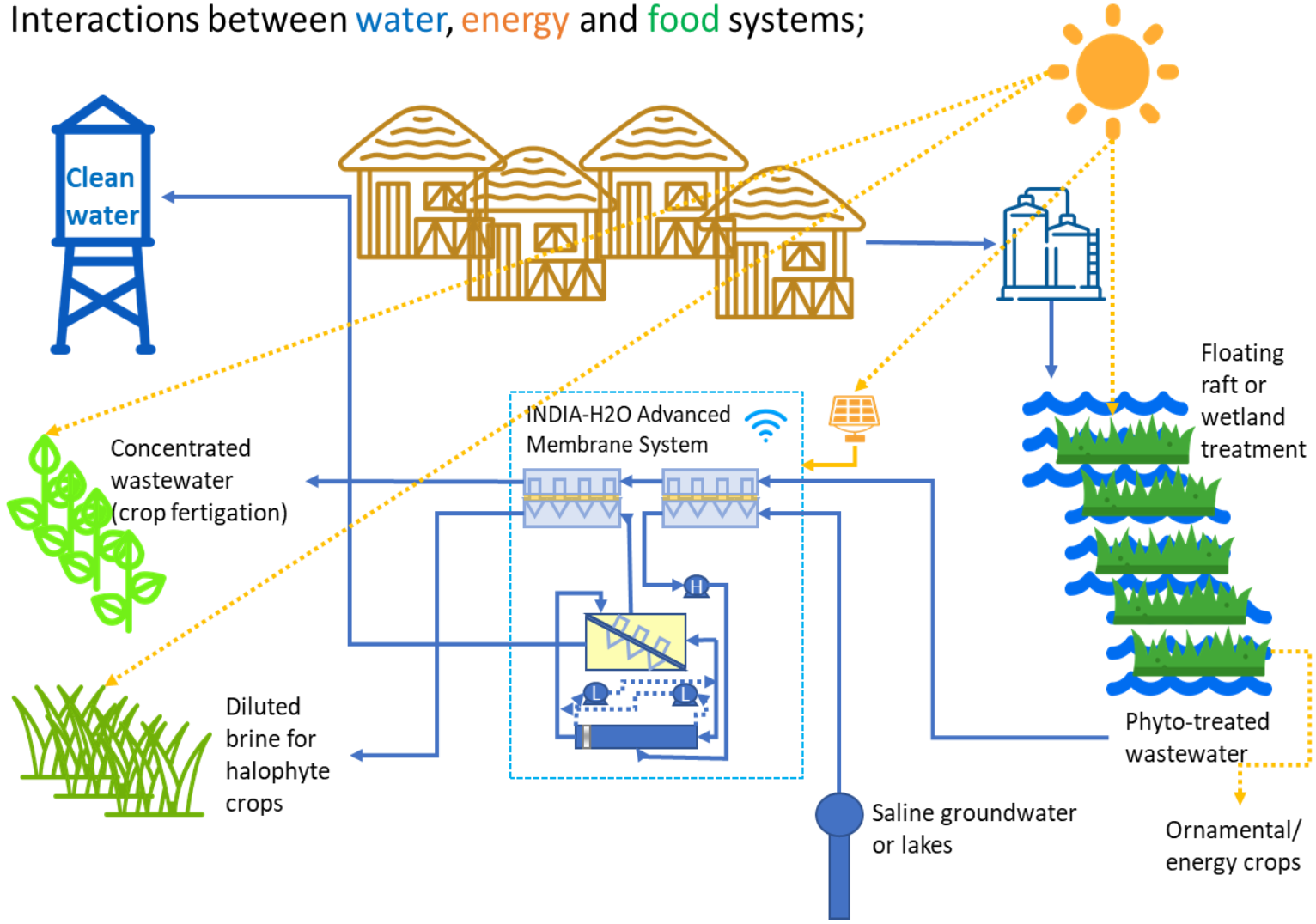
bIo-mimetic and phyto-techNologies DesIgned for low-cost purficAtion and recycling of water

Anurag Mudgal

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 820906. This project has been co-funded by DBT Project No. BT/IN/EU-WR/40/AM/2018.

INDIA H2O: What are we doing?

Interactions between water, energy and food systems;



***INDIA-H2O concept** for piloting water recycling and Water Energy Food Nexus at a village level*

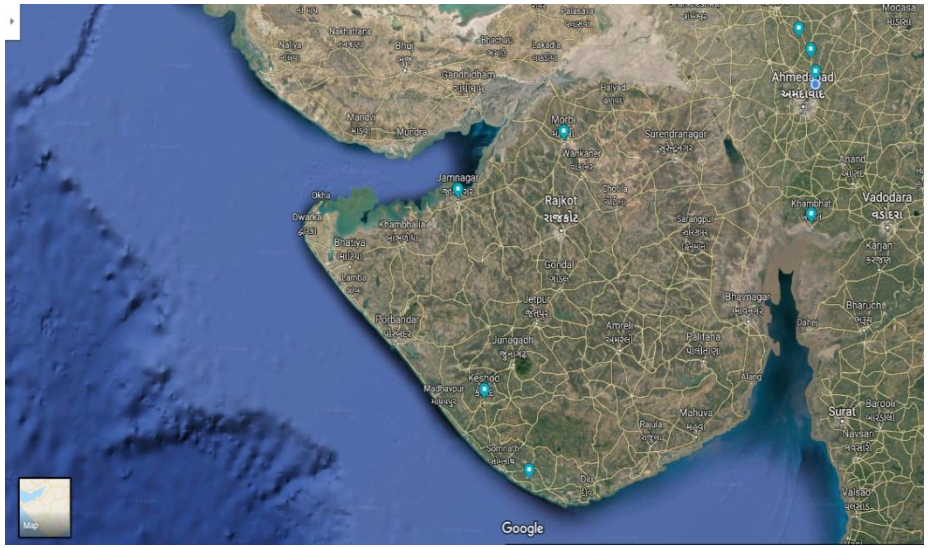
Added value of the expected outcomes for India

- Field work at Lodhva confirms water poverty and unequal access to water.
- Water available only once in 5-6 days
- Situation is made worse by climate change and salinization
- Only one season of cultivation possible
- Farmers seek alternative livelihoods in limestone mining

Figure 11: Storage Practices in Lodhva. Pictures taken in December 2019

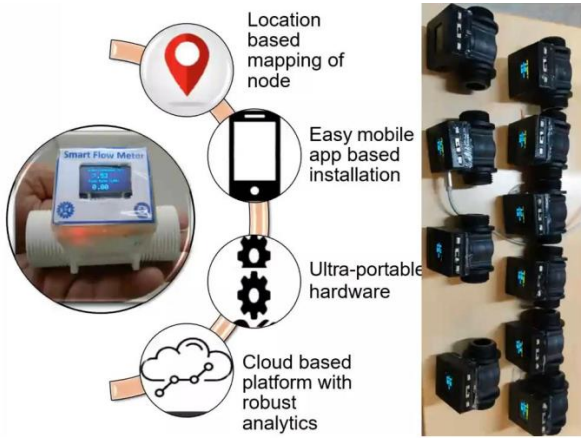
Analysing the market potential and LCA

- A Water ATM is planned to be installed at school premises to facilitate school children with drinking water and surplus water may be offered to villagers on a nominal price. Pre- paid scratch card may be issued for this.
- 1800 km long coast line with 10 km inland strip along Gujarat state is the target area (18000 km^2)
- Halophytic crop market: Local and export options
- Exploring other crop options that tolerate salinity and have local value like medicated plans, flower plants and aromatic plants
- Solar-driven low-cost water treatment unit has potential to pick up rural market where options are very limited
- Consideration of the CAPEX and also the ongoing maintenance and OPEX in terms of solar power, replacement membranes and other parts.
- Spin out and license potential of batch RO being pursued in parallel through UoB Enterprise
- Feasibility being considered from technical, commercial, financial, environmental and social perspectives

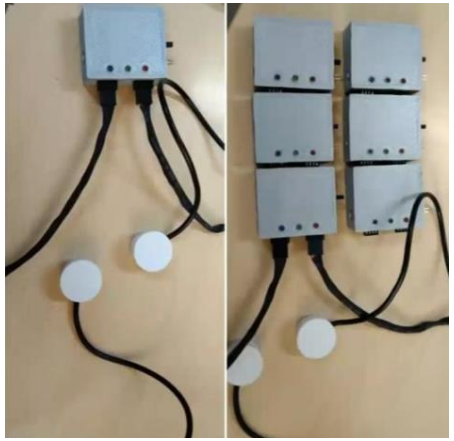


Added value of the expected outcomes for India

Pressure Sensors – Ambuj
Range: 0 – 5 bar and 0-50 bar



Flow Sensors – Dhara
Range: 10 -10000 LPM



Level Sensors – Jalad
Range: Low, Medium and High

Full grown Salicornia Brachiata

Maturing Salicornia Brachiata

Flowering in Salicornia Brachiata

CSIR CEERI's Online Monitoring and Control Application

Demonstration activities: Centre of Excellence at PDEU

Locations for plant, Site development, Centre of Excellence inauguration, equipment and water testing lab set up at PDEU premises

- At 10 bar avg. pressure, we obtained 87 % recovery using an integrated BRO-FO system.
- Long term testing for the integrated BRO-FO system is in progress.

https://www.google.co.in/maps/@20.8286743,70.5697527,206m/data=!3m1!1e3

Integrated Batch RO-FO for village (Lodhwa) community

Inauguration of Batch RO- FO unit

Batch RO- FO unit at School (capacity 800 lt/ hr, recovery 80%)

Water tanks outside the machine room

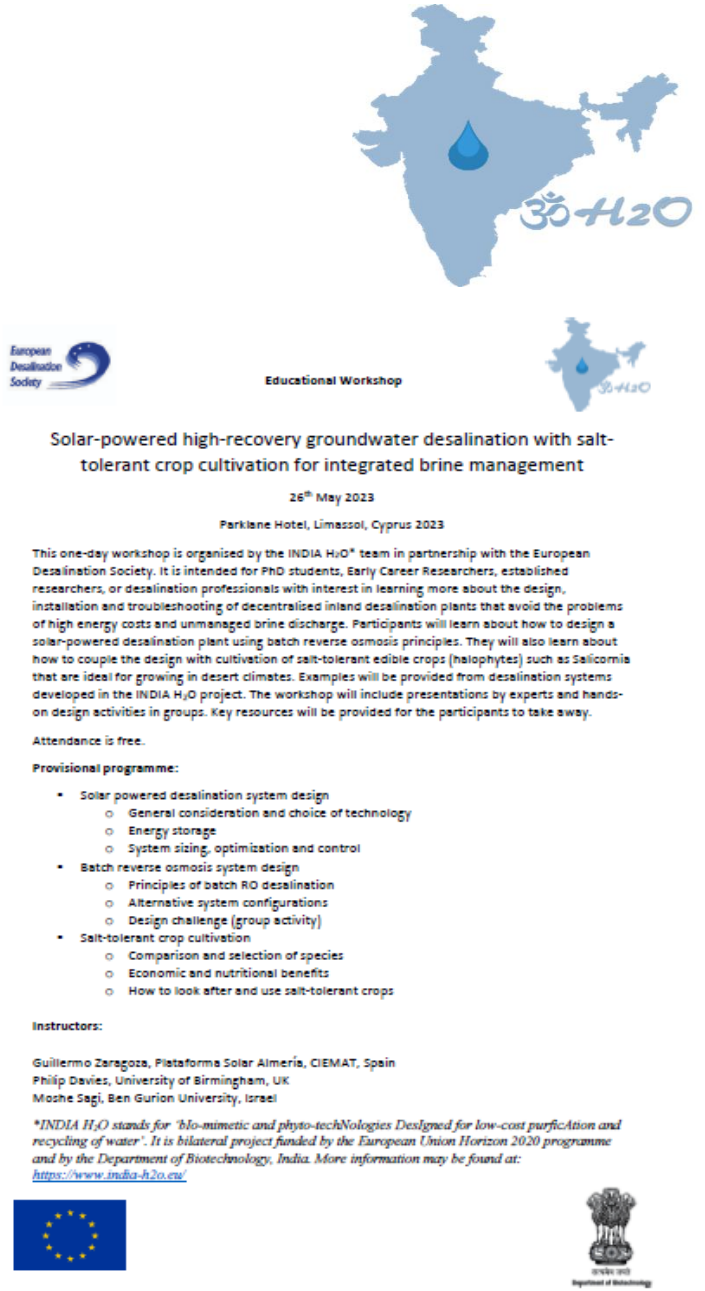
Growth of Salicornia

Location of village

Checking rainwater harvesting system from rooftop of school

Skills development and capacity building

- An open elective course on Food-Water-Energy nexus started at B Tech 3rd year
- Regular hands on workshops and training sessions
- Industrial visits (textile and Dairy) and exchange of ideas about effluent treatment and possible solutions
- Seamless interactions with concerned Government Departments (GUJCOST) and ministries (MoEFCC)



European Desalination Society

Educational Workshop

Solar-powered high-recovery groundwater desalination with salt-tolerant crop cultivation for integrated brine management

26th May 2023

Parklane Hotel, Limassol, Cyprus 2023

This one-day workshop is organised by the INDIA H_2O* team in partnership with the European Desalination Society. It is intended for PhD students, Early Career Researchers, established researchers, or desalination professionals with interest in learning more about the design, installation and troubleshooting of decentralised inland desalination plants that avoid the problems of high energy costs and unmanaged brine discharge. Participants will learn about how to design a solar-powered desalination plant using batch reverse osmosis principles. They will also learn about how to couple the design with cultivation of salt-tolerant edible crops (halophytes) such as Salicornia that are ideal for growing in desert climates. Examples will be provided from desalination systems developed in the INDIA H_2O project. The workshop will include presentations by experts and hands-on design activities in groups. Key resources will be provided for the participants to take away.

Attendance is free.

Provisional programme:

- Solar powered desalination system design
  - General consideration and choice of technology
  - Energy storage
  - System sizing, optimization and control
- Batch reverse osmosis system design
  - Principles of batch RO desalination
  - Alternative system configurations
  - Design challenge (group activity)
- Salt-tolerant crop cultivation
  - Comparison and selection of species
  - Economic and nutritional benefits
  - How to look after and use salt-tolerant crops

Instructors:

Guillermo Zaragoza, Plataforma Solar Almería, CIEMAT, Spain
Philip Davies, University of Birmingham, UK
Moshe Sagi, Ben Gurion University, Israel

**INDIA H_2O stands for 'bio-mimetic and phyto-techNologies DesIgned for low-cost purficAtion and recycling of water'. It is bilateral project funded by the European Union Horizon 2020 programme and by the Department of Biotechnology, India. More information may be found at: https://www.india-h2o.eu/*

Workshop on Solar-powered high-recovery groundwater desalination with salt-tolerant crop cultivation for integrated brine management –during EDS conference at Cyprus

Sustainability and on-field activities: Societal impact

- A MoU will be signed between INDIA-H_2O and BAPS trust under the witness of local Gram panchayat that the local body and trust will together enable the maintenance of the unit after project gets completed
- At least two more projects will be identified with help of Decision Support Tool
- PhD and Masters students on-board and being trained

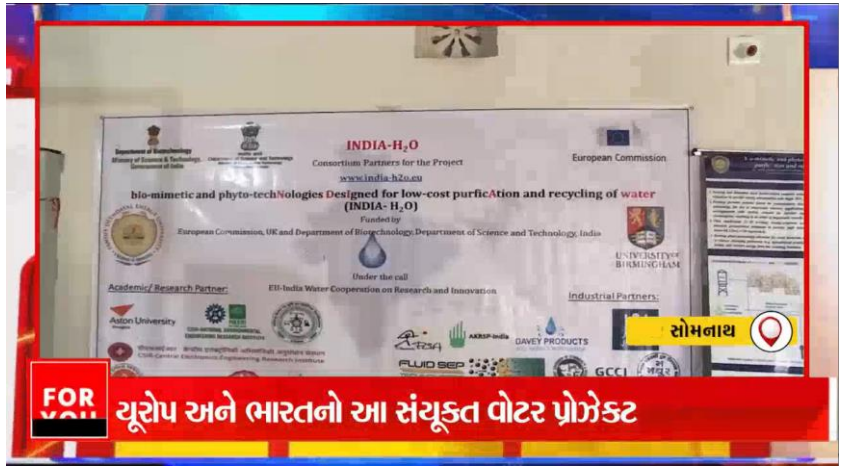



Engagement with villagers and MoU with local bodies

Interaction with villagers in Lodhwa

Engagement and Dissemination

- Centre of Excellence officially opened in March 2022
- We have organised two international conference: ICAWTM-22 and ICAWTM-23
  - 200 papers: From all states of India and 12 overseas countries
  - Workshop and Training sessions were held during the conference
- 7 publications in peer-reviewed journals with more planned
- Engaging with the public through Gujurat news programmes and newpapers



Acknowledgement

- Horizon 2020 scheme (EU- India water call)
- Department of Science and Technology and Department of Bio-Technology (Project grant No: BT/IN/EU-WR/40/AM/2018)
- European Commission (Grant Agreement no. 820906)
- British Council (Grant No: 877775303)
- All consortium partners and project staff
- PDEU

And the Journey continues…….

Reach us at **water@pdpu.ac.in**


Water Team at PDEU

To highlight in the introduction and the wrap-up – 3 points per project

1. Establishment of COE in Water at PDEU, India
2. Development of Low cost real time sensors with online monitoring App
3. Salicornia, a hylophitic crop helping in ZLD and adding value to farmers life

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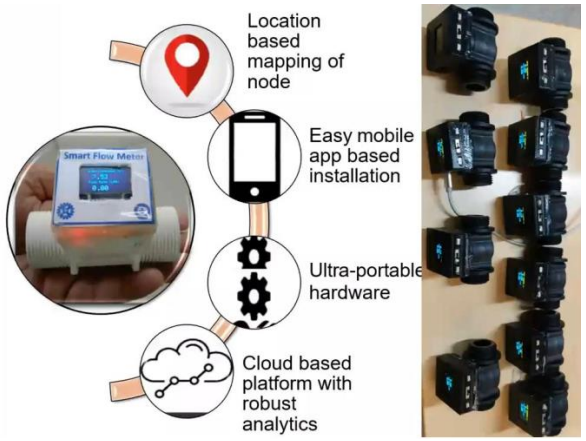

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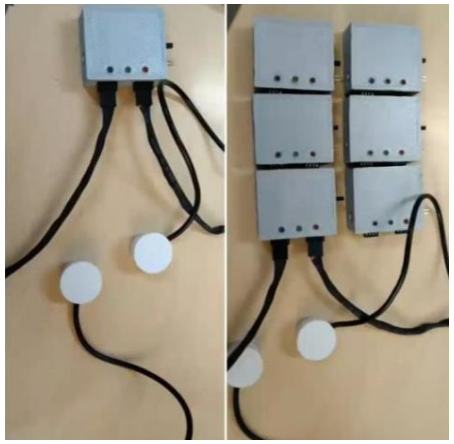

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