

**Project: Development, testing and installation of innovative water desalination and purification units of 1000-1500 LPH capacity at Mota Asota Village of Devbhoomi Dwarka District of Gujarat by CSIR- CSMCRI, Bhavnagar(Gujarat).**

**Funding Agency: National Water Mission( Ministry of Water Resources, RD & GR )  
Sanctioned Amount: Rs. 42.52 Lakh. Fund released till 31/05/2018: Rs. 21.35 Lakh.  
Project Duration: 12 Months. & Second Instalment released in June 2018.**

### Objectives

- To indigenously developed water purification and desalination technology capable of mitigating salinity, fluoride, nitrate, pathogens and other impurities in drinking water with high recovery.
- To design, fabricate and test site specific RO units having capacity of 1000-1500 LPH for villages.
- To install the unit at the site with the help of funding agency/local administration/panchayat.
- To impart training to the identified operators(Skill India). from respective village.

## Work accomplished till 25/02/2019

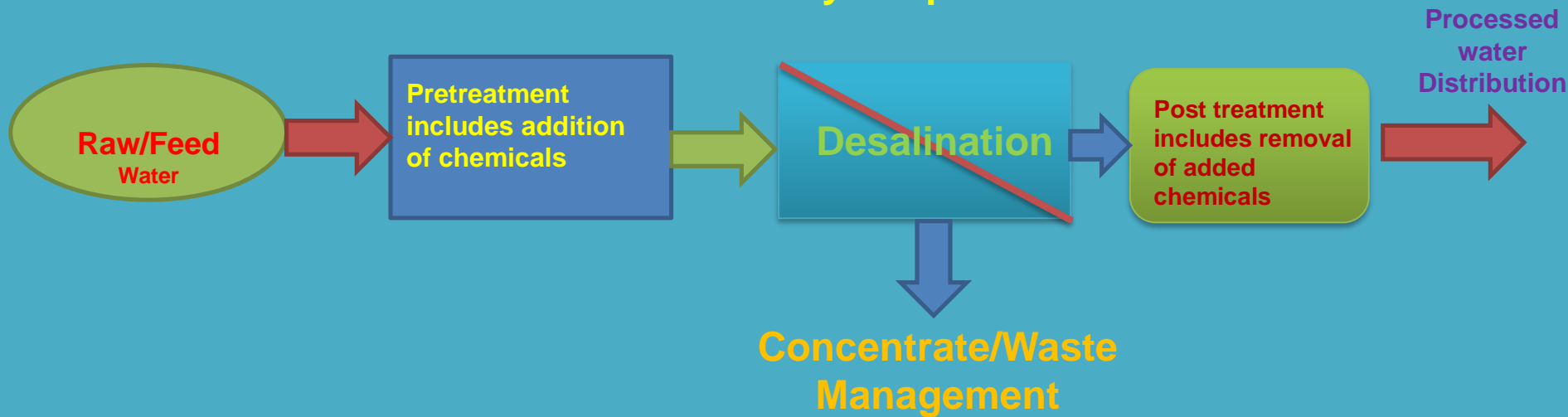
- 1.** Project is basically Applied and Action Oriented Research to develop water purification and desalination technology in form of RO unit/plant capable of producing 1000-1500 LPH safe and clean drinking water from contaminated harmful Brackish. Water. Design and development work for 1000- 1500 LPH capacity RO unit has been carried out and exploration of various components required for the project has been completed.
- 2.** Market survey and probable suppliers of the various components of the unit were identified as this requires customised procurements and not available readily in markets. Procurement process of various components has been accomplished and plant is ready to be dispatched from CSIR-CSMCRI end. Continues correspondence and visit is done at site, Plant room is ready and we are awaiting the power supply availability at site, which is in the preview of local gram panchayat.
- 3.** We were not able to start fabrication, assembly and testing of components required for the project as funds for the manpower, TA/DA etc. was not released in first instant. Fund of Rs. 21.35 Lakh was released only under **head of machinery & equipment and cannot be utilised for other requirements** unless not approved and sanctioned by funding agency.

We are working to execute this project with the support of ‘Gujarat Water Supply & Sewerage Board’ (GWSSB) and Suptd. Engineer Rajyaguru and his team are instrumental along with CSIR-CSMCRI, Bhavnagar for successful completion of the Project. **This project is applied and action oriented and therefore required complete release of funds for smooth work accomplishment.**

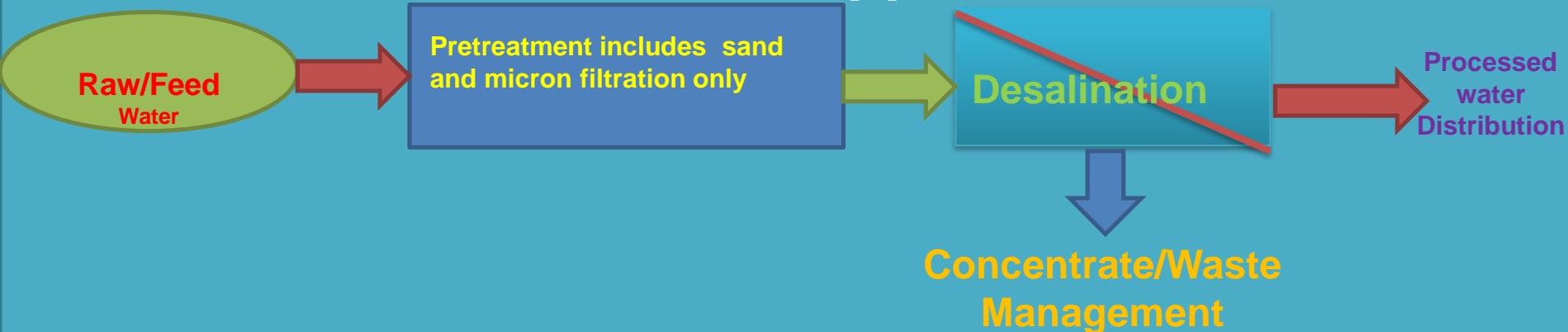
# Innovative process, Indigenous technology and methodology

## CSMCRI's unique Approach to RO Desalination

Conventionally adopted



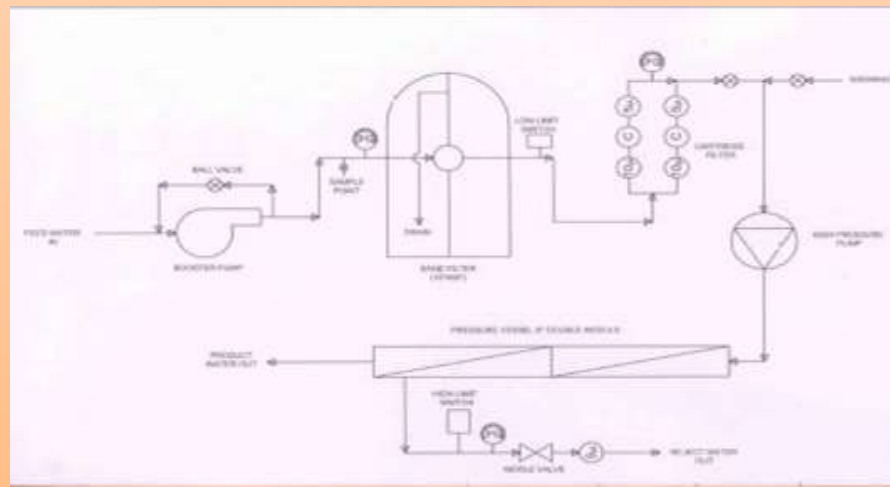
## CSMCRI's approach



## Water Sample Analysis at Mota Asota Village site of Devbhoomi Dwarka District of Gujarat

Sr.No.	Chemical Report.	Result.
01	TDS.	3830 ppm
02	PH.	7.23
03	Total Hardness.	2420 mg/ml
04	Calcium.	1680 mg/ml
05	Magnesium.	740 mg/ml
06	Chloride.	1683 mg/ml.

- Indigenous membrane RO technology and process will be adopted which is cost effective in adverse field conditions.
- Feed water (saline/brackish of up to 10000 ppm) stored in sintex tank(s) will be pumped through booster pump in bank of cartridge filters followed by sand/bag/disc filters.
- It will pass through RO membranes and its housing called membrane banks with higher flow velocity and pressure enabled by high pressure pumping system.
- Membrane banks have a special feature to divide the flow velocity of raw/feed water into two streams. Stream 1 called permeate stream/water which is also called product/drinking water and is safe and clean having TDS(Total dissolved solids) < 500 ppm being stored in sintex tank and ready for consumption/drinking. Stream 2 called reject stream having TDS more than feed water is drained in drainage pipe line or can be used for toiletry use.



# CSIR- CSMCRI, Bhavnagar credentials and capability

*CSMCRI has set up more than 150 RO plants of various capacities in the country and abroad (Kenya and Afghanistan)*

CSMCRI has also shouldered the social responsibility of providing safe drinking water especially to the people affected by natural calamities like Orissa super cyclone, Kutch earthquake in Gujarat, Tsunami in Tamil Nadu, Cyclone Aila in West Bengal, Kosi floods in Bihar, Himalyan Tsunami in Uttarakhand , Odisha cyclone (PHALIN),Latur drought and recently during Kerala floods.

CSMCRI licensed the technology for manufacturing TFC membrane and spiral modules and hollow fibre ultrafiltration membranes to (1) M/s Uniqflux Membranes LLP, Pune in year 2011 and (2) M/s Aquatic Fresco, 15 Payal complex, Jawaharnagar, Vasna, Ahmedabad. and (3) M/s OM TECH, Dwarkesh Complex, 1<sup>st</sup>. Floor, Panchvati Society Main Road, Opp. Sitara Building, Rajkot- 360 001  
The company has started the commercial production of the TFC membranes,

## **Solar PV Powered Brackish Water RO Plant in Salinity Affected Villages**

**Feed/Raw water TDS: upto 8000 ppm.**

**Product/Drinking water TDS: Less than 500 ppm.**

**Plant Capacity: 400- 800 LPH**

**Process: Brackish water RO Desalination with no addition of Chemicals in feed/raw water.**

**Mota Asota Village site of Devbhoomi Dwarka District of Gujarat & RO Plant developed and tested by CSIR- CSMCRI, Bhavnagar(Gujarat).**





# Plant tested at CSIR- CSMCRI, Bhavnagar.

DEVELOPMENT, TESTING & INSTALLATION OF  
1000-1500 LPH CAPACITY RO PLANT, MOTA ASOTA .  
VILLAGE : DEVBHOOMI-DWARKA ; GUJARAT  
MINISTRY OF WATER RESOURCES, NATIONAL WATER MISSION, NEW DELHI.  
&  
CSIR-CSMCRI, BHAVNAGAR.





# 20 MLD Mine Water Desalination RO Plant setup by Doshi Ion on BOOT Basis under CSIR- CSMCRI as Consultant



CSMCRI's 2-stage 3000 LPH RO plant set up at Nagaur mine site in 2005 to convert saline mine water into drinking/agriculture water.



## Rajasthan State Mines & Minerals Ltd.

(A Government of Rajasthan Enterprise)

Corporate Office


4-Meera Marg, Udaipur, Rajasthan, PIN 313 004

I am also happy to inform you that the recent pump tests have conclusively proved the existence of huge reservoir of brackish water underground. The management of RSMML is determined to make this water usable by the society at large.

The Chief Secretary, Government of Rajasthan and Chairman, RSMML has been informed in detail about desalination plant installed by CSMCRI. The Chairman has deeply appreciated the cooperation and proactive action taken by CSMCRI.

Thanking you,

Yours faithfully,

  
(Rajat Kumar Mishra)  
Managing Director

**20 MLD DESALINATION PLANT AT KASNAU-MATASUKH MINES  
(NAGOUR)**

# Sea Water Desalination and Purification for seacoast Rural Segments



**6000 LPH SEAWATER RO PLANT**  
Village: Ervadi , Tamil nadu



**Mullimunai Village, Tamilnadu**  
seawater Plant 6000 LPH  
Daily production of drinking water is  
around 55000 liters(10 hrs.  
operation)

THE MANGALAM HINDU  
Mangalapuram, 10th April 2011  
A special feature on the seawater desalination plant in Ervadi, Tamil Nadu, is being highlighted in the Mangalapuram edition of the newspaper. The article mentions that the plant is a landmark project for the region, providing clean drinking water to the rural population. The plant is owned and operated by the Tamil Nadu government. The article also mentions that the plant is a model for other coastal regions in the state.

# Village Community Managed RO Plants(50 nos.) for Villages of Rajasthan

**Objective:** Many areas of ground water in Rajasthan are brackish, fluoride and nitrate contaminated and therefore not safe for drinking. The proposed community managed RO Plant will help the community to ease out the problem and will open the passage for safe drinking water at their villages.

**Scope:** The project confined to setting up of 50 Nos. of 1000 LPH capacity high recovery RO Plants in villages of Rajasthan as per direction for mitigation of salinity, fluoride, nitrate, pathogens and other impurities in drinking water, with provision of fluoride removal from reject water.

**Financial input: 941.12 Lakh**

**Background of the project approval and sanctions:** CSIR- CSMCRI, Bhavnagar earlier installed village community managed RO Plants in Bhojdesar(Sikar district), Theekaria kalan(Nagaur district) and Kisari(Jhunjhunu district) villages of Rajasthan in year 2009. The plants were working with full satisfaction of the villagers and consequently principal secretary (Mr. Ajit Singh, IAS) of Rajasthan government wrote a letter to Director of CSMCRI, Bhavnagar regarding RO Plants installed by CSMCRI ;which were operational at satisfactory level. Hence forth Rajasthan government sanctioned and approved through DST, Rajasthan for installation of 50 RO Plants in various villages. These plants will be managed and operated by village community. Village sarpanch/head will provide space for plant, power supply and feed water source in close coordination and help with local state administration (Logistic support).

CSMCRI will closely monitor the plants for one or two years and short out the teething problem if any at initial stage. Village community will thereafter manage the plant operations. DST, Rajasthan has provided all 50 Nos. of site/locations in different district of Rajasthan. RO Plants installed in the villages of Rajasthan are operational and providing drinking water in the villages. Cost of drinking water [as per world health organisation (WHO) norms] is 3-4 paise/liter. Cost of the plant(1000 LPH capacity) is approx..Rs.16.00 Lakh exclusive of infrastructural facility (which is in the domain of local/state administration). Plants are capable of producing drinking water even with High TDS(More than 15000 ppm) feed water. Approximately 50,000 villagers in the worst affected areas will be benefitted by this project.



# Brackish water RO Plant

Village Community managed 1000 LPH Capacity.

Village: Girdharipura(District: Nagaur, Rajasthan)

Installation Year: 25 Feb 2014

Feed TDS: 11200 ppm, Product TDS: 180 ppm, Product Rate: 1680 LPH



# Brackish Water RO Plant

Village Community managed 1000 LPH Capacity

Village: Kusumdesar(Churu District, Rajasthan)

Installation Year: 10 Oct , 2013

Feed TDS: 3200 PPM, Product TDS: 100 ppm, Product rate: 2500 LPH





# 10 KLPH RO Plant Central University of Punjab, Bhatinda Installation 16 July 2016

Feed: 1570 ppm, Product: 227 ppm, P rate: 14640 LPH





# RO Process based Water Desalination and Purification

## Village Community Level (600-1000 LPH)

### Utilizing Renewable Energy Sources



Village: Jhaag; Feed TDS = 2500 ppm; Product water TDS = 300 ppm



# Animal Powered RO device for Brackish water Desalination

Capacity: 400- 600 LPH

Feed TDS: 5000 ppm(maximum), Product TDS: 250 ppm



US Patent No. 7,387,728



## ऊंट पानी में घोलेगा मिठास

जैसलमेर

एक घंटे में 600 से 700 लीटर खारे पानी को शुद्ध पानी में बदलने का एक अनूठा संयंत्र अब बिजली की अपेक्षा ऊंट की मदद से चलाया जा सकेगा। यह संयंत्र केंद्रीय नमक एवं समुद्री रसायन अनुसंधान केंद्र भावनगर में राजस्थान स्टेट माइंस एंड मिनरल्स लि. के सहयोग से बनाया है। परीक्षण के तौर पर इस संयंत्र को जैसलमेर जिले में सोनू माइंस में स्थापित किया गया है। इससे कर्मचारियों को मीठा पानी सुलभ होने लगा है। आरएसएमएम के प्रबंध निदेशक रजत मिश्र ने बताया कि इस संयंत्र में खारे पानी को शुद्ध करने की प्रक्रिया 'ओसमोसिस प्रोसेस' विधि से की जाती है। इससे फ्लोराइड आर्सेनिक नाइट्रेट बैक्टीरिया एवं वाइरस को हटाया जाता है। इस संयंत्र में 3000 टीडीएस मात्रा वाले खारे पानी को 100 टीडीएस की मात्रा तक शुद्ध किया जा सकता है। जिससे पानी पीने योग्य हो जाता है। परीक्षण के तौर पर बनाए गए इस संयंत्र की लागत करीब ढाई लाख रुपए है।

Gujarat Vaibhav, July 19, 2004

# Pioneering Project on RO Desalination in Afghanistan

25 Nos. of Brackish water RO Plants of 1000 LPH capacity

Design, developed, fabricated and installed by CSMCRI, Bhavnagar during Year 2007-11 in villages of Afghanistan





## **PI Capability and experience:**

**More than 12 years of working experience in field of RO membrane based water desalination and purifications related Project formulation, Execution and implementation. Various Projects worth More than Rs.15.00 crores were formulated, implemented and executed during year 2009-14. Design, development, fabrication, installation and monitoring of RO Plants.RO TFC, UF and NF spiral membrane configurations for industrial application. Water softening for industrial use using membrane technology. Membrane based ultrapure water generation technology. Renewable energy driven processes such as Animal and solar-PV Powered brackish/sea water desalination, solar thermal pump and solar pond.**

**Papers: 10 Nos.**

THANK YOU