

# Groundwater Recharge, Reduction in Soil Salinity- solutions and way forward for Indian Sunderbans

## Report of Workshop

August 07, 2019



INDIA-UK  
Water Centre  
भारत-यूके  
जल केन्द्र



## Groundwater Recharge, Reduction in Soil Salinity- solutions and way forward for Indian Sunderbans

Report of Workshop 07-08-2019

Published August 2019

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www.iukwc.org

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### CITATION

*National Institute of Hydrology, Roorkee (2019). Groundwater Recharge, Reduction in Soil Salinity- solutions and way forward for Indian Sunderbans: Report of Workshop August 2019. The India-UK Water Centre; Centre for Ecology & Hydrology, Wallingford and Indian Institute of Tropical Meteorology, Pune.*

Version **GWHD/NIH/IUKWC/03**



The India-UK Water Centre promotes cooperation and collaboration between the complementary priorities of NERC-MoES water security research.

भारत-यूके जल केंद्र, एनईआरसी-एमओईएस जल सुरक्षा अनुसंधान की मानार्थ प्राथमिकताओं के बीच सहयोग और सहकार्यता को प्रोत्साहित करता है।

Front cover image: River Ganga

# Contents

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<b>Executive Summary</b>	<b>4</b>
<b>1. Workshop Conveners (Or Activity Leads)</b>	<b>5</b>
<b>2. Workshop (or Activity) Aims</b>	<b>6</b>
<b>3. Workshop Participants (or Activity participants if appropriate)</b>	<b>6</b>
<b>4. Activity Structure</b>	<b>9</b>
<b>5. Activity Conclusions and Outputs</b>	<b>10</b>
5.1. Key themes/Points/outcomes arising	10
5.2. Conclusions from the workshop	10
5.3. Participant feedback ( where applicable)	10
<b>6. Annexes</b>	<b>11</b>
ANNEX A: Agenda	11



## Executive Summary

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Groundwater Hydrology Division of National Institute of Hydrology, Roorkee organized a workshop on “Groundwater Recharge, Reduction in Soil Salinity- solutions and way forward for Indian Sunderbans” on August 07, 2019 at ICAR-CSSRI, complex, Canning Town, Kolkata (Fig. 1) under IUKWC pump priming project in association with R. Prasari and BGS, UK. The livelihoods of the rural population of the Sunderbans are precarious, freshwater aquifers are deep, expensive to exploit and suffering over-exploitation. Farmers use ponds, filled during the monsoon for dry season irrigation, but these have limited capacity. An Aquifer Storage Recovery (ASR) approach that utilises saline aquifers adds resilience to the water supply system, without the challenges inherent in the management of the freshwater aquifers. The approach may be applicable beyond the deltaic systems studied, for instance in areas of irrigation induced salinity or geogenically contaminated aquifers.

Focused Group Discussion are required to get water level and quality parameters in the saline and fresh water aquifers and further the information will also be gathered from Rapid Rural Survey and field experiments conducted with barefoot-hydrogeologists in two blocks; Gosaba and Sandeshkhali II of Sunderbans West Bengal, India. The data on the saline aquifers will be integrated with available data for the deeper fresh water aquifers; data that has demonstrated deterioration in both yield and water quality as a result of over abstraction. The focused group discussions will highlight the principal water resource challenges facing farmers. The stakeholders and scientists working in the targeted areas will be brought in on platform by organizing a workshop.

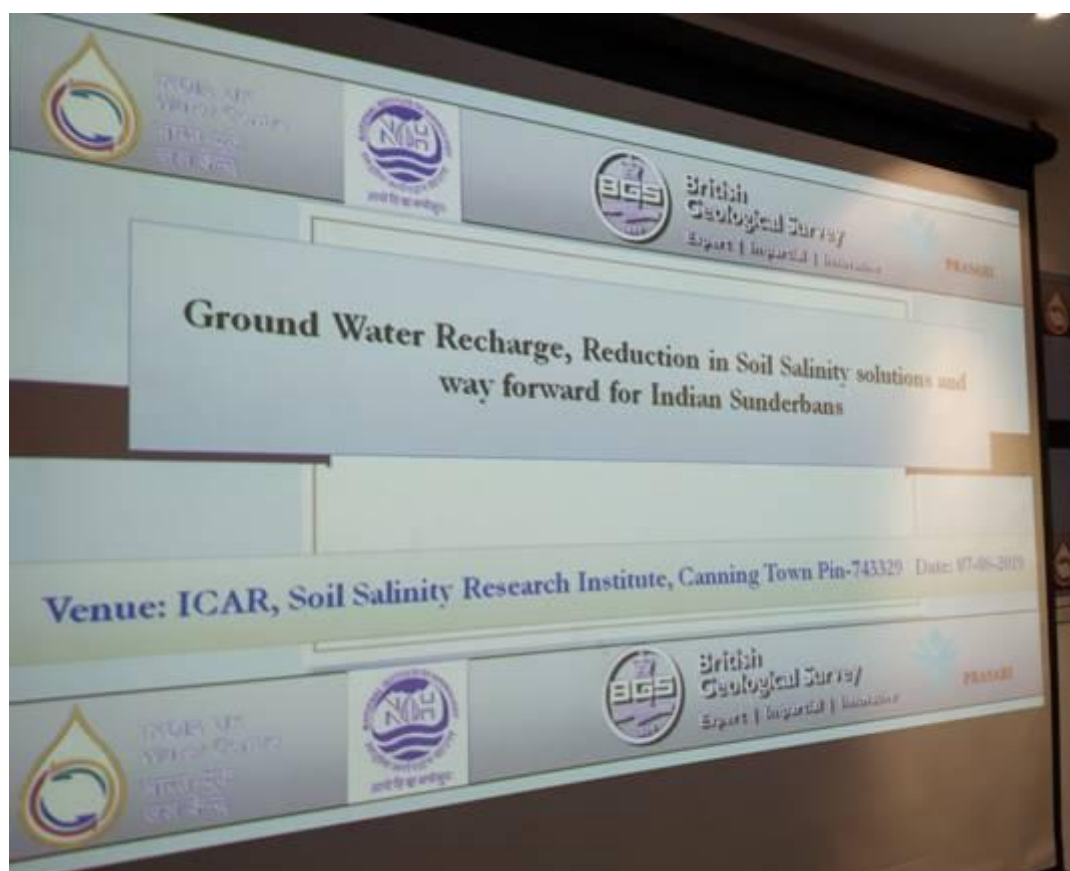


Figure 1: Workshop banner



# 1. Workshop Conveners

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The workshop was convened by NIH, Roorkee jointly with Prasari and BGS, UK under India-UK Water Centre (IUKWC) and led by the co-coordinators/Activity Leads:

NAME: Dr. Gopal Krishan  
ROLE: Convenor  
Organisation: National Institute of Hydrology,  
Roorkee  
Address: NIH Roorkee-247667, Uttarakhand,  
India  
Email: [drgopal.krishan@gmail.com](mailto:drgopal.krishan@gmail.com)

NAME: Dr. Purnaba Dasgupta  
ROLE: Co-Coordinator  
Organisation: Raharhat PRASARI  
Address: Jadhavpur, Kolkata, India  
Email: [Purnaba.irdm@gmail.com](mailto:Purnaba.irdm@gmail.com)

NAME: Mr. Andrew Mackenzie  
ROLE: Co-Coordinator  
Organisation: BGS, UK  
Address: Wallingford, UK  
Email: [aam@bgs.ac.uk](mailto:aam@bgs.ac.uk)

The workshop was held at the ICAR-CSSRI, Canning Town on 07-08-2019.

## 2. Workshop (or Activity) Aims

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The India-UK Water Centre is based around five key cross-sectoral themes and aims to deliver a portfolio of activities across these themes. This activity focused on the theme: Using new scientific knowledge to help stakeholders set objectives for freshwater management; Improving freshwater monitoring frameworks and data for research and management;

The main objectives of the workshop were –

- To get the baseline information
- Data dissemination for developing a conceptual model of the island aquifer systems and collate available evidence on aquifer extent
- Methodology to collate aquifer property data on the aquifer systems, including data on the shallow saline aquifers.

## 3. Workshop Participants

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{Participants details):

Workshop was attended by participants from CGWB, ICAR-CSSRI, Stakeholders, NIH-Roorkee, BGS, UK and Prasari.

- Participants were Government officials;
- Women leaders of the SHGs, GP members and others associated ground water of the area were invited by the field facilitator appointed for this project

Total 23 participants participated in the workshop.



Figure 2: Participants of workshop



Table 1. List of Delegates

One Day Workshop on Groundwater Recharge, Reduction in Soil Salinity Solutions and Way forward for Indian Sundarbans on 7<sup>th</sup> August 2019 at ICAR-Central Soil Salinity Research Institute, Regional Research Station, Canning Town

**Registration Form**

Sr. No.	Name, Designation, address	Mobile/e-mail	Signature
1	Rommel Das, VI+PO Gatabom P.S. Sundeshkhari (N.S.P.)	6297067158	Rommel Das
2	Kalpana Howry VII+PO Sandeshkhali (N.S.P.)	6295259763	Kalpana Howry
3	Sovanika Gayen, VII+PO - D/ Kozakati, P.S. Sandeshkhari (N.S.P.)	8537978017	Sovanika Gayen
4	Biswanath Patra, G.P.R.D VIII+PO P.S. Sandeshkhali	9064724457 biswanathpatra544@gmail.com	Biswanath Patra
5	Dr. P. Prasad, Project Executive, PRASARI, SDM-II	8622075781 p.prasad@prasaari.com	P. Prasad
6	Dr. Anjan Prasad, Project Supervisor, Prasaari, SDM-II	9732511156	Anjan Prasad
7	Maharani Geharui Sandha Khali, Staff	8583068976	Maharani Geharui
8	Dr. Purnaleha Dasgupta Research Integrator, PRASARI	8777834291	Purnaleha Dasgupta
9	Dr. K. K. Mahanta, Sr. Sc. CSSRI, RRS, Canning Town	9569224120 mahantakk@rediffmail.com	K. K. Mahanta
10	Andrew McKenzie, British Geological Survey, Wallingford, UK.	+44 7583785183 aam@bgs.ac.uk	Andrew McKenzie
11	Dr. Gopal Krishna Saha Nating Pali, IIT Guwahati, Assam, India	9634254939 gopal.krishna@iitg.ac.in	Gopal Krishna Saha
12	Amlanjyoti Kar, Sr. Scientist, Hydrogeology CWB, E. Region, Kolkata	9540606777 karamlanjyoti@gmail.com	Amlanjyoti Kar
13	Utkam Kumar Mandal CSSRI, RRS, Canning	8697311020 uukam@icar.gov.in	Utkam Kumar Mandal
14	Dr. Sukanta Kr. Sarangi Principal Scientist, ICAR-CSSRI, RRS, Canning Town	9123607762 skumar@icar.gov.in	Sukanta Kr. Sarangi

15	Dr. Subhasis Mondal Principal Scientist, ICAR-CSSRI, RRS, Coming Town	905889673	Subhasis Mondal
16	Dr. T. D. Lama Principal Scientist, ICAR-CSSRI, RRS, Coming Town	9007094739 tadidripcy@icar.in	T. D. Lama
17	Gina Naskar, Farmer vill - Jalapara, P.O. Gopalnata P.S. - <del>South 24 Parganas</del> Alpaha Mali Farming	9564529616	Gina Naskar
18	vill - Pathankhata P.S. - Paschim Medinipur	767902629	Alpaha Mali
19	Astami Mondal Vill - Pathankhata P.S. - (Gosabals) Farming	7584902903	Astami Mondal
20	Kanena Sarda, <del>Farmer</del> , Vill - Jalapara, P.O. Gopalnata, P.S. - <del>South 24 Parganas</del> Dist - South 24 Parganas.	9732776178	Kanena Sarda
21	<del>Farmer</del> Farmer - <del>South 24 Parganas</del>	8926639692	<del>Farmer</del>
22	<del>Farmer</del> <del>South 24 Parganas</del> (Gosabals)	95645738 < 54	<del>Farmer</del>
23	Sulat Mondal, Field Executive Munshiganj, West Bengal	9768092656	Sulat Mondal

## 4. Activity Structure

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Activity started with welcome address by Dr. Gopal Krishan and he also provided overview of the programme. Four groups were made for focused Group Discussion on getting the information like number of groundwater structures, water level, salinity status, socio-economic conditions, soils, agriculture, crop calendar etc.



Figure 2: Introduction and presentation during workshop



Figure 4 Focused group discussion during workshop



Figure 5 Focused group discussion during workshop

# 5. Activity Conclusions and Outputs

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In addition to focused discussions, presentations were made by Mr. Andrew Mackenzie, BGS, UK on Aquifer storage recovery; Dr. Mondal, ICAR-CSSRI on Soil salinity, Dr. Purnaba, Prasari on Sunderban working experience and Dr. Gopal Krishan on Groundwater salinity and way forward.

## 5.1. Key themes/Points/outcomes arising

Main occupation is agriculture; cropping pattern paddy (Kharif) and vegetables (Rabi) and some issues are:

**Soil salinity:** Entire area is affected by soil salinity and during kharif season salinity is less due to leaching but high in rabi season mainly from January onwards when drying starts and patches of salt deposits can be seen. Ponding of water leads to leaching.

**Acid saline soils:** In some areas acid sulphate and acid saline soils are found. The soils have high acidity with salinity. Acid sulphate soils are found in sub surface layers. These soils are exposed after digging in addition to affecting crops fish growth in ponds is poor with high mortality rates.

**Water availability:** Availability of good quality as well as availability of water for irrigation is a problem due to the depletion in water levels as well as deterioration in quality.

**Climate Change threats:** Rise of extreme events like cyclone; changing rainfall distribution etc.

## 5.2. Conclusions and next steps/recommendations from the activity

On the basis of the soil and water problems faced in the study area, following solutions are suggested:

- Addition of organic matter
- Mulching
- Growing salt tolerant crops
- Liming for acid soils
- Rain water harvesting
- Awareness programmes

It was decided that through participatory groundwater data collection approach, data will be collected on the following aspects -

1. Depth of saline aquifers, and lithological descriptions of the saline intervals
2. Properties of saline and fresh water aquifers
3. Cost of drilling to saline aquifers in the study area

Apart from participatory approach, field measurements will be taken on following -

- Estimates of aquifer properties such as grain size, permeability, water level and yield
- Estimates of the size of existing ponds in 'typical' farms (estimate wet season water availability)
- Salinity of saline aquifers, preferably taking samples of saline water if aquifers are accessible

## 5.3. Participant feedback ( where applicable)

At the conclusion of the Activity participants were asked to provide comment on:

- the Workshop content; **all appreciated**
- the meeting venue and organisation; **Venue was excellent**
- networking opportunities; **it was decided to conven these activities on regular basis**
- provide an overall score out of 10 for the workshop. **10**

## 6. Annexes

### ANNEX A: Agenda

Day 1 – Date

Time	Agenda item					
Date	07-08-2019		Venue	Conference Hall, CSSRI		
Address: Central Soil Salinity Research Institute, Canning- 743329						
Sr no	Topic	Points to be covered	Speaker & Organization	Time	Start time	End Time
1	Overview of the programme		Dr. Gopal Krishan	10mins	11.00am	11.10am
1.1	Overview of Problems	What are the water related issues in Sunderbans?	Small group discussions	20mins	11.10am	11.30am
1.2		Why present ground water scenario is so critical in Sunderbans?				
1.3		Research objectives				
1.4		Research design				
1.5		Role of different stakeholders in the research?				
1.6		Implementation methodology				
1.7		Way forward				
2.1	Summarization of the findings	Summarization by Group A	PRASARI, CGWB, NIH, ICAR-CSSRI	40mins (10 mins for each group)	11.30am	12.10pm
2.2		Summarization by Group B				
2.3		Summarization by Group C				
2.4		Summarization by Group D				
2.5		Summarization by Group D				
3.1	Sharing of field data collection from different sources	Data collection process	PRASARI, CGWB & ICAR-CSSRI	15mins.	12.10pm	12.25pm
3.2		Field data sharing by didis				
3.3		Soil layers				
3.4		Future target data collection				
3.5		Collaboration plan with other research agencies to receive existing data				
4.1	Region Specific solutions for the region	Concept of ASR	Dr. McKenzie, BGS	10mins	12.25pm	12.35pm
4.2		Sharing of past experiences on Artificial Recharge	Dr. Gopal Krishan, NIH	10mins.	12.35pm	12.45pm

4.3		Soil salinity reduction methods developed by CSSRI	Soil Salinity Research Inst.	10mins.	12.45pm	12.55pm
4.4		Process followed to include community in this research	Dr. Purnabha Dasgupta, PRASARI	10mins.	12.55pm	1.05pm
4.5		Experiences of CGWB	Dr. A.J. Kar	10mins.	1.05 pm	1.15 pm
<b>Lunch Break for 35mins</b>						
5.1	<b>Way forward</b>	Consolidation of the Primary ideas	Dr.McKenzie, BGS Dr. Gopal Krishan, NIH	10mins.	2.15pm	2.25pm
5.2		Date for next meeting on data review		10mins.	2.25pm	2.35pm
5.3		Initiation of research consortium		10mins.	2.35pm	2.40pm
5.4		Date of next meeting of this research Consortium		30mins.	2.40pm	3.10pm
Vote of thanks by Dr. Gopal Krishan, NIH						



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