



**SEHGAL**  
FOUNDATION

TOGETHER  
WE EMPOWER  
RURAL INDIA

**INNOVATION  
FOR  
CREATING POTABLE WATER SOURCE  
IN  
SALINE GROUNDWATER AREAS**

Lalit Mohan Sharma



S M Sehgal Foundation (Sehgal Foundation) is a public, charitable trust registered in India in 1999.

### MISSION

Our mission is to strengthen **community-led** development initiatives to achieve positive **social**, **economic** and **environmental** change across rural India.

### VISION

We envision every person across rural India **empowered** to lead a more **secure and prosperous** life.

To date, we have reached nearly **500,000 people** living in **464 villages** in Haryana, Bihar and Rajasthan.

## WHAT WE DO

- Manage **water** resources
- Increase **agricultural** productivity
- Empower village-level **institutions**
- Facilitate **citizen participation**
- Monitor, learn through research



## **In 2000**

- **1.1 billion people (1 out of every 7 person)** on earth faced water salinity issues
- Groundwater salinity spread: over **24 million sq km** i.e. **16% of earth's land area**<sup>1</sup>

### **Salinity levels and spread continue to increase due to:**

- **Evaporative enrichment: industrial, treatment wastes, irrigation**
- **Anticipated sea level rise and decreased ground water recharge**

## **In 2010**

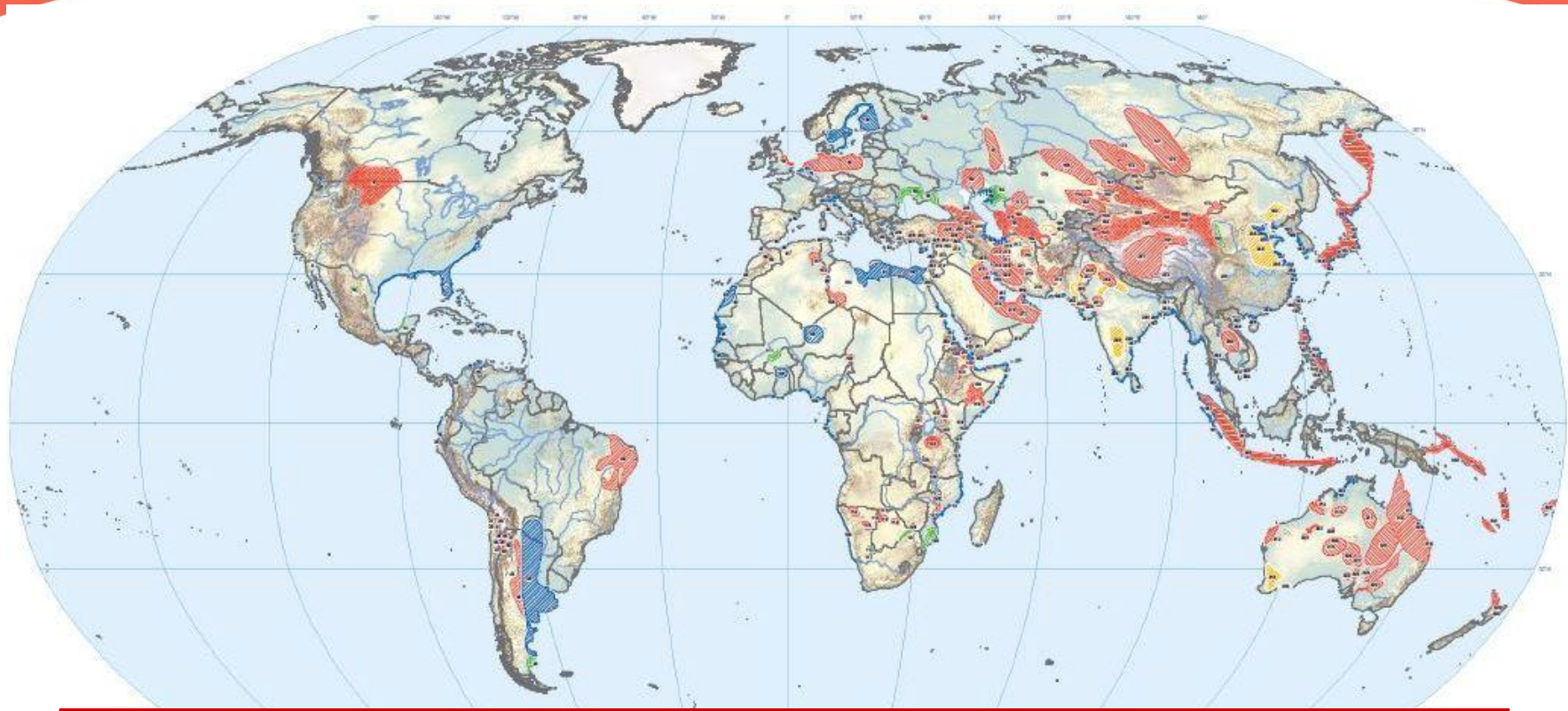
- **44% of world's population** live in Coastal areas<sup>2</sup>: threatened by sea water intrusion

1. Van Weert, Frank, Jac van der Gun, and Josef Reckman. "Global overview of saline groundwater occurrence and genesis." *International Groundwater Resources Assessment Centre* (2009).

2. Accessed from <http://www.oceansatlas.org/servlet/CDSServlet?status=ND0xODc3JjY9ZW4mMzM9KiYzNz1rb3M~> on September 19th, 2015

# Saline Groundwater Occurrence: Global

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**24 million sq. km (16% of the total land area), affecting 1.1 billion people**

**Legend**

**Saline and brackish groundwater by genesis**

Occurrences at shallow and intermediate depths (less than approximately 500 m)

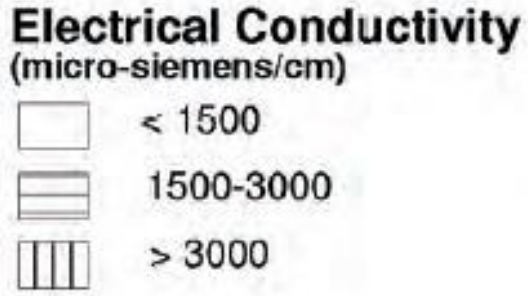
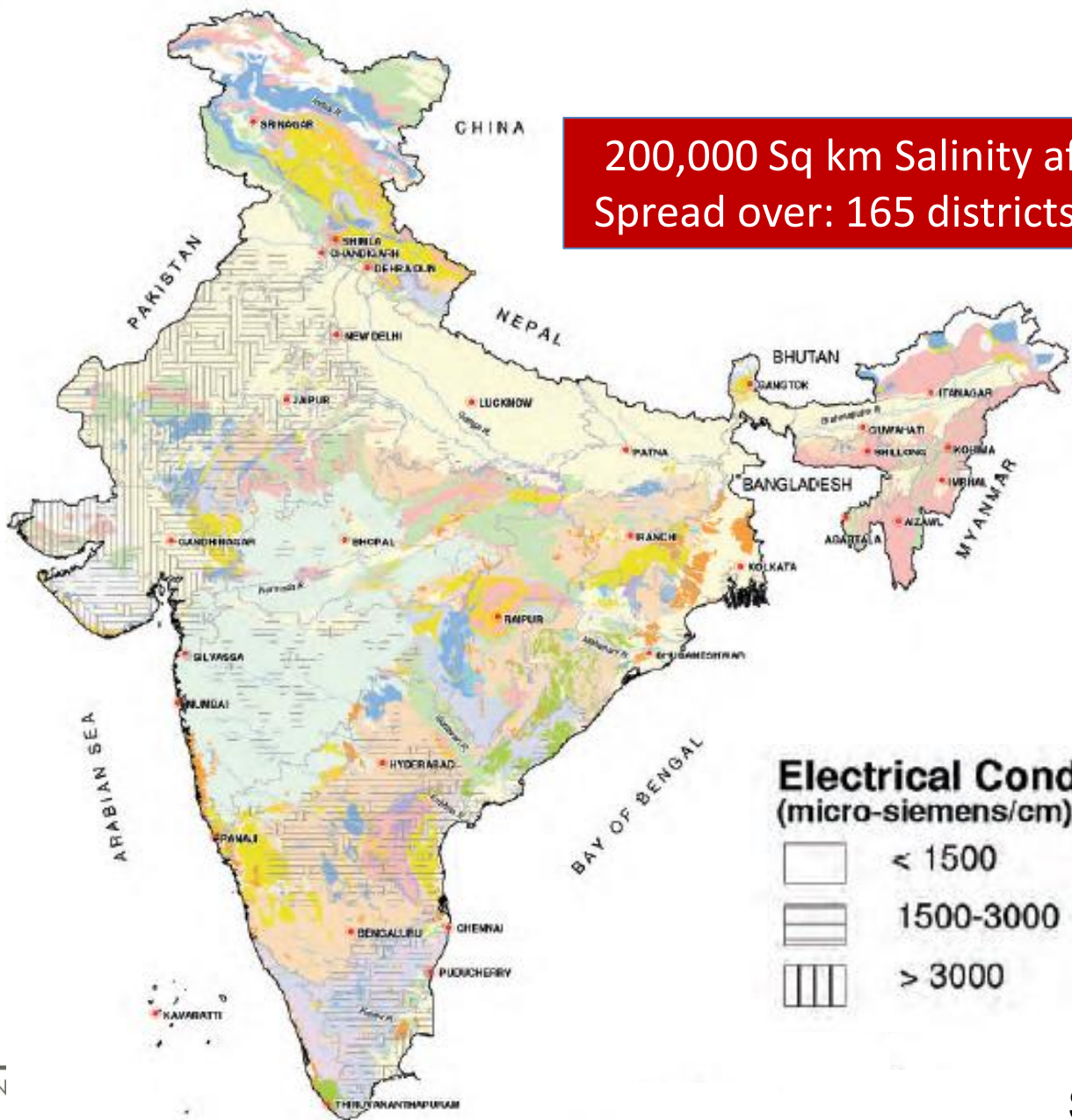
- |                                       |   |   |
|---------------------------------------|---|---|
| Marine origin                         | Marine origin   | Diastolite                                  |
| Transgression                         | Coastal   | Igneous activity hydrothermal mineral water |
| Flooding                              | Marine transgression                                      | Combination of evaporation & diastolite     |
| Lateral seepage intrusion & upwelling | Lateral seepage intrusion & upwelling                     | Irrigation                                  |
| Irrigation                            | Combination of coastal, transgression and recent flooding | Pollution                                   |
|                                       | Natural brackish origin                                   | Unspecified origin                          |
|                                       | Preparation   |   |



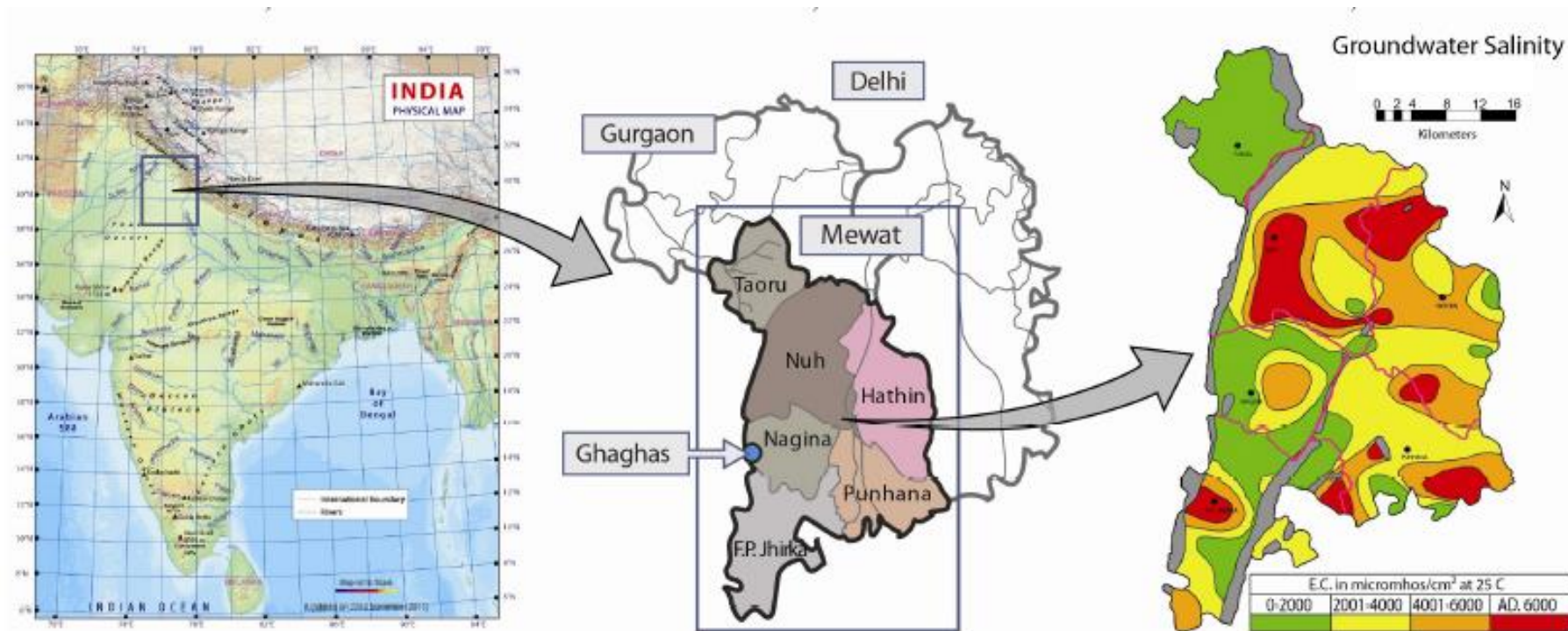
# Saline Groundwater Occurrence: India

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200,000 Sq km Salinity affected area  
Spread over: 165 districts in 15 states



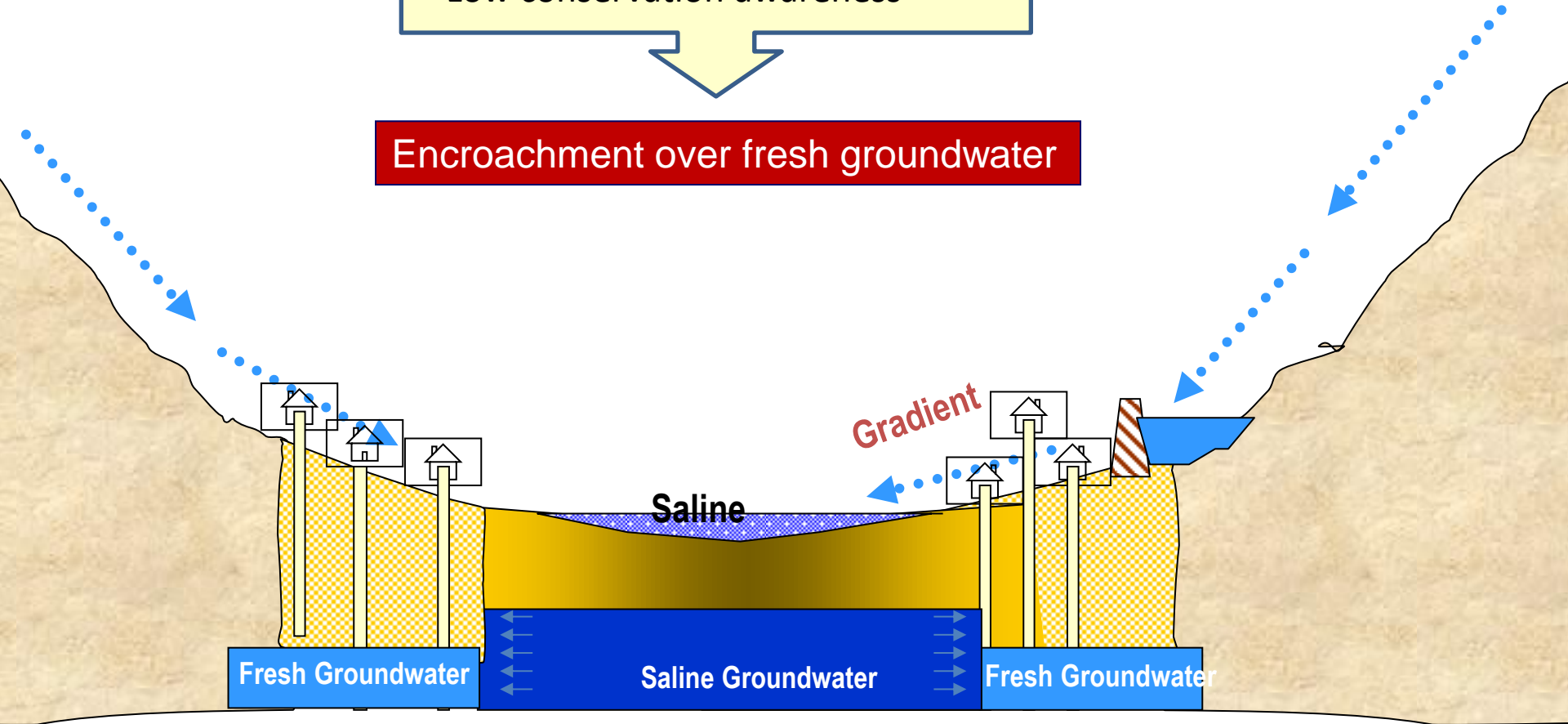
- Saline groundwater in 78% area (TDS over 3500 PPM)
- Affecting over 1.0 Million people



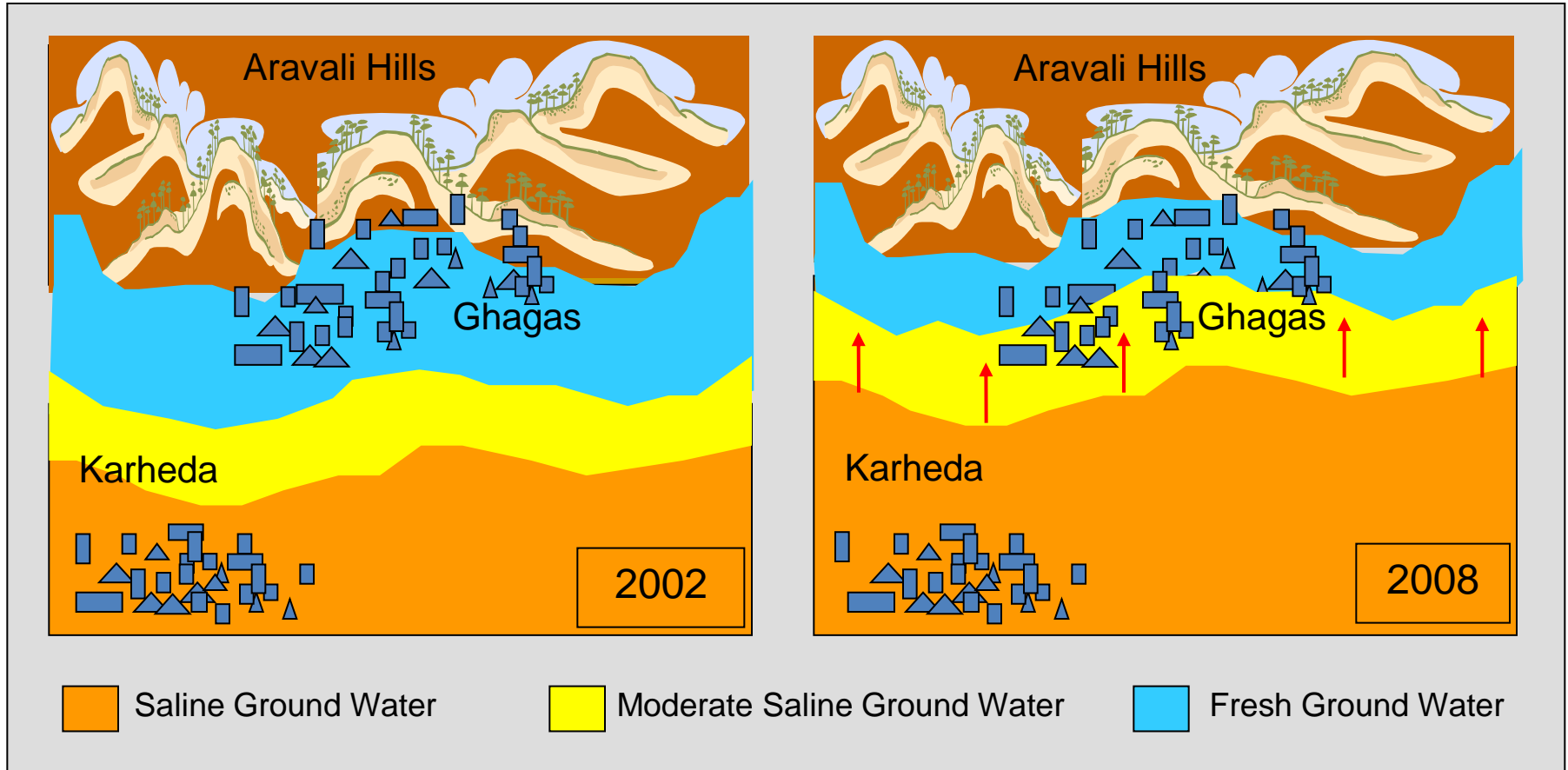
Out of 503 villages only 61 have fresh groundwater

- Poor fresh groundwater recharging
- Higher exploitation
- Low conservation awareness

Encroachment over fresh groundwater



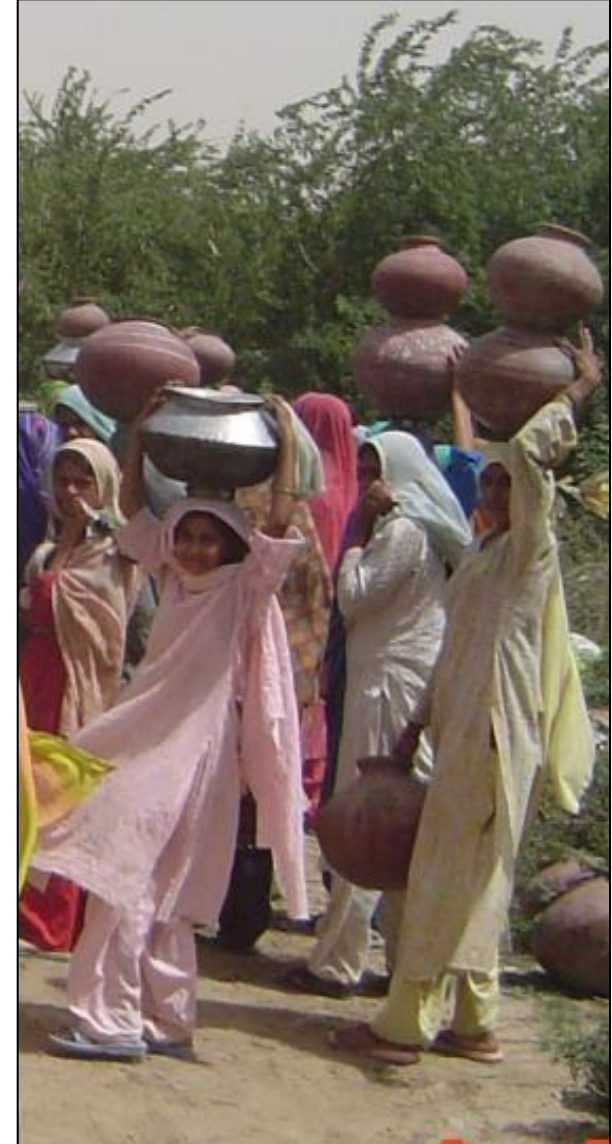




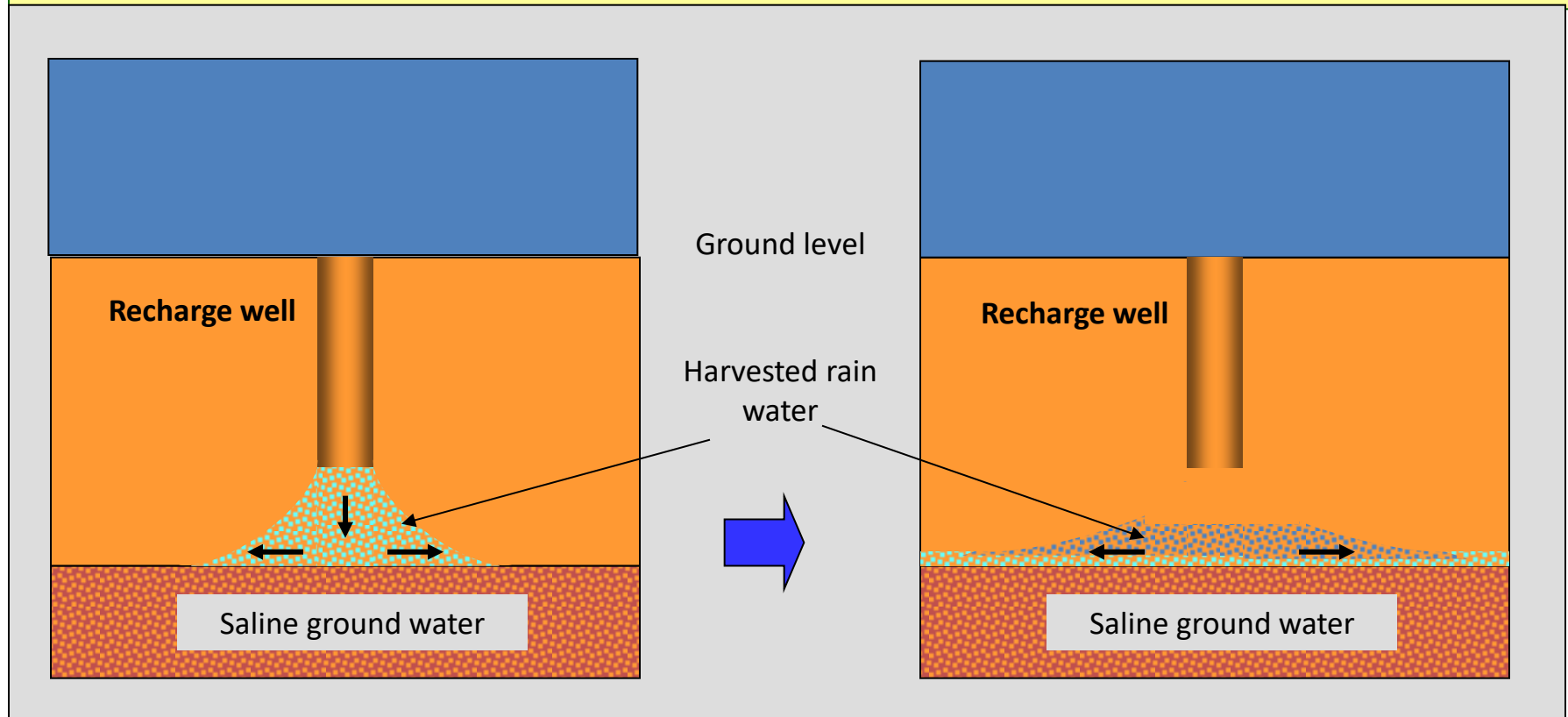
*Ghagas Community restraining to share water with other villages*

- **Social**
  - Fetching water from long distances  
(Loss of productive time, money and health)
  - Poor hygiene
- **Economic**
  - Limited choice of crops
  - Increased agri-input expenditure
    - Low land productivity: more fertilizer use
    - Purchasing water
- **Environmental**
  - Deteriorating soil quality
  - High depletion of fresh groundwater  
(higher dependence on limited fresh water)
  - Salinity encroaching fresh water aquifers

**Need: To create potable water source locally**



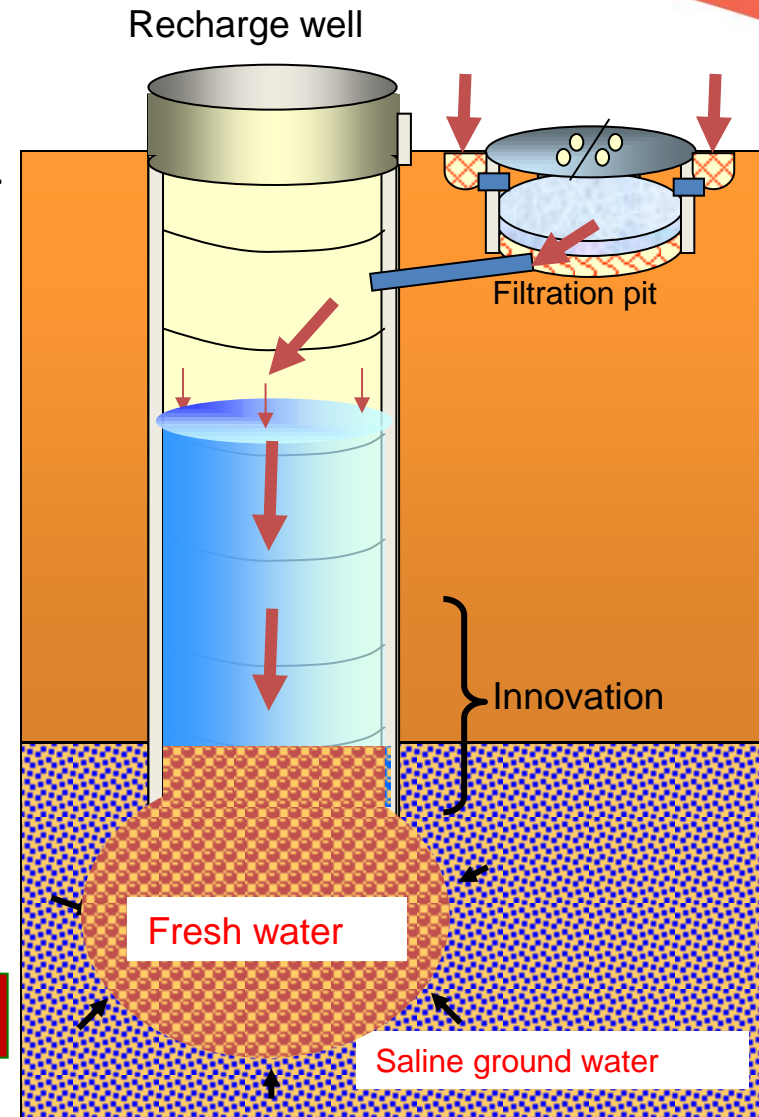
Harvested rain water does not remain consolidated but spreads out

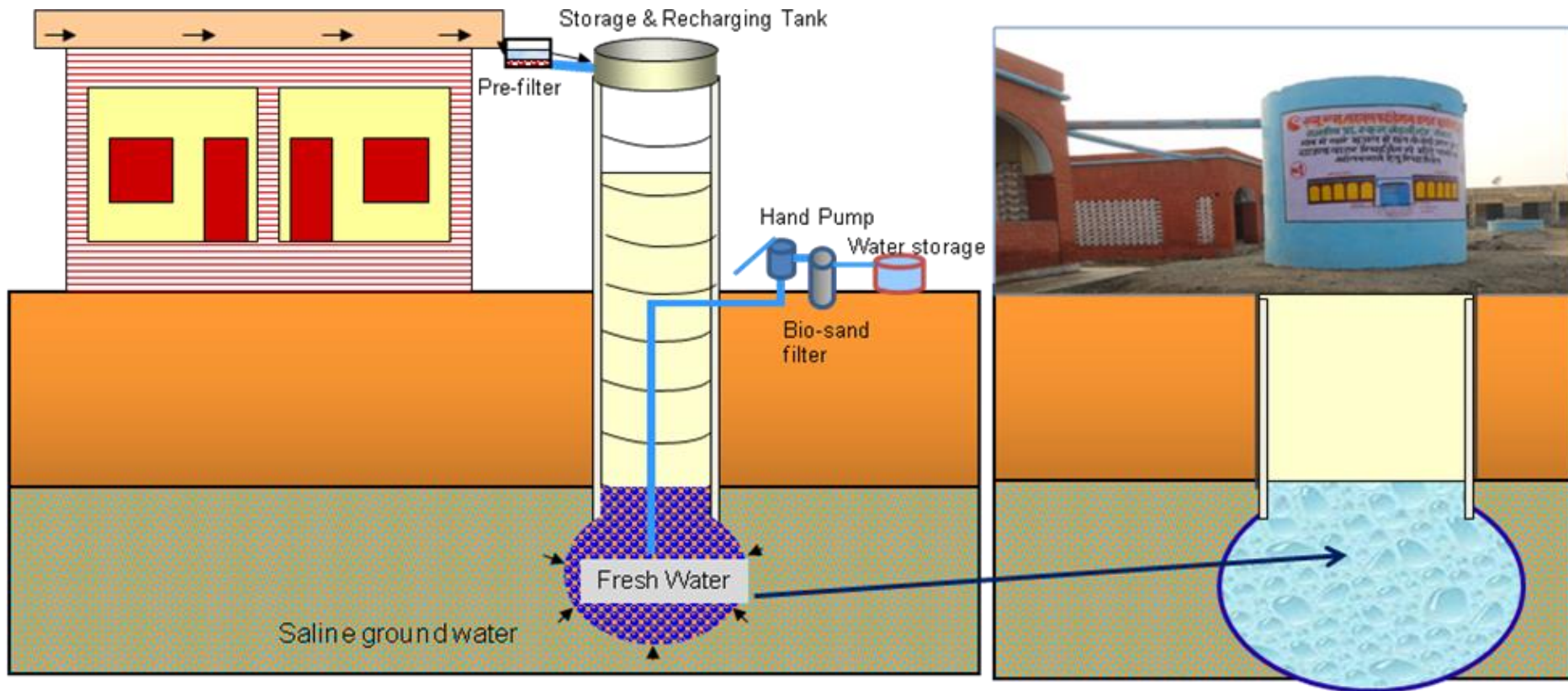


Need: Innovation to create pool in stead of thin spread

- **Overburden pressure** pushes the saline water down
- Flow under the ground through soil voids is a **stream-line flow**
- First rush of water into the void spaces **flushes the voids**
- **Buoyant force** from surrounding saline ground water keeps pocket intact
- **Limited Brownian motion** within tiny void spaces limits further mixing
- Absence of light and air **prevents growth** of pathogens

Still low potential due to very shallow Aquifer





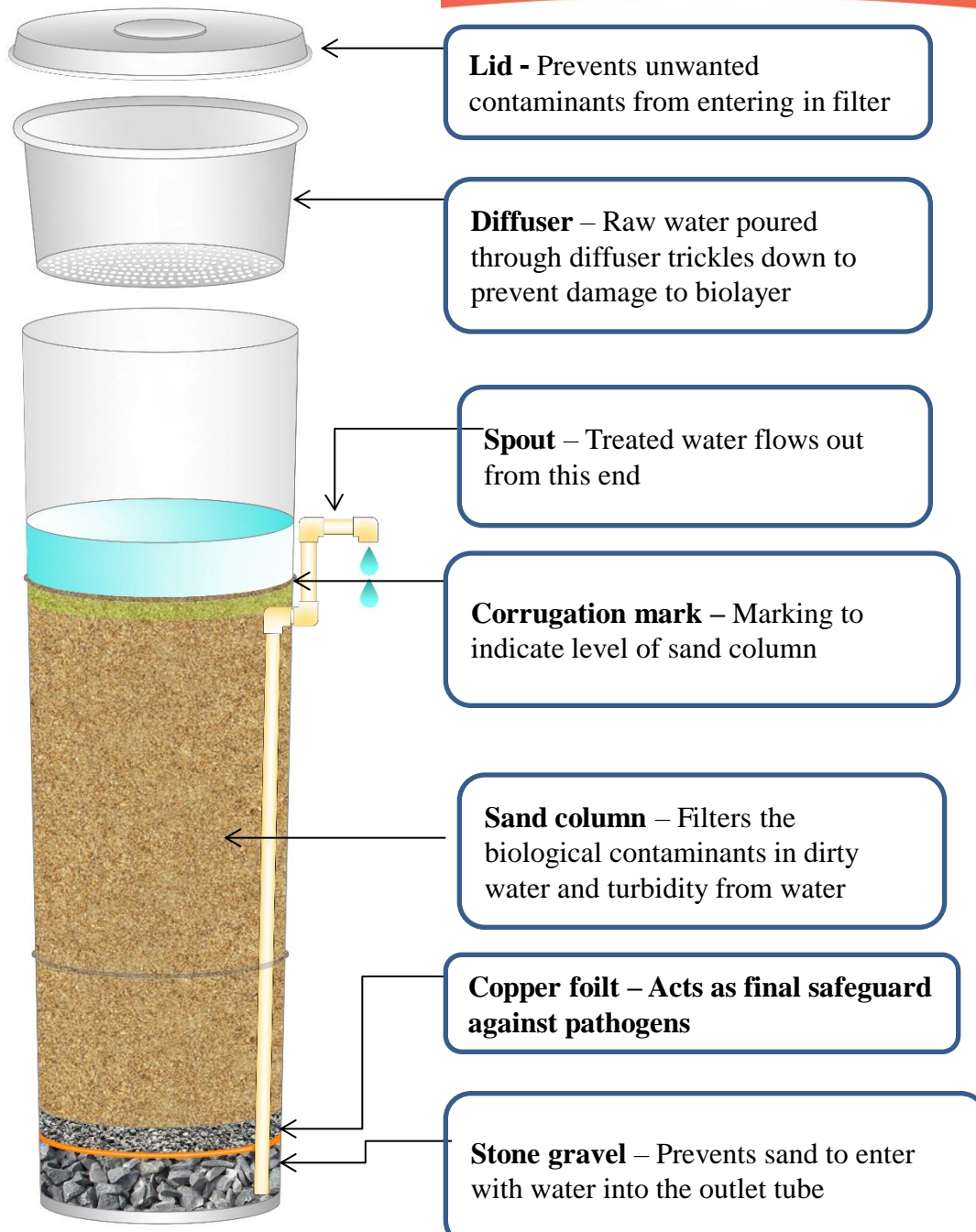
**AND IT WORKED!**

- JalKalp Water Filter is capable of removing
  - Biological impurities like bacteria, protozoa, virus, parasites etc.
  - Turbidity
  - Iron contamination
  - Arsenic (With simple adaptation)
- An easy, inexpensive, sustainable and effective technique to treat water
- No recurring expenses
- Filters up to 0.7 litres in one minute



# JalKalp Water Filter

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**Students: 297**

**Roof area: 638 sq m**

Daily water Demand: 750 liters ([297@2.5](#) ltr/day for drinking, cooking mid-day meal and sanitation)

Avg annual rainfall: 594 mm

Annual water demand: 150,000 liters approx

Annual Harvest potential: 322,126 ltr

**Groundwater salinity: 5980 PPM**

## Salinity of RWH System water

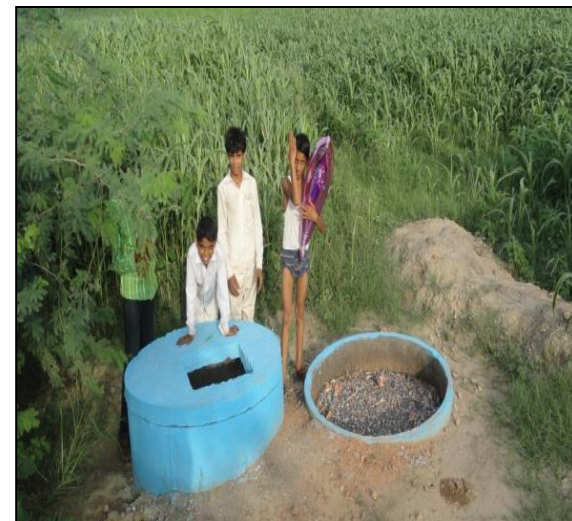
Month	Year 2013					Year 2014					
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
TDS (PPM)	91	92	88	92	95	82	99	96	102	108	98



INSTITUTIONS: 19

HOUSEHOLDS: 18

AGRICULTURE FARMS: 45



# UNIQUE FEATURES

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**Technology** Open source for the cause

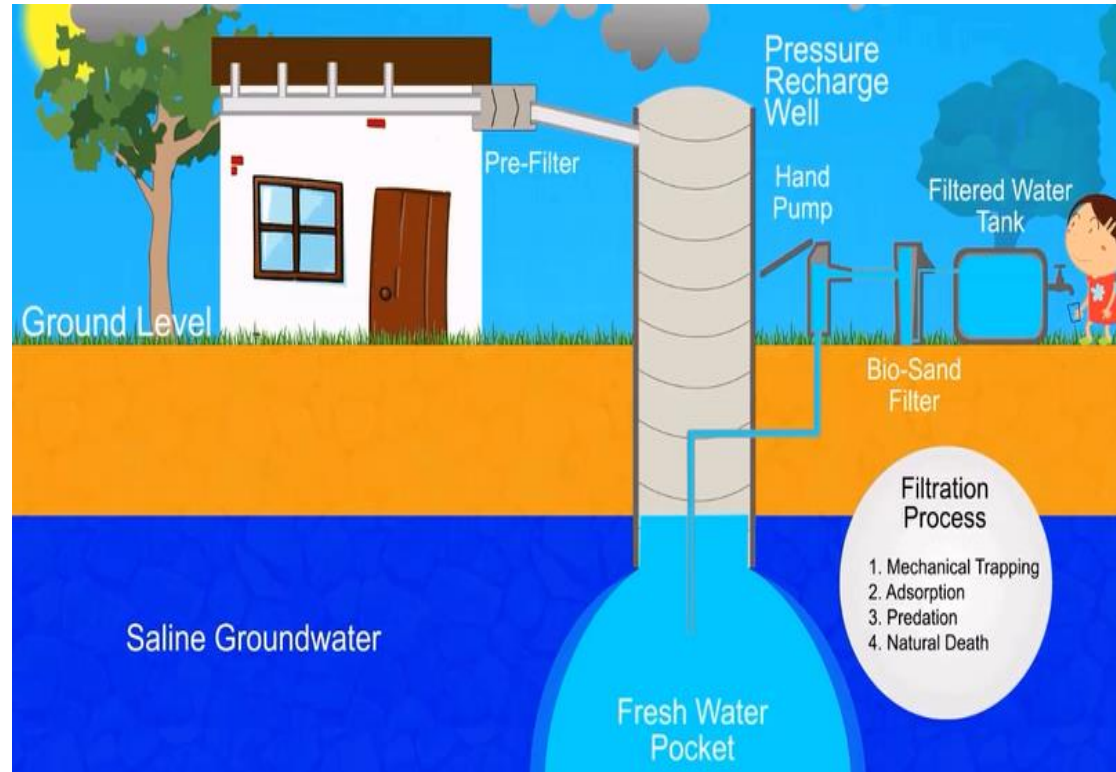
**Cost** Low capital, no recurring costs

**Scalability** Household to community level

**Adaptability** Inland and coastal salinity

**Applicability** Saline groundwater yielding areas

**Expense** Small space on ground



# Thank you!

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