

"Bridging relief work with more long-term assessment and remediation of Tsunami effects on groundwater and water supply in Sri Lanka"

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Objectives

1st phase:

- To support and evaluate the immediate relief efforts aimed at rehabilitating the decentralized water supply from groundwater. The focus will be on the sustainable rehabilitation and use of groundwater wells in affected areas

2nd phase:

- To support the efforts of re-establishing a functioning water supply in the affected areas and to ensure that viable solutions are sought for water supply based on groundwater in the longer term

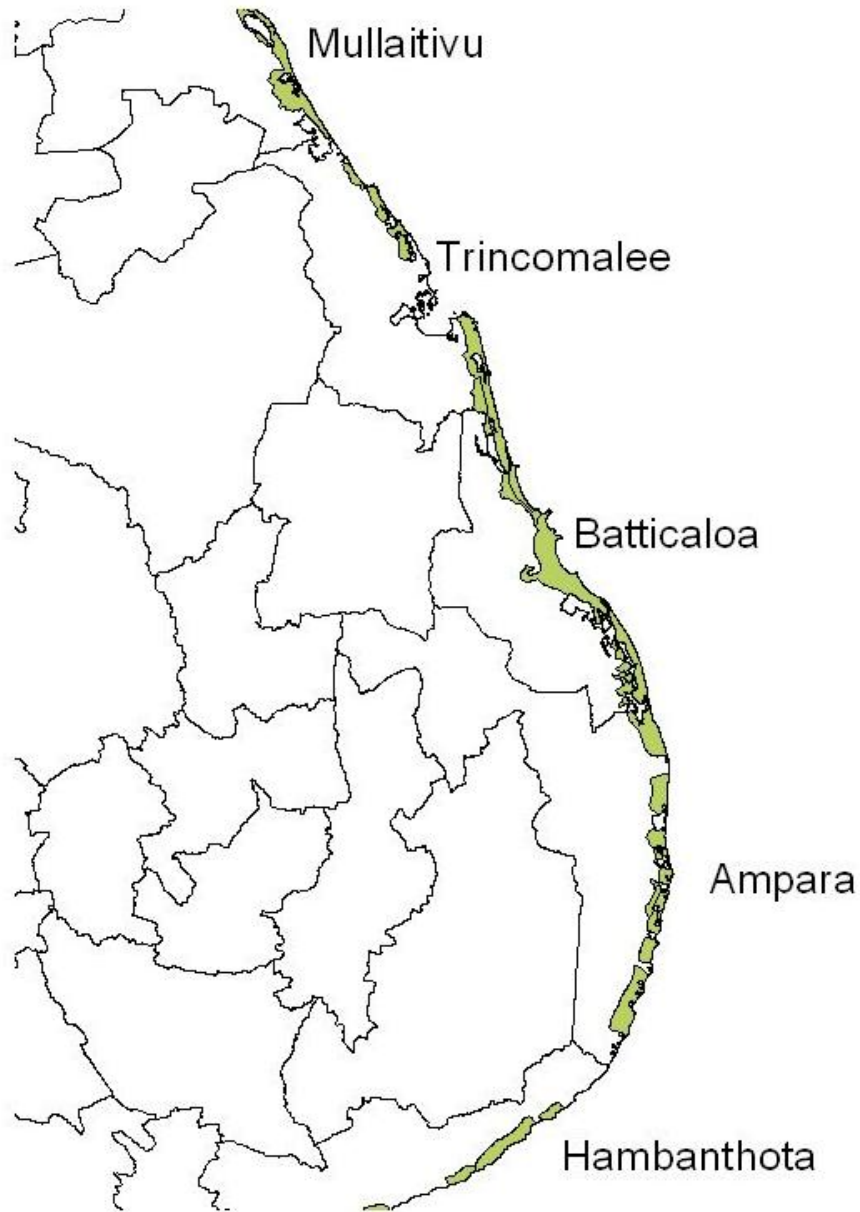
Components

1st phase:

- Dialog with NGOs and other actors on well cleaning and well monitoring
- Producing and disseminating recommendations and guidelines on well cleaning and GW use
- Monitoring GW conditions and water quality

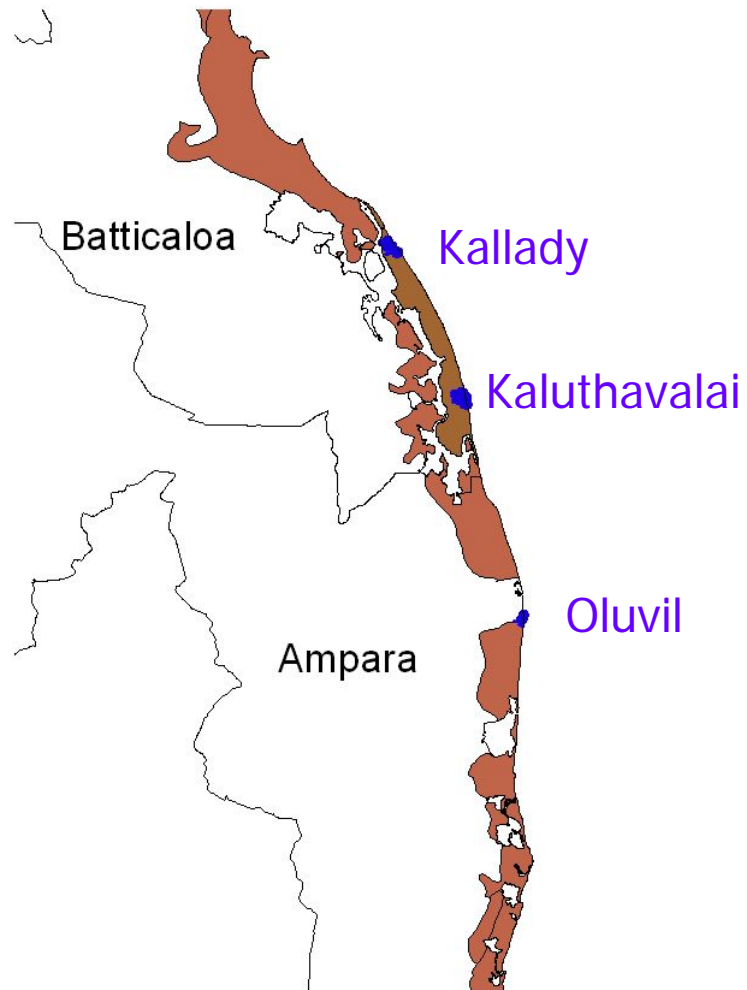
2nd phase:

- Assessment of risk areas and groundwater potential for water supply
- Devise sustainable and adaptable solutions
- Capacity building and awareness raising

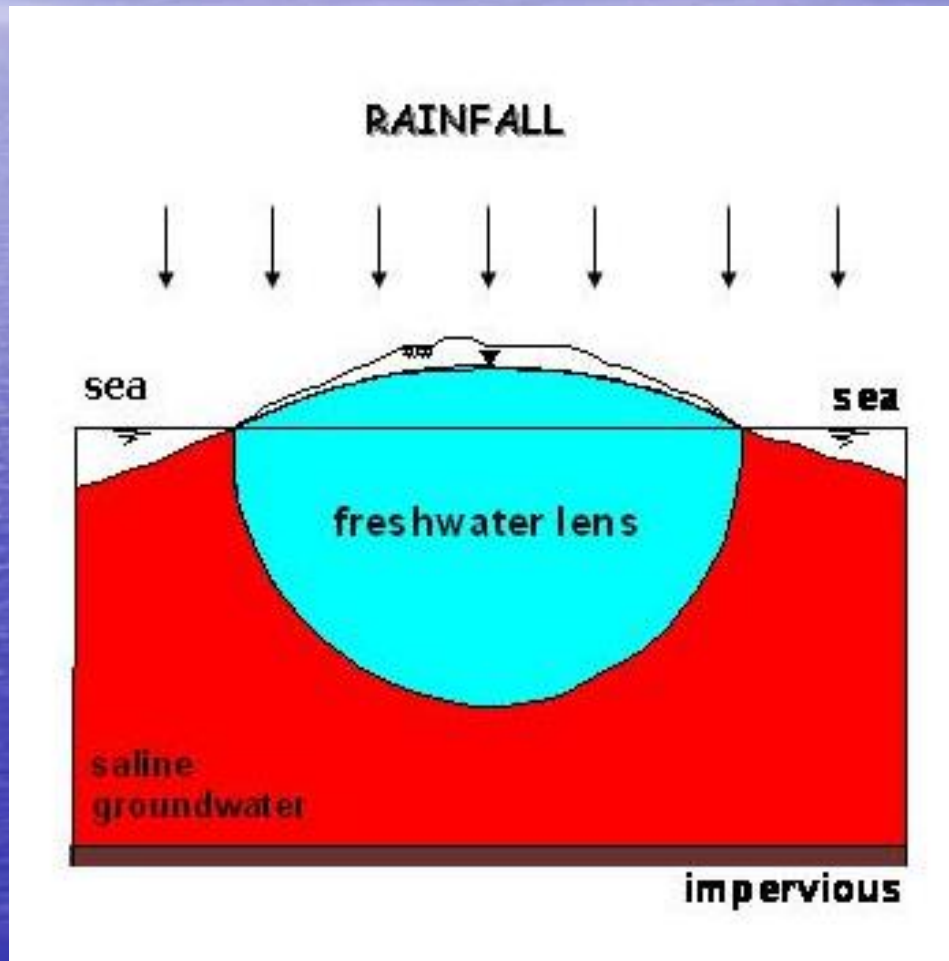


Extent of coastal aquifers on the East coast

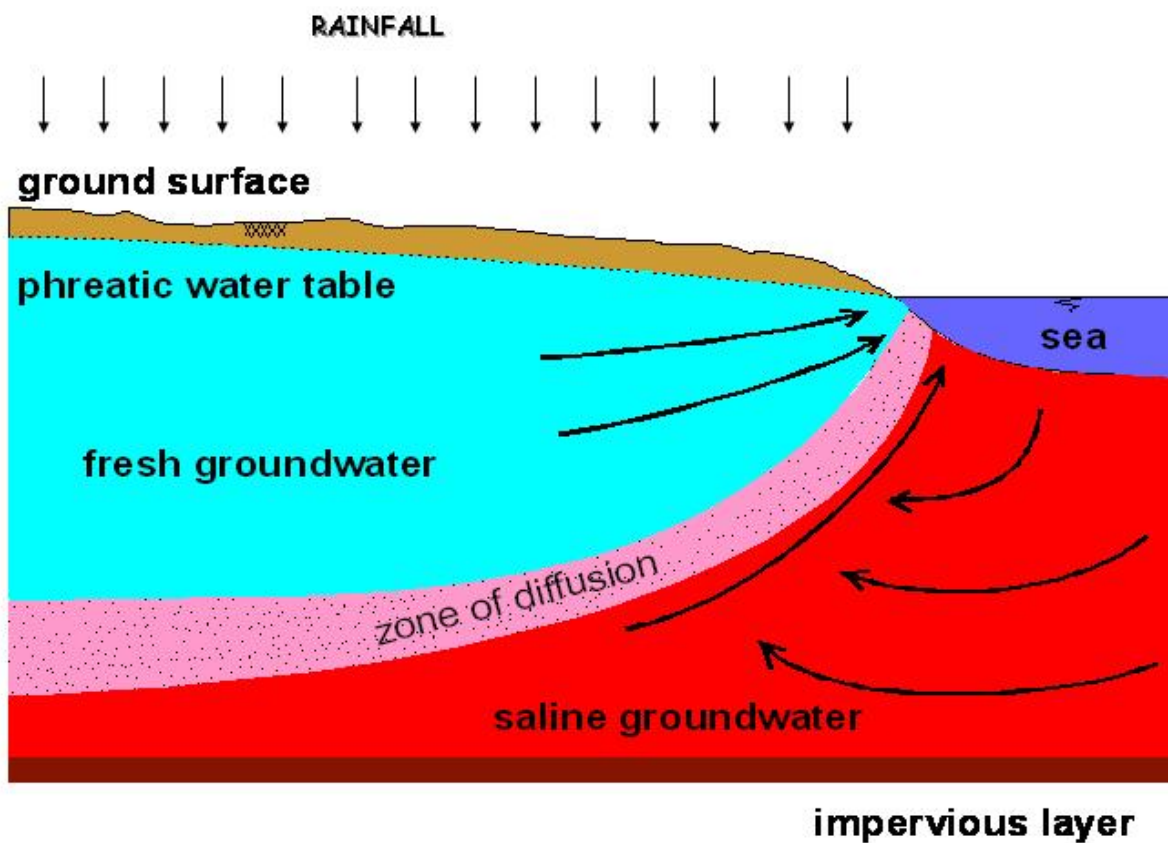
Study areas



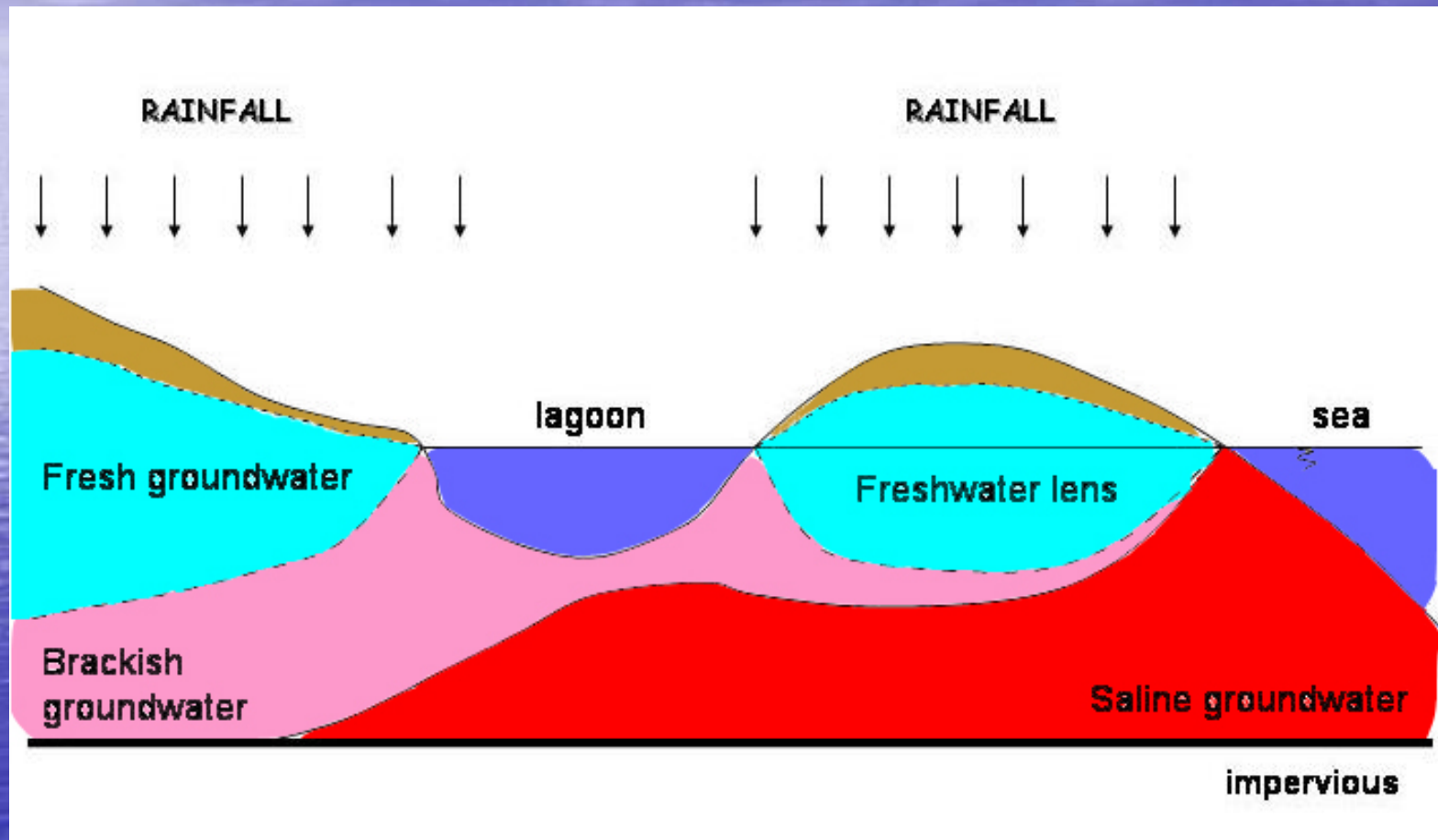
An island is surrounded by salt water



Constant balance between salt and freshwater



A coastal lagoon is an intermediate case



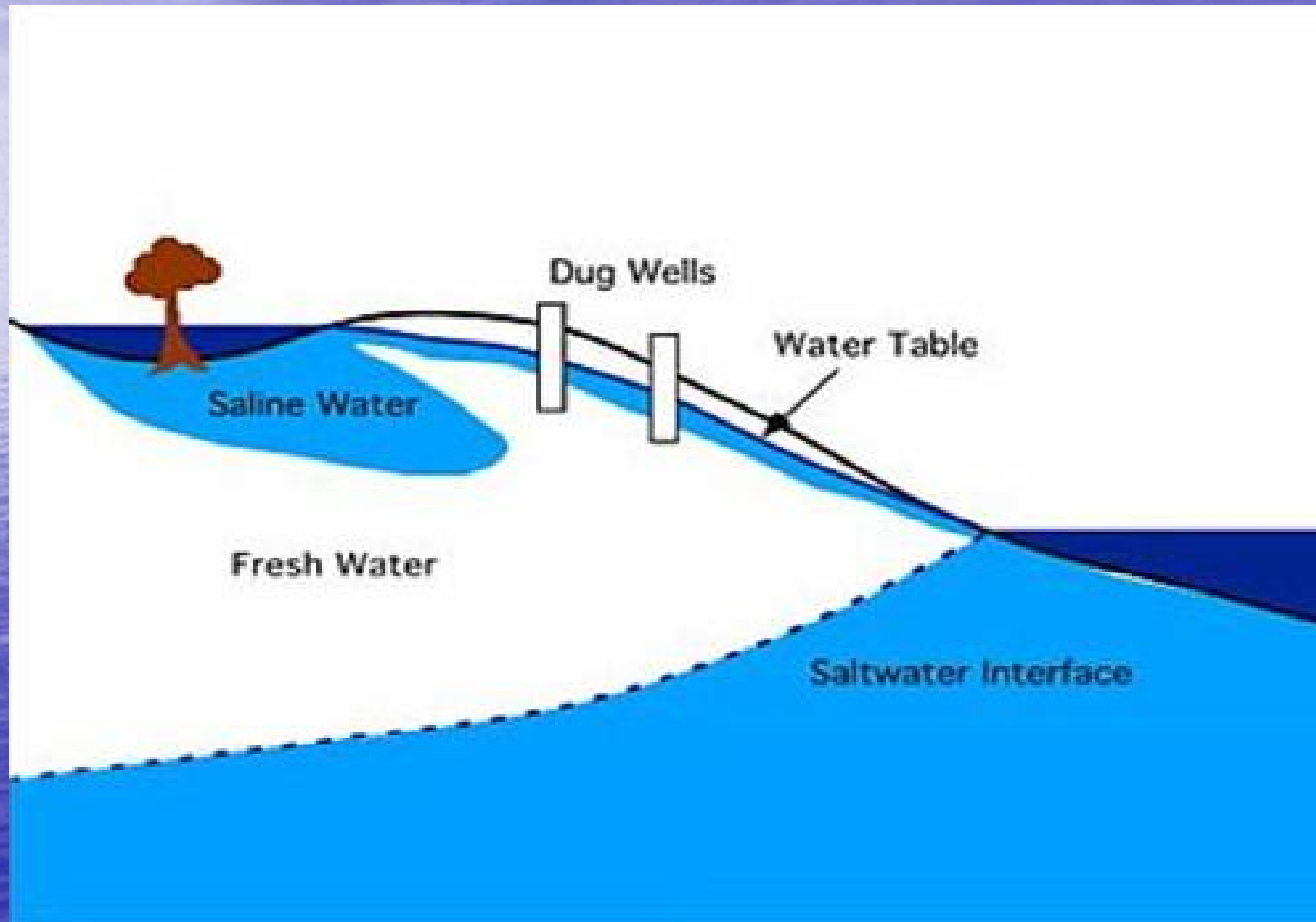
The coastal aquifers are good water sources

- On land strips, groundwater is the only source
- Generally replenished with good and sufficient rainwater
- No natural groundwater contamination, like fluoride or arsenic
- High-yielding, shallow wells

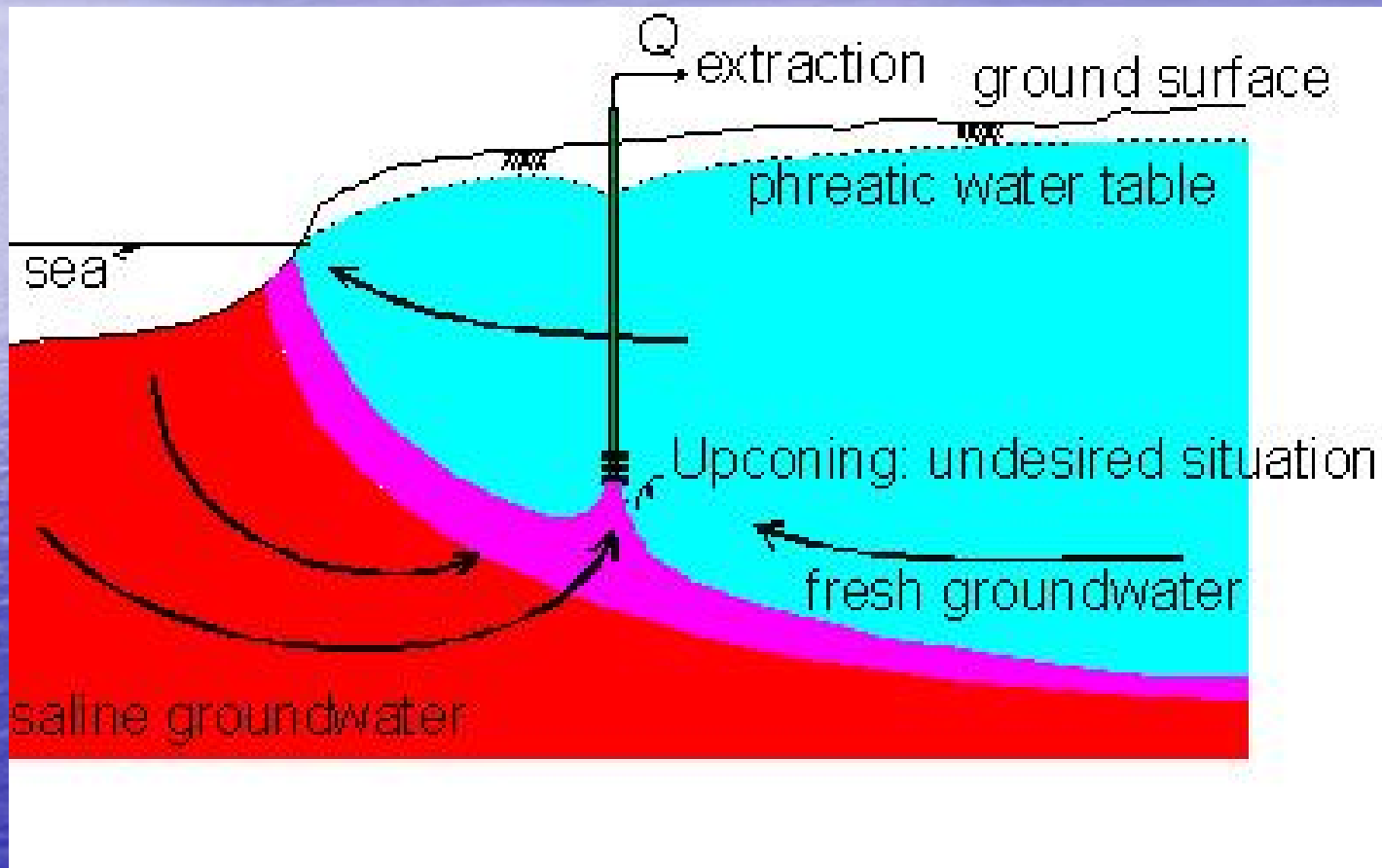
→ Water on-demand, on-the-spot

- However, potential threat from tsunami, saltwater intrusion and other pollution

Saltwater effects of the tsunami

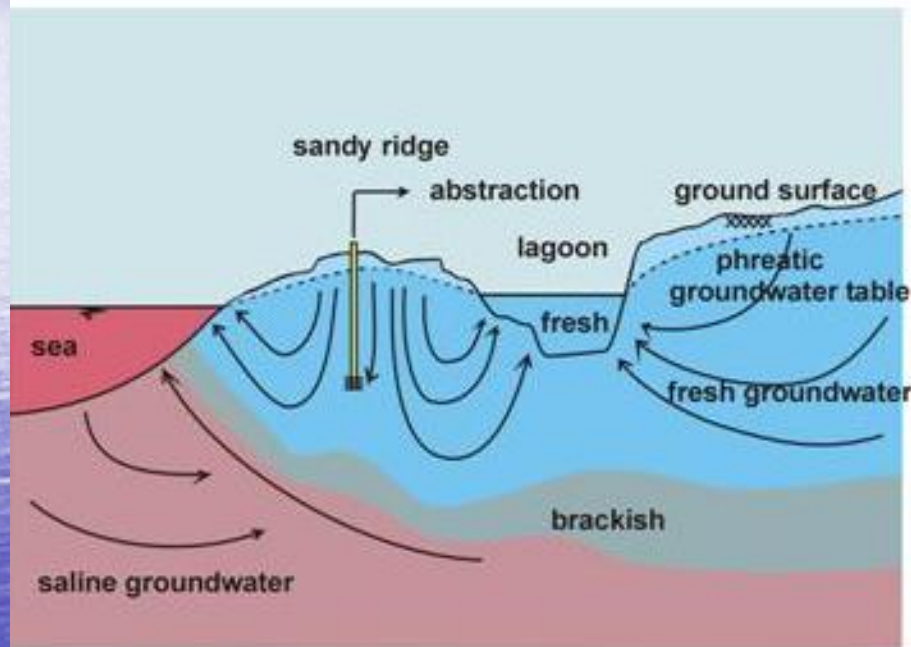


Pumping and cleaning of wells in the coastal aquifers

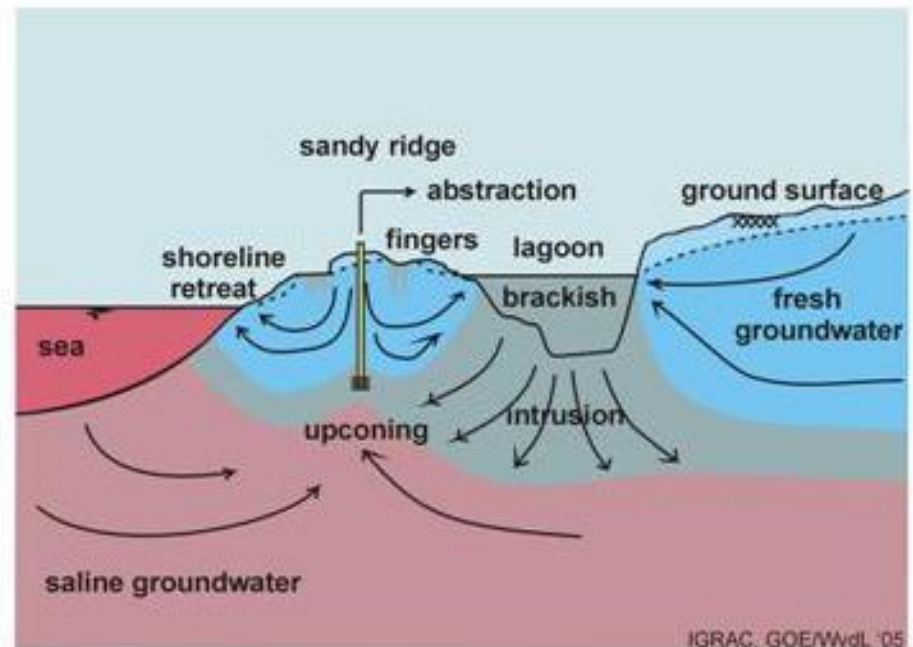


Saltwater effects of the tsunami

Cont.....



Before the Tsunami



After the Tsunami

Monitoring program

- 140 wells monitored, approx. 45 per site
- Each site 1.5 – 2.5 km²
- Distance covered inland: 1.5 km
- Mostly private, domestic, shallow wells
- A few deep tube wells
- 35 % of wells were flooded

Multi-Parameter TROLL 9000

Rugged Design



Smallest Size, Most Features

The TROLL 9000 is the ultimate tool for profiling, surveying and long-term monitoring.

- 45mm (1.75") outer diameter
- Marine-grade (industrial) 316-Stainless Steel design
- Integrated Quick-Connect cable - no need for additional supports
- EVERYTHING NEED IS IN ONE UNIT
 - ⇒ Sensors
 - ⇒ Data Logger
 - ⇒ Clock
 - ⇒ Power



Multi-Parameter TROLL 9000

The Most Sensors

The Most Sensors In a 45mm (1.75") diameter body

- Up to 9 sensors simultaneously!
- Each sensor has been specially designed to provide extra long-life and low-drift.

Dissolved oxygen
(with screw-on membrane cap)

level · pressure · depth · open channel flow

NEW! turbidity

'Optional' anti-fouling wiper

pH · ORP

NEW! nitrate, chloride or ammonium
(not shown)

conductivity · resistivity · TDS · salinity

temperature

internal barometric pressure



Multi-Parameter TROLL 9000

Handhelds

Pocket-Situ software for the COMPAQ IPAQ COLOR Pocket PC!

Powerful instrument controller

- All of the features of Win-Situ
- View data in Graph OR Meter format
- View data real-time!
- Download data, calibrate sensors, setup logging

It's also a fully functional PDA

- Store contacts, make schedules
- Use Pocket Word, Excel, play games, etc.



Pocket-Situ Kit

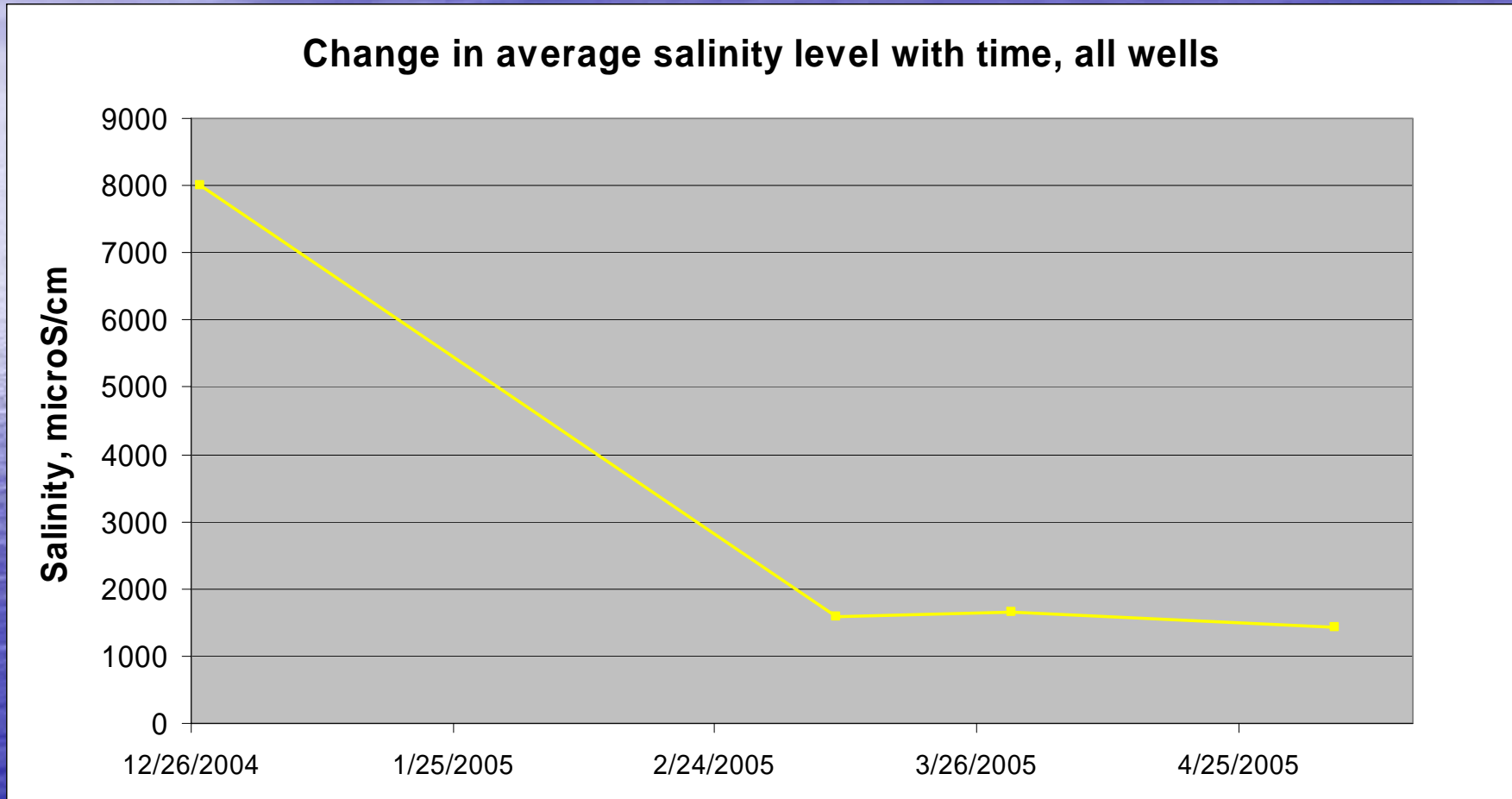


Pocket PC
Docking
Station

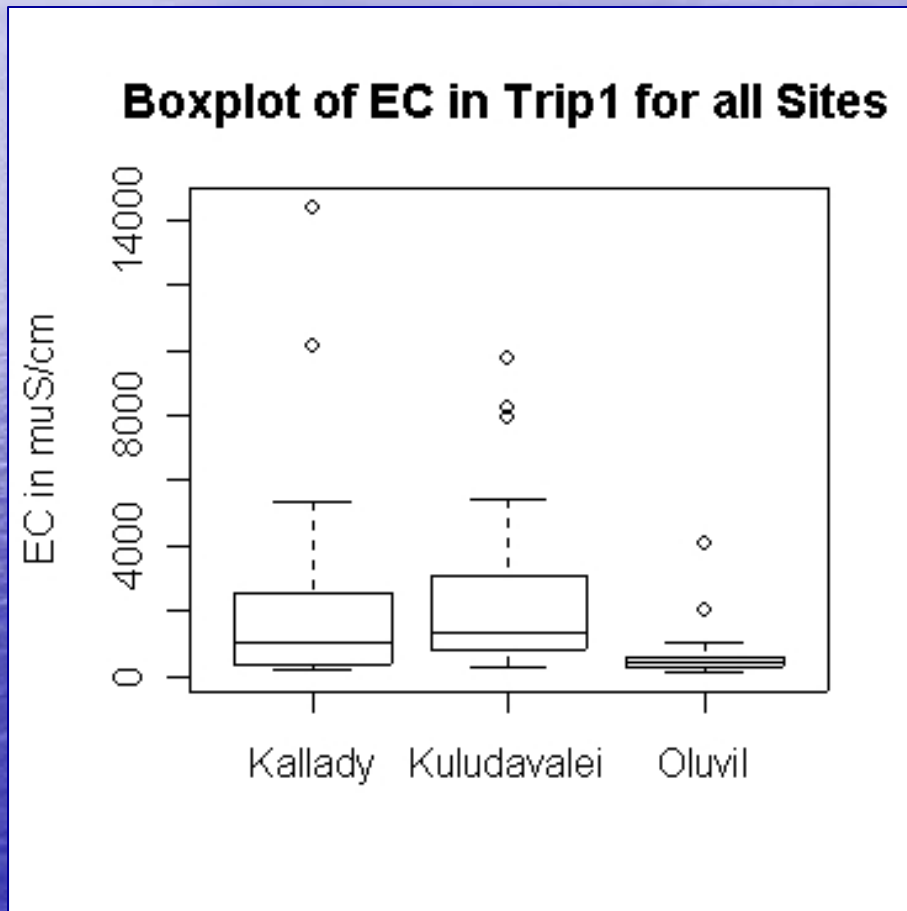


Pocket-
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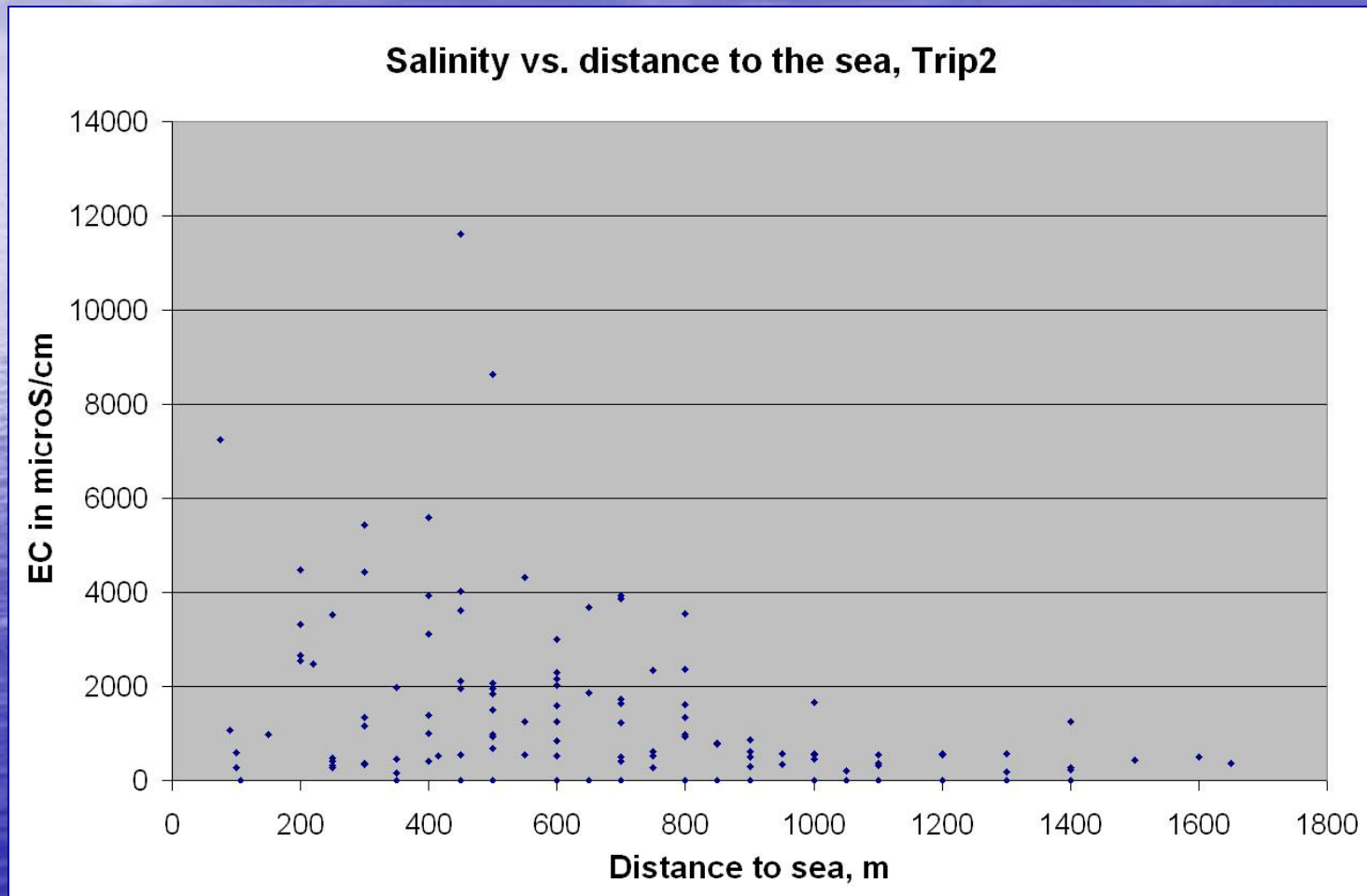
Change in salinity with time



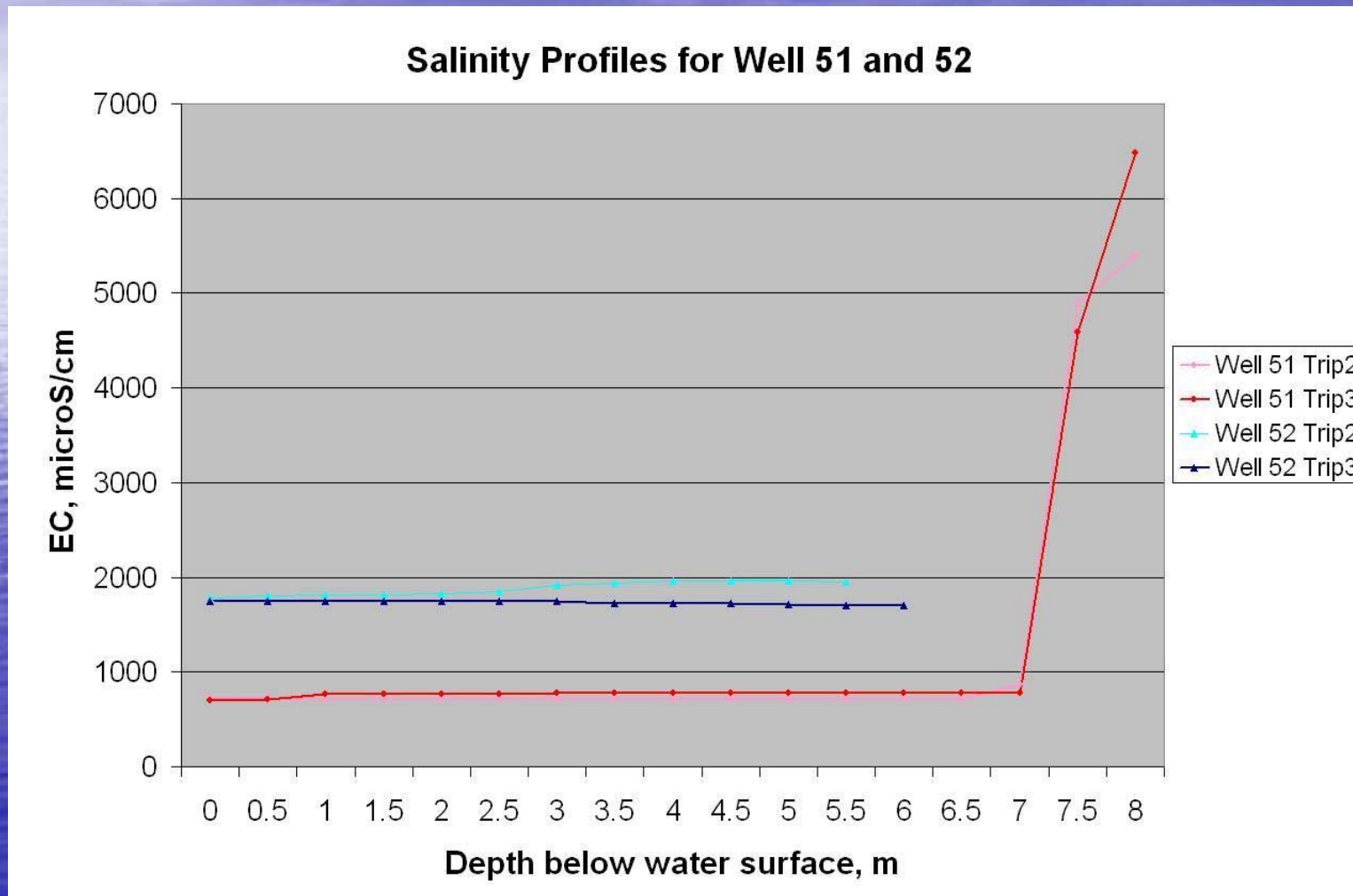
Areas were impacted differently



Distance of impact



Salinity with depth, cont.



Recommendations for pumping

- Don't concentrate pumping for bowsering in same wells for extended times
- Distribute pumping to more wells
- Pump intermittently from wells
- Wells that are pumped intensively (agro and bowser) should be monitored for salinity
- If salinity increases, pumping should be discontinued
- Preferably, pump from shallow wells away from the coast, and away from other sources of pollution

Findings

- Salinity initially decreased rapidly, but residual salinity may persist for longer times
- Lagoon areas will experience more long term impacts
- Wells affected up to 800 m inland
- Large spatial variability in the salinity of flooded wells
- About one third of wells in these areas are still unfit for drinking
- Uncertain whether saltwater is intruding from below