

UNDERSTANDING THE HYDROGEOCHEMICAL EVOLUTION OF GROUNDWATER IN COASTAL AQUIFERS OF SOUTHWEST BANGLADESH

Md. Mizanur Rahman Sarker^{1, 2}, Marc Van Camp¹, Delwar Hossain², Mazeda Islam^{1, 2}, Md. Abdul Quaiyum Bhuiyan³, Md. Ariful Ahsan³, George Bennett^{1, 4} and Kristine Walraevens¹

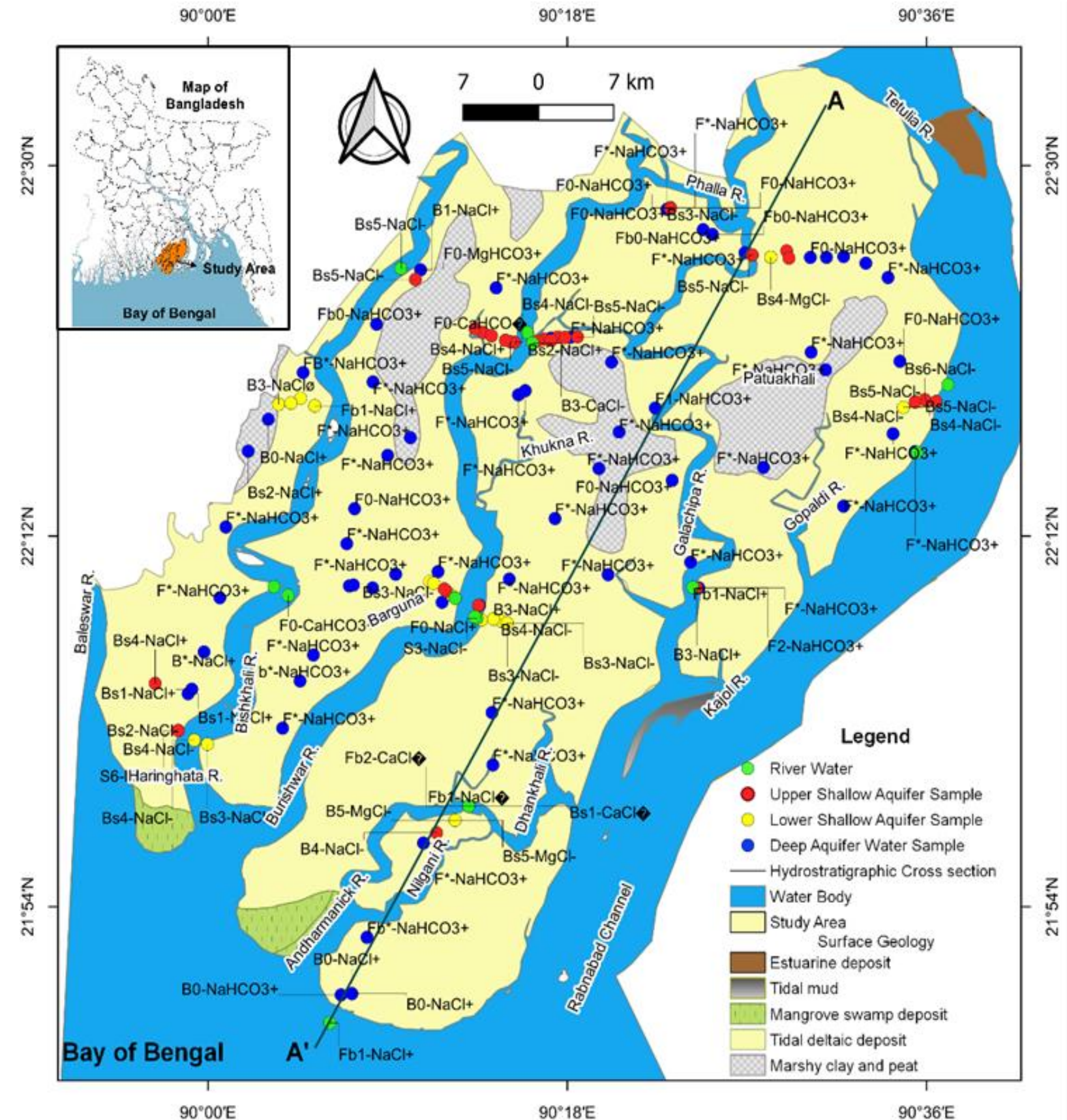
¹Laboratory for Applied Geology and Hydrogeology, Department of Geology, Ghent University, Belgium

²Department of Geological Sciences, Jahangirnagar University, Savar, Dhaka, Bangladesh

³Isotope Hydrology Division, Bangladesh Atomic Energy Commission, Dhaka, Bangladesh

⁴Department of Mining and Mineral Processing Engineering, University of Dodoma, Tanzania

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AQUIFER DESCRIPTION

Deep aquifer (200 – 300 m)

Fresh NaHCO_3 type water

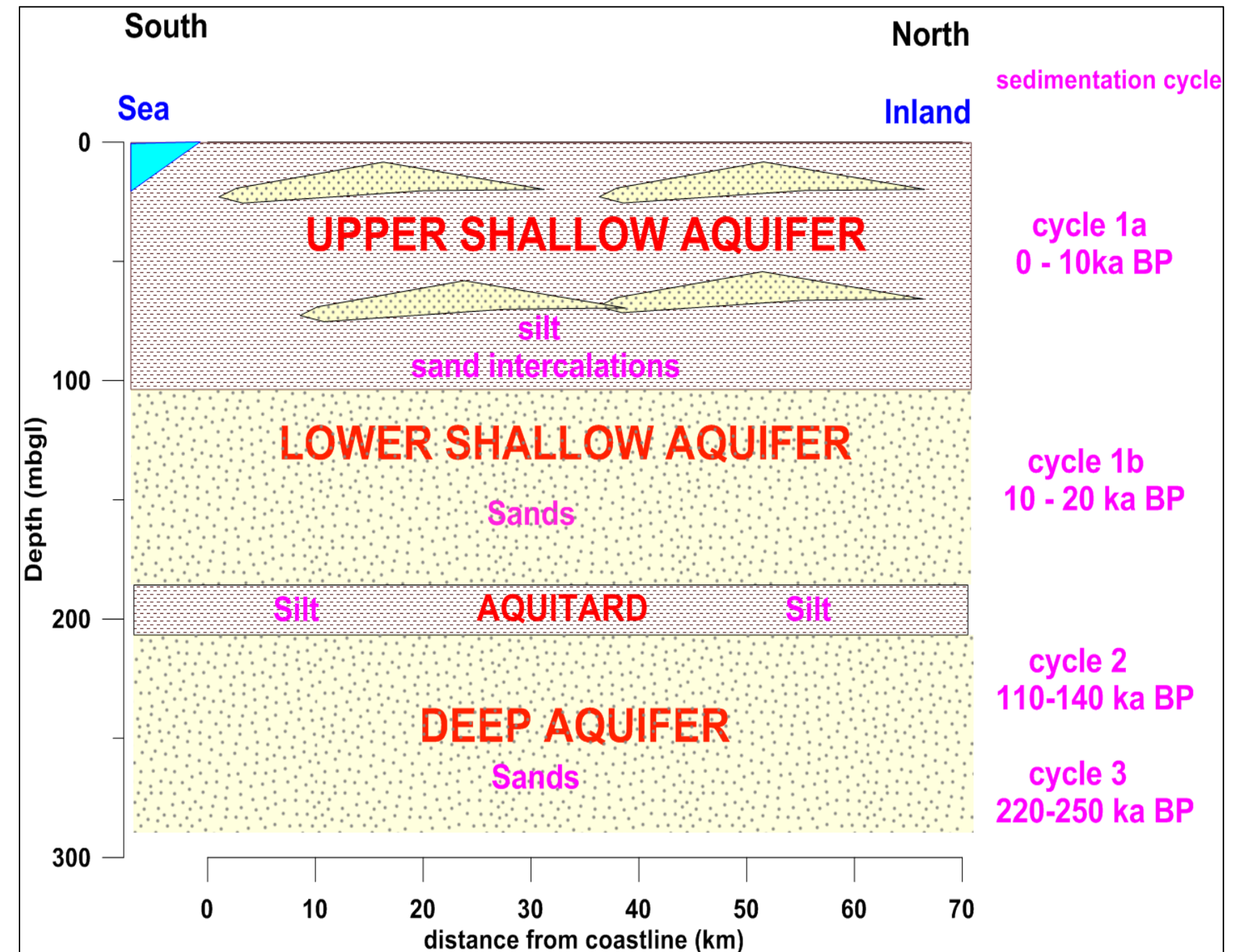
Lower shallow aquifer (100 - 200 m)

Mostly NaCl

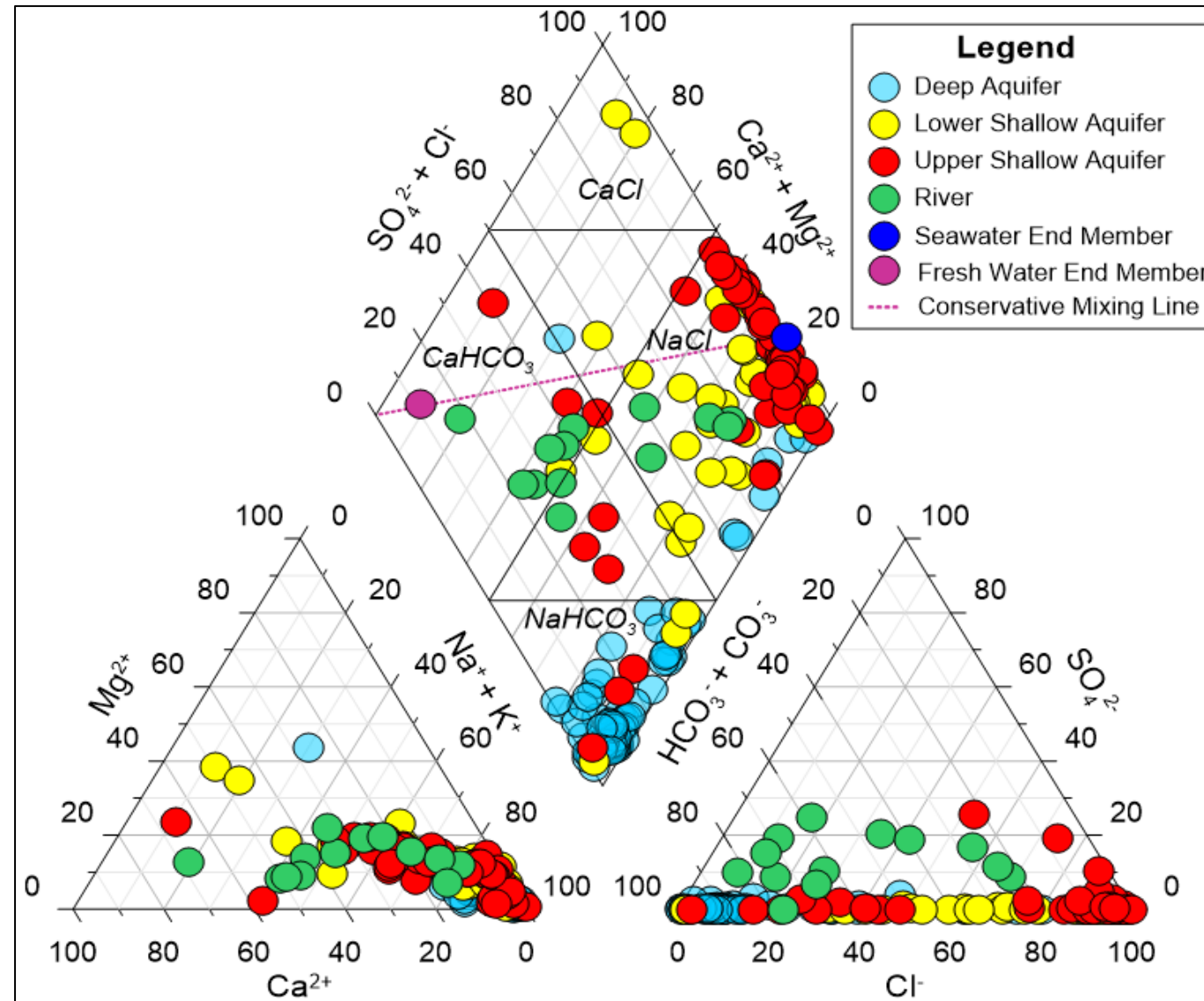
Some CaCl type waters.

Upper shallow aquifer (<100 m)

NaCl type water.

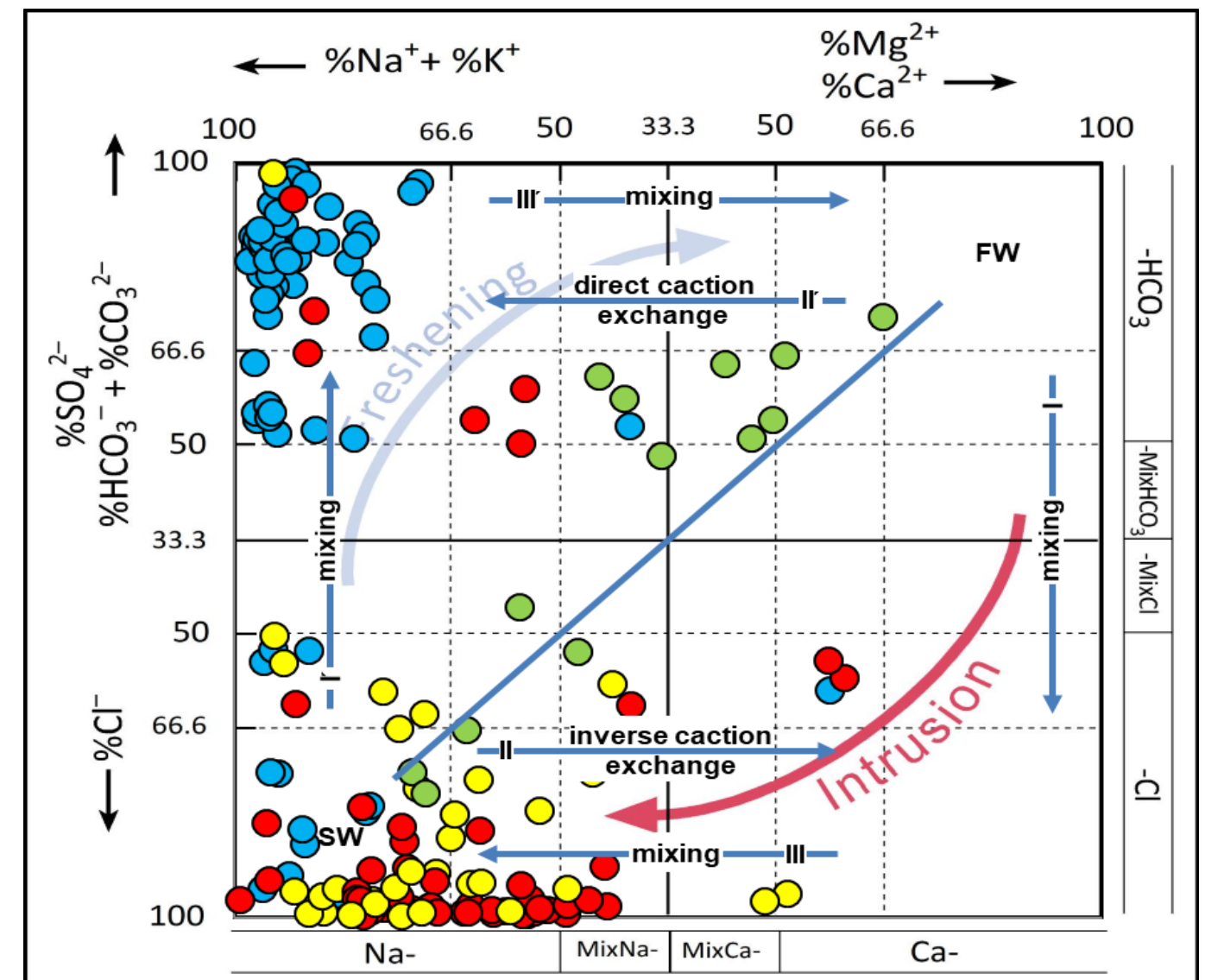


GROUNDWATER CLASSIFICATION



- NaHCO_3 type in deep aquifer
- NaCl & CaCl type in shallow aquifers

- Freshening in deep aquifer
- Salinization in shallow aquifers



SEASONAL FORMATION OF EVAPORITES

Late monsoon: Flooding



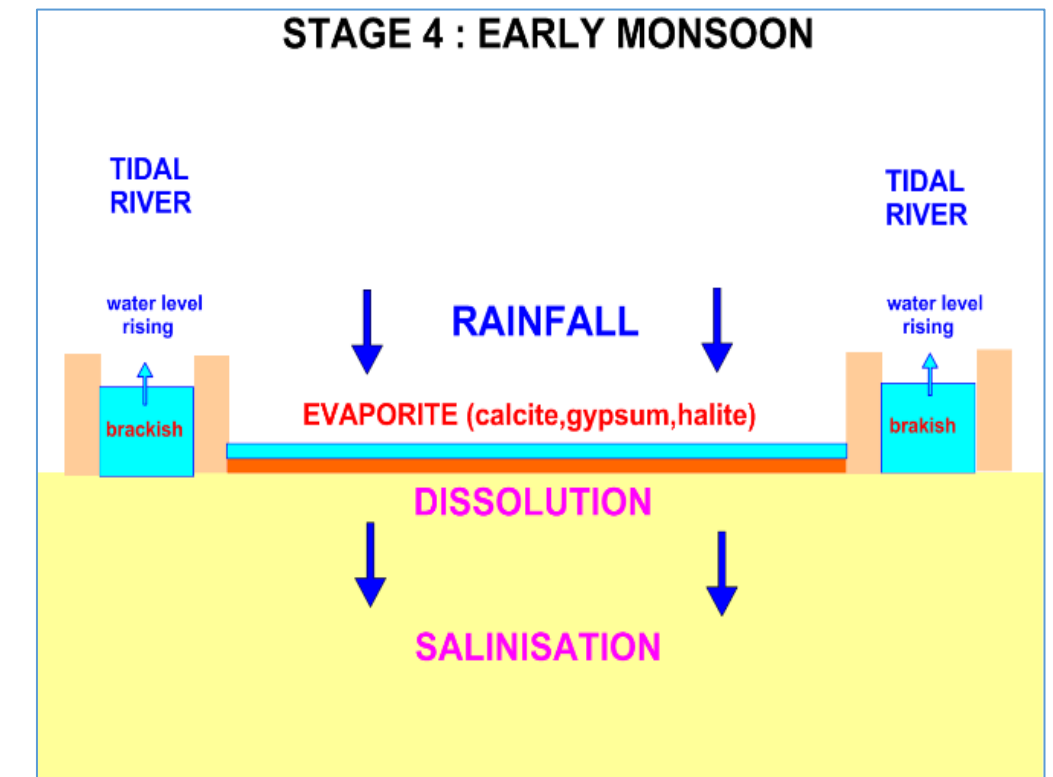
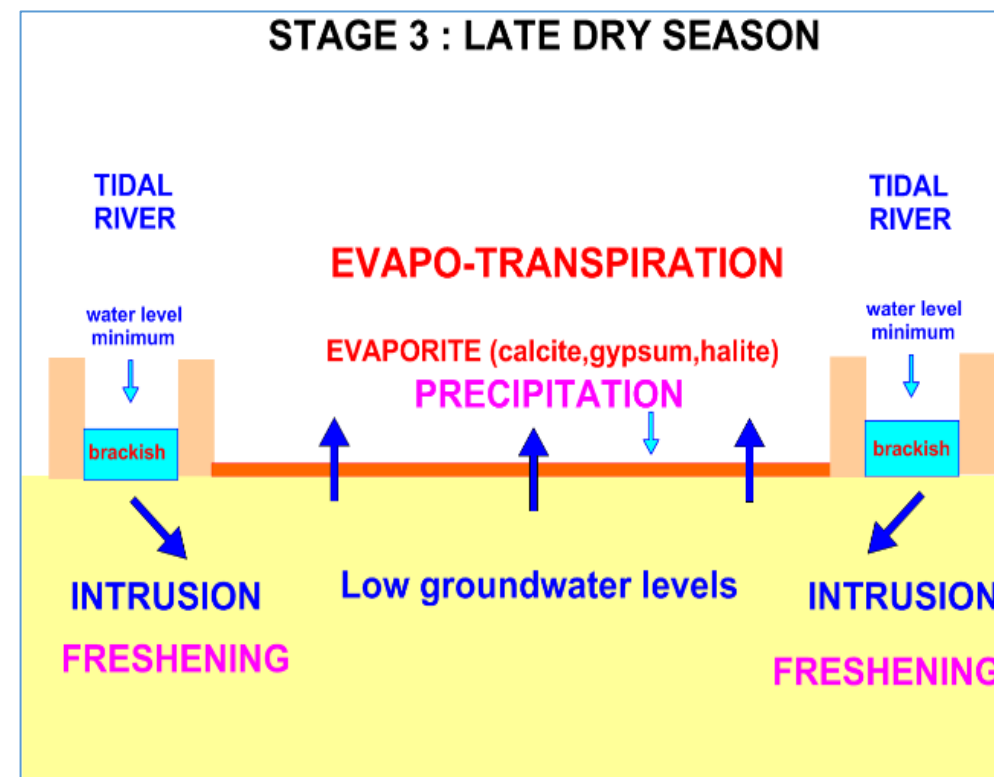
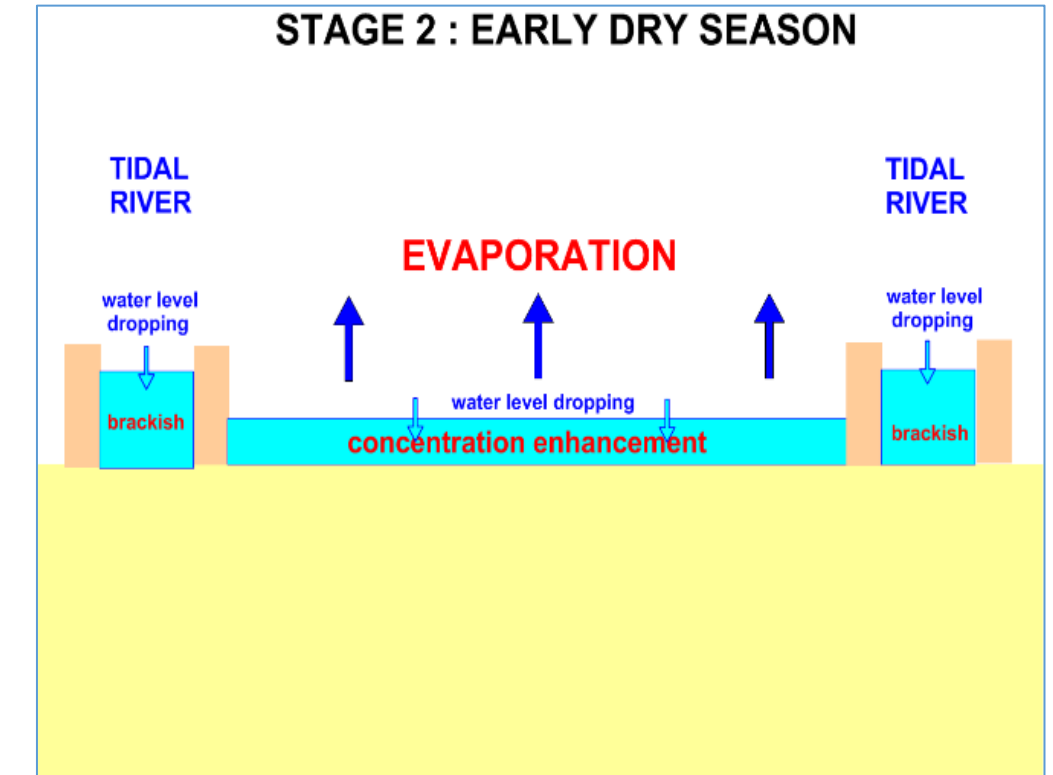
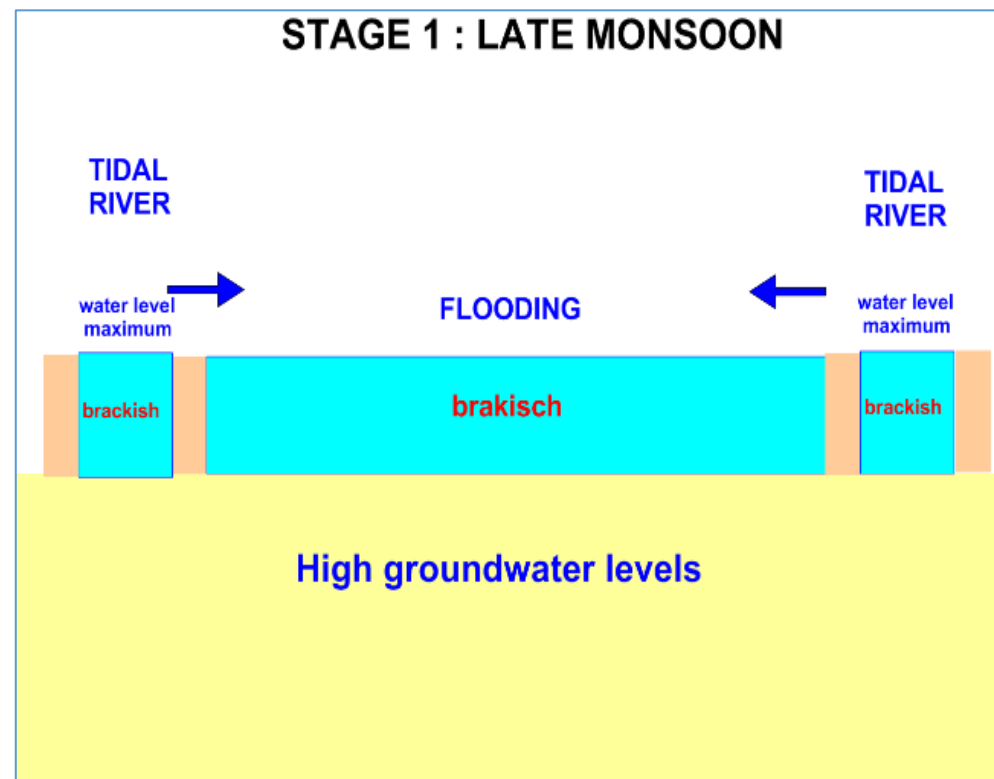
Early dry season: Evaporation



Late dry season:
Evapotranspiration + Precipitation



Early monsoon: Dissolution by
rainfall



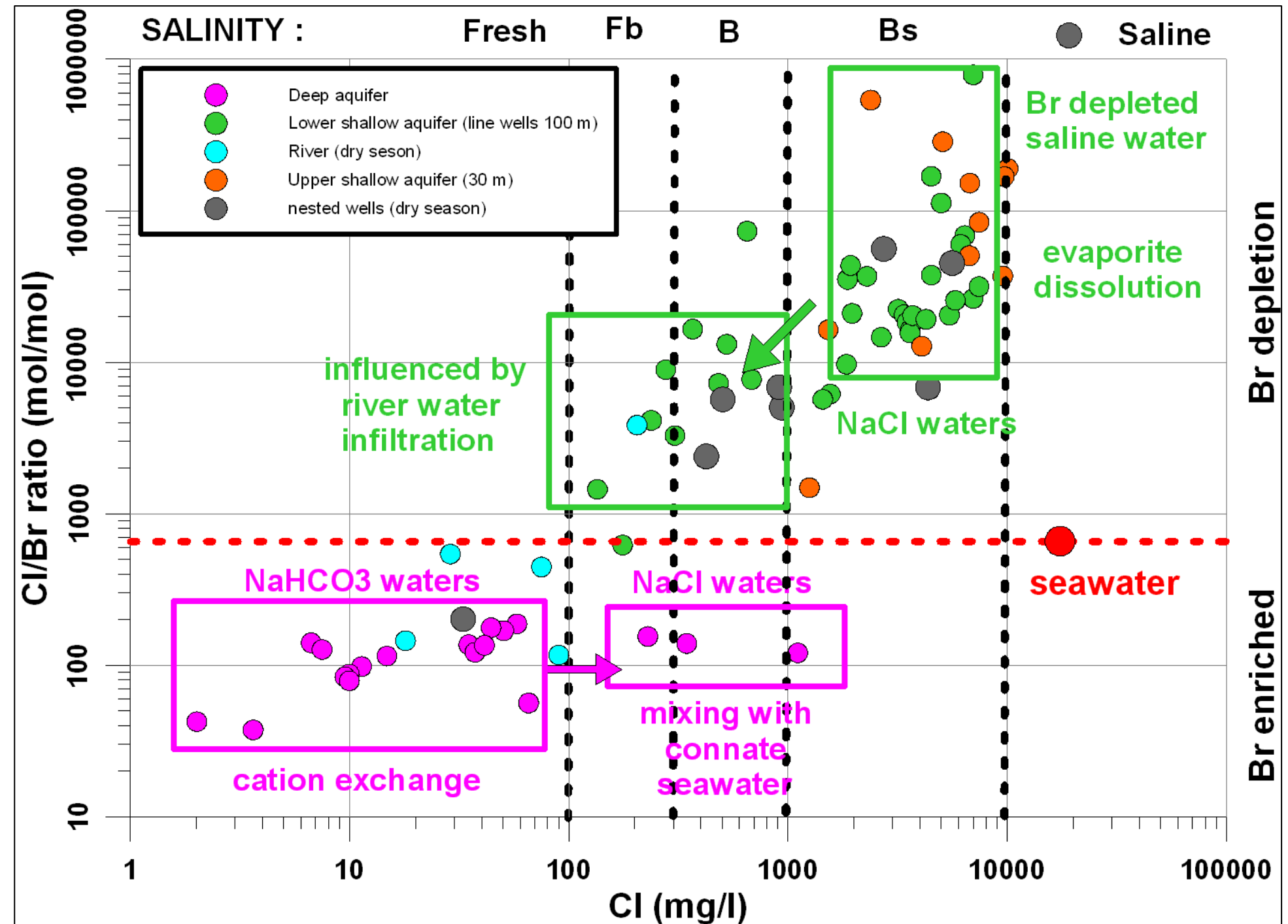
SOURCE OF SALINITY:

Shallow Aquifers

- High Cl/Br⁻ ratios
- Infiltration of dissolved evaporite

Deep Aquifer

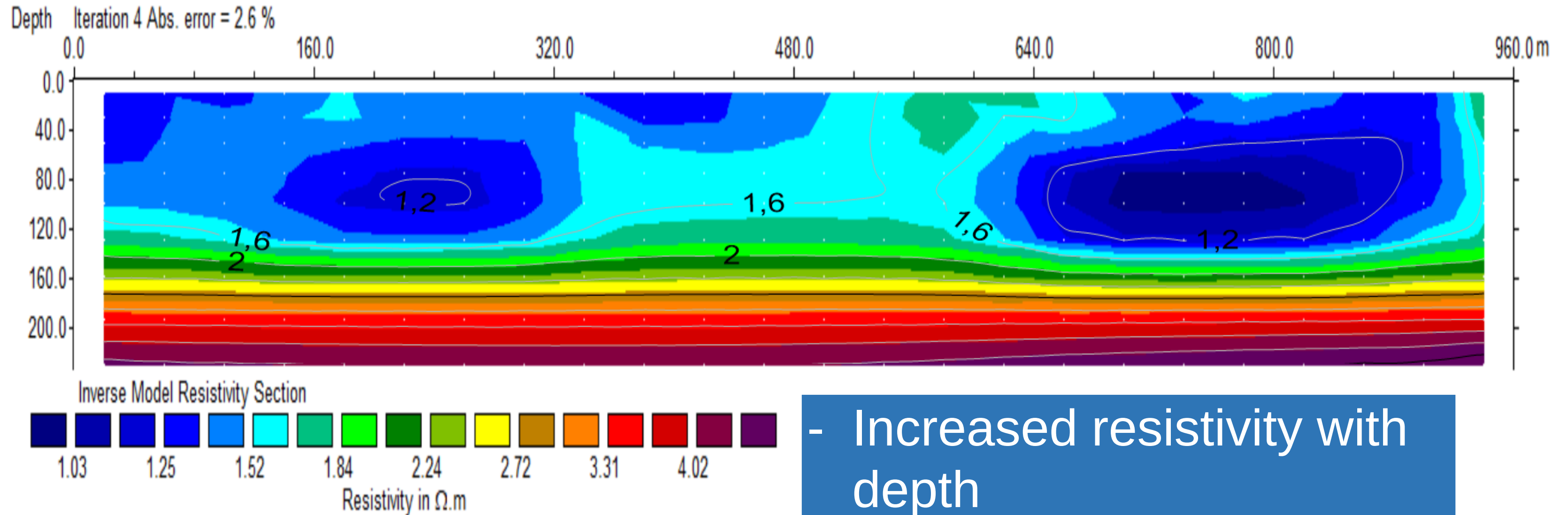
- Low Cl/Br⁻ ratio
- Low Cl/Br⁻ with high Cl⁻: Connate water



ELECTRICAL RESISTIVITY TOMOGRAPHY

South/Sea

North



- Increased resistivity with depth
- No lateral seawater flow

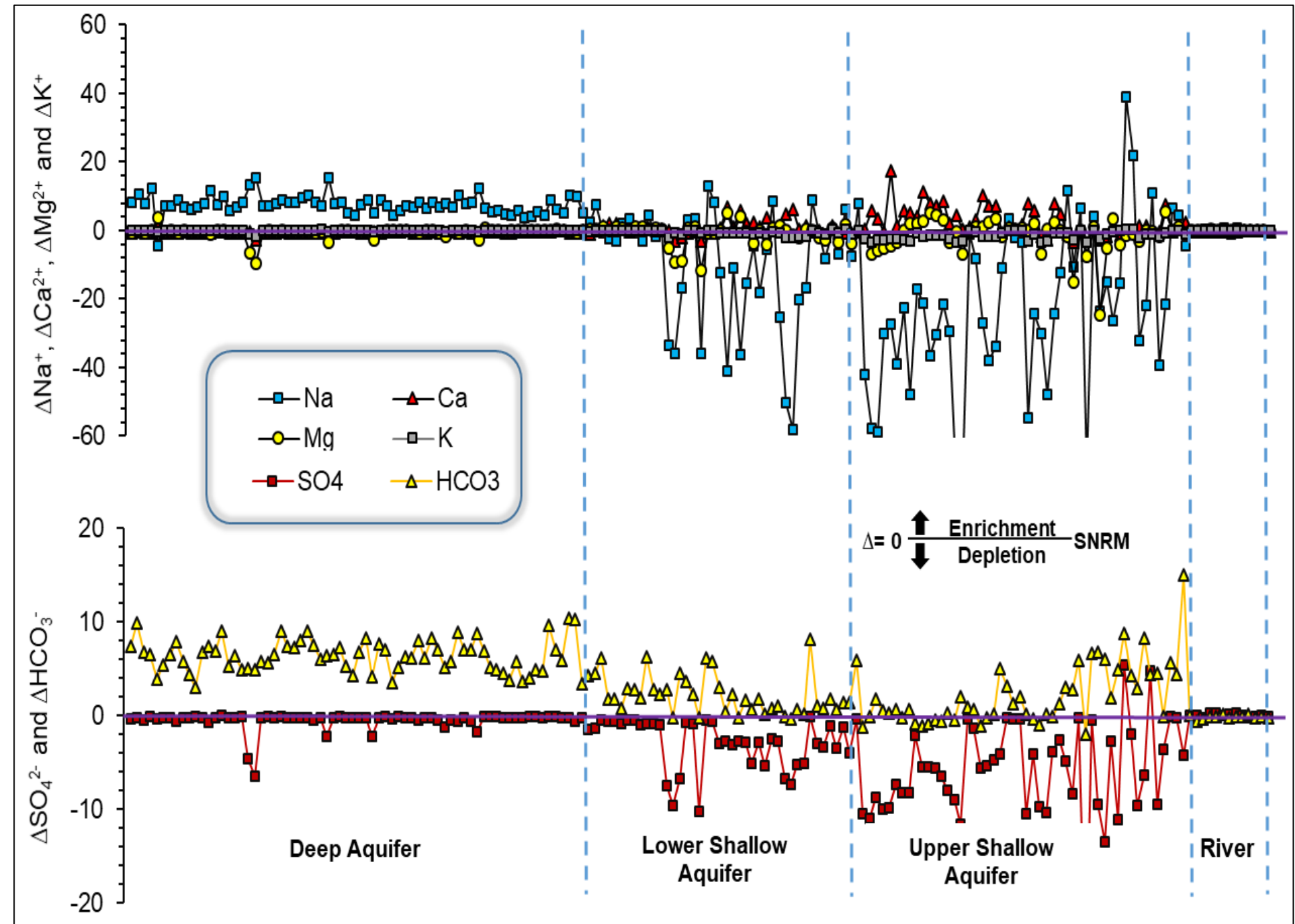
EXCHANGE PROCESSES

Shallow Aquifer

- Na^+ and K^+ ↓ : Adsorption
- Ca^{2+} ↑ : Release
- Reverse cation exchange

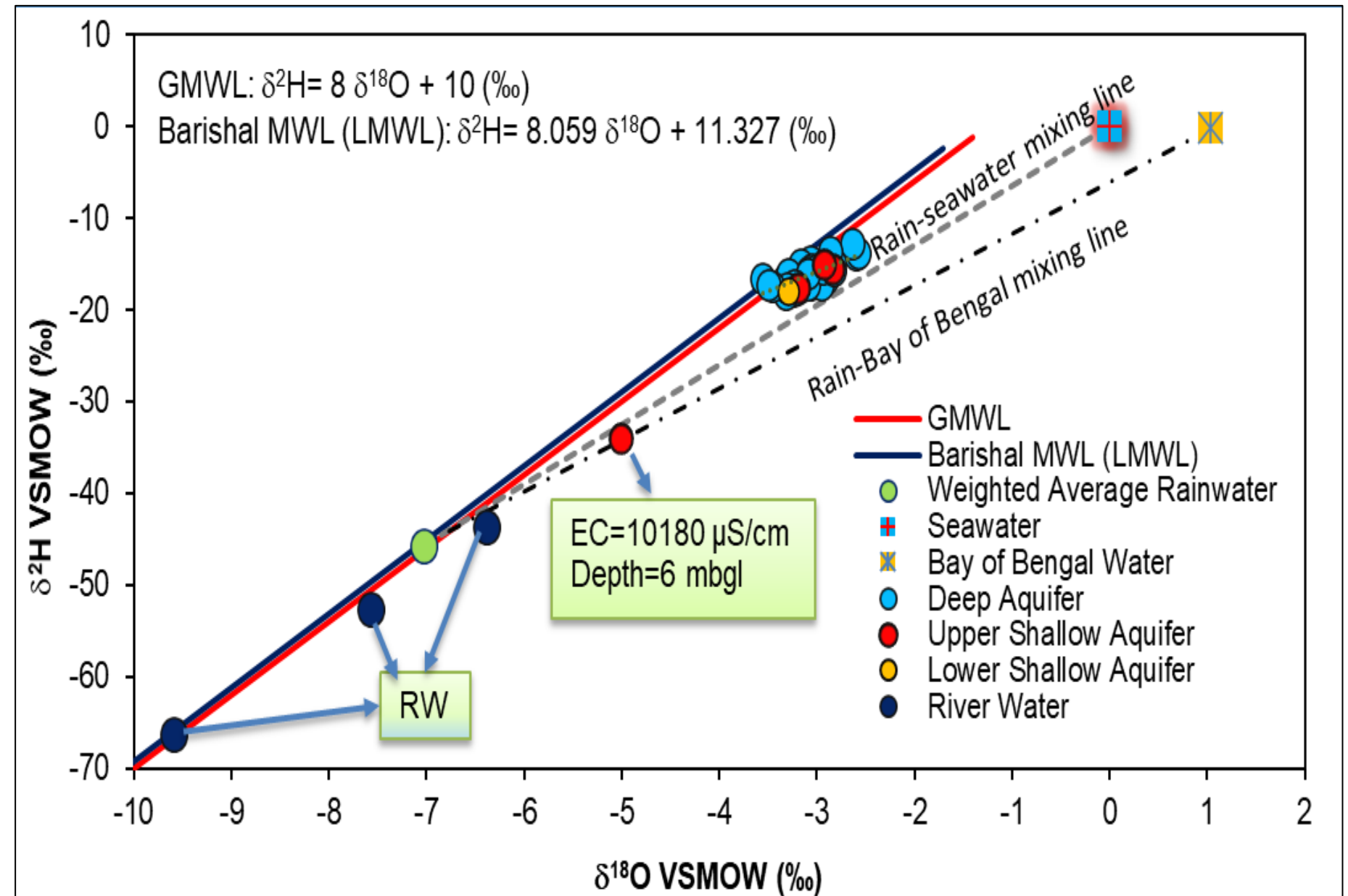
Deep Aquifer

- Na^+ and K^+ ↑ : Release
- Ca^{2+} ↓ : Adsorption
- HCO_3^- ↑ : Calcite dissolution



STABLE ISOTOPES

- Meteoric origin
- Mixing affect shallow aquifers
- Evaporation effect on shallow aquifer



CONCLUSION

- ❑ Upper aquifers: dissolved evaporites
- ❑ Deep aquifer: fresh infiltrated water
- ❑ No flow from Bay of Bengal
- ❑ Future exploitations: deep aquifer

For detail please read

Sarker, M.M.R, Van Camp, M., Hossain, D., Islam, M., Ahmed, N., Karim, M.M., Bhuiyan, M.B.Q., and Walraevens, K., 2021; "Groundwater salinization and freshening processes in coastal aquifers from Southwest Bangladesh." Sci. of the Total Environ. 146339. <https://doi.org/10.1016/j.scitotenv.2021.146339>



Thank You