# Study the effect of mineral sands on groundwater and surface water quality in Alluvial plain.

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By

CHELVAVINAYAKAM GOKILAKUMARAN

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**Supervisor**

**Dr. Daham Jayawardana**

Faculty of Science and Technology
Uva Wellassa University
Sri Lanka

## ABSTRACT

In a confined alluvial aquifer located between two rivers, discrete zones of anomalously high concentrations of redox species such as iron, lead, manganese are thought to be a result of groundwater flow dynamics rather than a chemical evolution along continuous flow paths. This new hypothesis was confirmed at a study site located between Mahaweli and Valavachar rivers in Navaladitottam, Trincomalee, by analyzing concentrations of redox species in comparison with dynamic groundwater flow patterns related with sea water. River incision into the confined alluvial aquifer and seasonally varying river stages result in truncated flow paths.

The groundwater flow dynamics between two rivers has four phases that are cyclic, including: aquifer discharge into both rivers, direct flow from one river toward another, aquifer recharge from both rivers, and reverse of river-to-river flow. The resulting groundwater flow direction has a zigzag pattern and its general trend is flow direction as conduct the sea bed. High mineral anomaly appears as discrete zones in the transition areas of the confined alluvial aquifer because the lateral recharge from rivers penetrates into the aquifer only by tens of meters. The high mineral anomaly, which is nearly constant in space and time, is a result of groundwater, surface-water and sea water interactions and related groundwater flow dynamics.

In this study, strong hydrological linkages existed between stream water and alluvial groundwater table depths. However, the effect of an in-stream structure on the stream water –groundwater and sea water-groundwater exchange zone was localized despite changes in geomorphic complexity and water quality. The implications of the de-coupling of streams from upcountry to lower level land and floodplains, weathering/erosions are only now beginning to gain the minerals, with significant impacts on hydrological connectivity.



Key words: alluvial; redox, truncate, geomorphic complexity