Estimation of shallow aquifers vulnerability at Cu-Chi, north of Ho Chi Minh City, using hydrogeophysics

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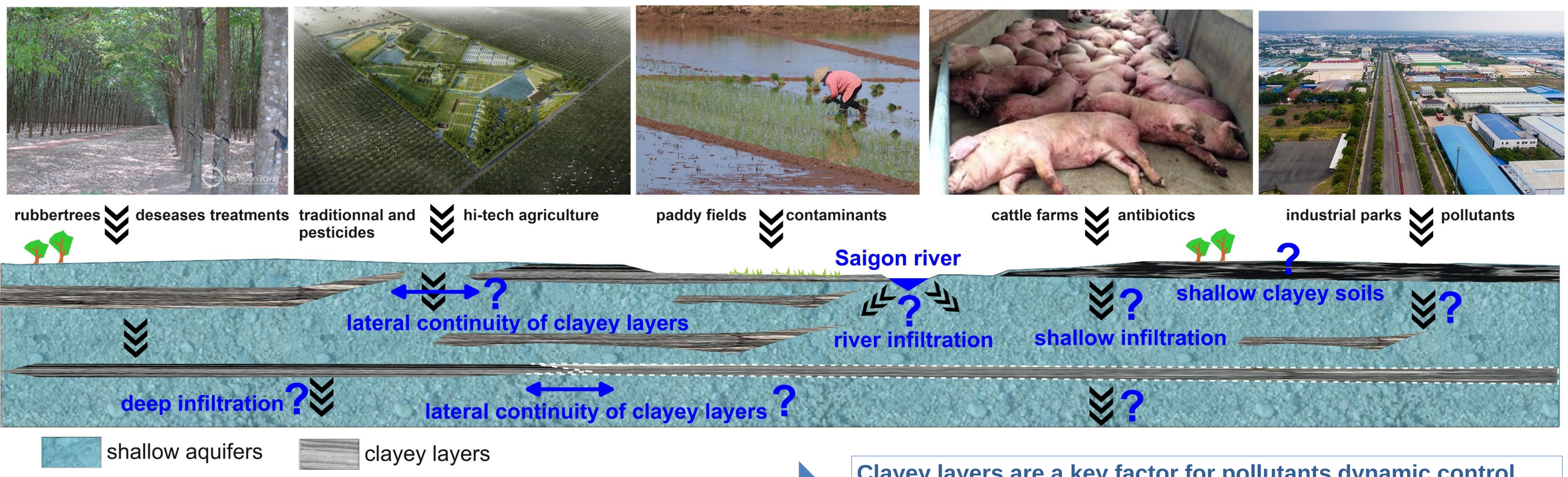
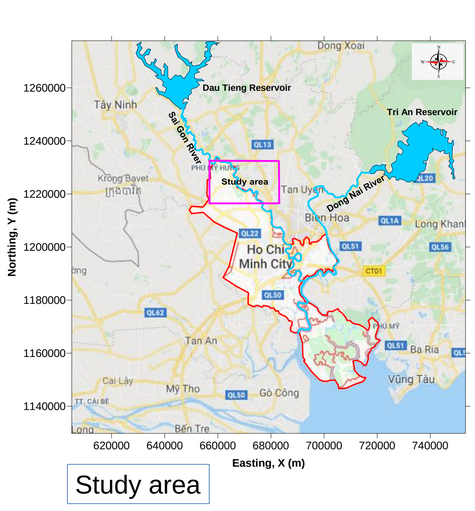
Possible threats to aquifers and scientific questions



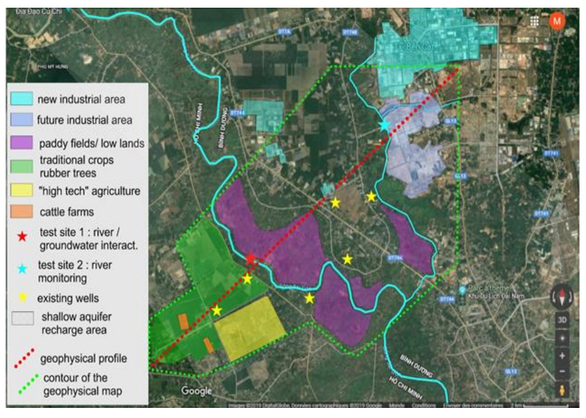
Clayey layers are a key factor for pollutants dynamic control,

We need to **understand how clayey layers are organized**

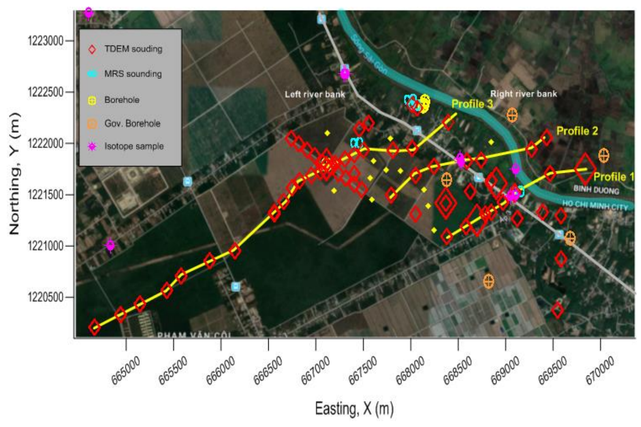
Hydrogeophysics for clayey layers detection



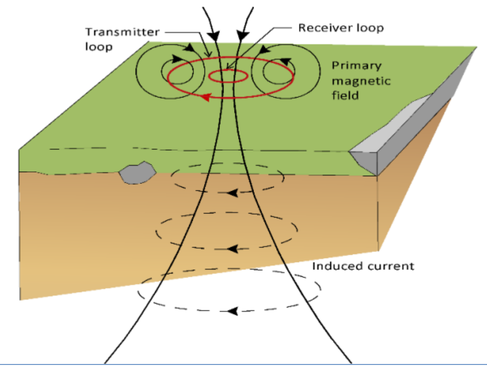
Study area



Selection of a representative zone near Cu-Chi



Geophysical electromagnetic survey

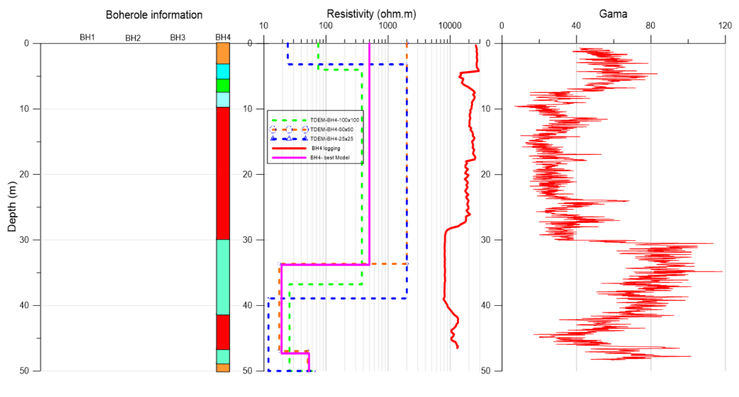


Principle of **Time Domain Electro-Magnetic (TDEM)** method
(modified from Slovenz et al., 2012)

TDEM sounding method allows us to investigate the ground (0-100 m deep) ***to study the electrical resistivity of the rocks, parameter very sensitive to clayey layers***

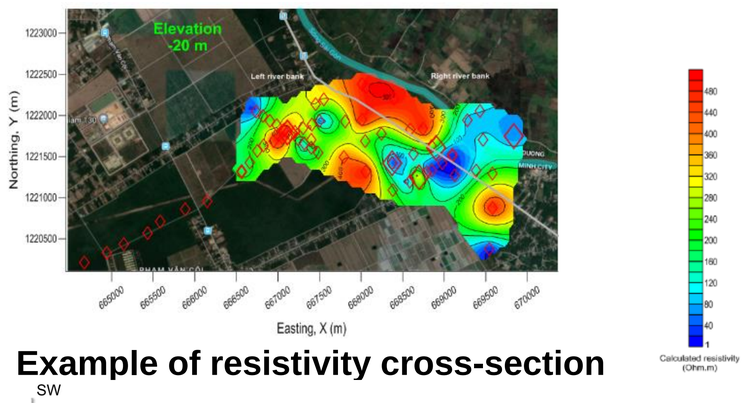
First results

Boreholes and TDEM comparison



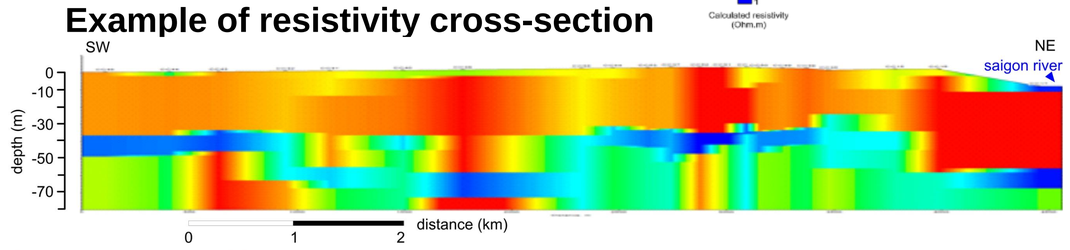
TDEM sounding interpretation allows us to locate thick clayey layer between 33 and 47 m deep, also detected by gamma logging in a borehole test near Cu-Chi

Resistivity map at 20 m deep



TDEM resistivity map at 20 m deep allows us to delineate the clayey layer (in blue) and sandy aquifer (in red). ***Clayey layers are not connected between eachothers,***

Example of resistivity cross-section



TDEM cross section between 0 and 80 m deep allows us to follow laterally the clayey layer (in blue): ***it is not continous. The sandy aquifer (in orange-red) is not protected by clay at the surface****.*

Preliminary conclusions and further studies

- TDEM electromagnetic survey allow us to **identify thick clayey layers between 0 and 80 m deep**, separating the aquifers,
- **Clayey layers are not connected between eachothers** and **no massive clay layer is observed at the surface**

➡ **Shallow aquifers are thus very vulnerable to pollutions**.

- The next steps will be to a) **extend the geophysical survey** , b) **identify the main pollutants sources** and c) select test sites in sandy aquifers for **groundwater sampling**

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