ACC DAR Adapting to Climate Change in Coastal Dar es Salaam

Technical Workshop on Monitoring Seawater Intrusion in Coastal Groundwater

THE GROUNDWATER MONITORING CAMPAIGN

Dar es Salaam, 17 November 2011

Centro Interuniversitario di Ricerca Per lo Sviluppo sostenibile - CIRPS

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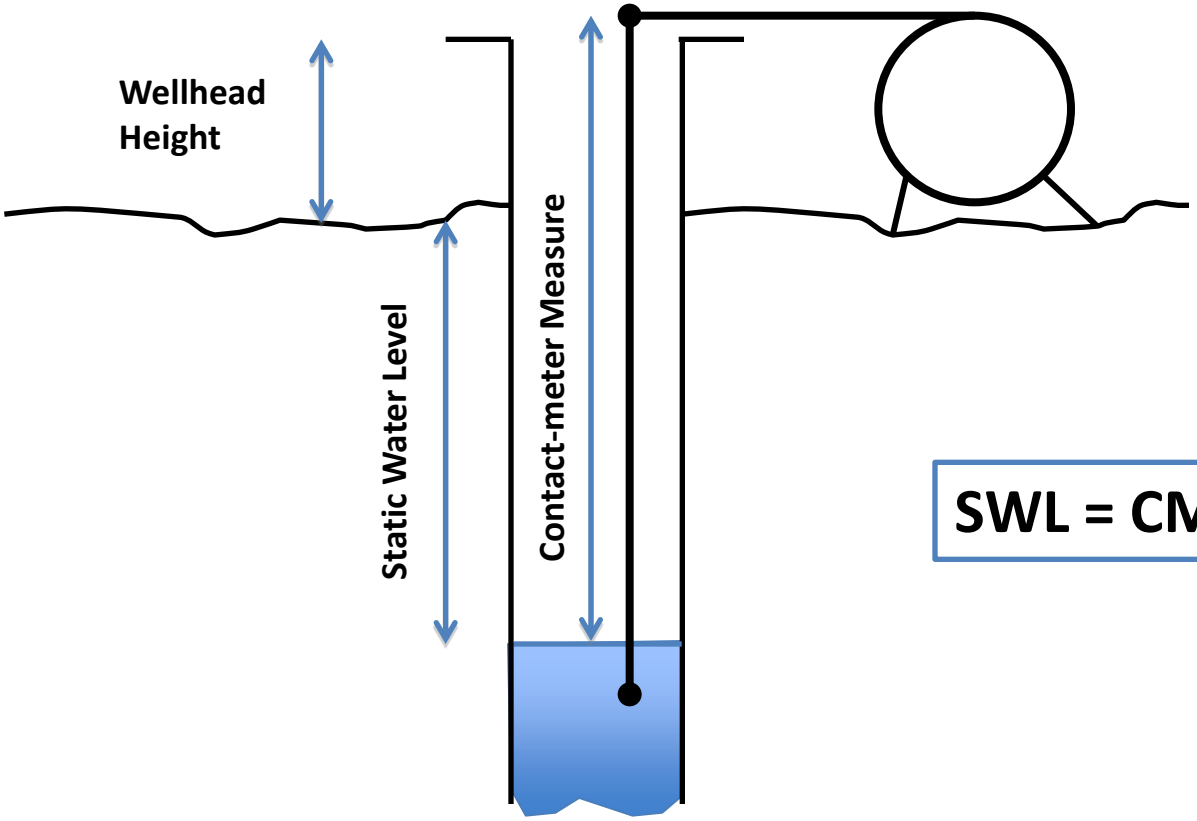
WHAT

- Take the boreholes coordinates with the GPS (only for the 1st campaign);
- Make sure that the borehole's pump is NOT WORKING (almost 30' before the SWL measure);
- Use the contact-meter to measure the SWL;
- Take the measure of the height of the well head from the ground level (only for the 1st campaign);
- Take a groundwater sample for the phys-chem parameters measure with the multi-probe;
- Collect groundwater samples for the lab analysis (only for the 1st and last campaigns).

SWL



SWL = CM - WH

Phys-Chem param.

How is salinity measured?
A quick way is to use a conductivity meter and read off the electrical conductivity. The idea being that a salty solution, because it is full of charged particles will conduct electricity. Most conductivity meters give readings in micro Siemens per cm (µS/cm).

Most fresh drinking water will have less than 100 µS/cm conductivity;
Salt drainage water conductivity could range from 8000 to 20000 microS/cm;
Very brackish water could be around 30000 µS/cm;
Seawater has conductivity of around 54000 µS/cm.

Phys-Chem param.

Some salinity meters read off parts per million (ppm*). This is an approximation - the problem is that ppm is a measure of dissolved solids and its usually on a weight for volume basis. How does a conductivity meter know how many ppm to show? It just uses its inbuilt conversion factor.

There is no exact relationship between conductivity as µS/cm and TDS as ppm.
Different salts in water have a different ability to conduct electricity. This is because of the differences in charge and size / weight and mobility of the different ions. This difference is quantified as a property called the specific conductance.
Although it is possible to calculate the conductivity for any electrolyte at any temperature and concentration, it is difficult to work out what the conductivity of a particular salt mix should be.

*1 ppm in water means there is 1 milligram of solids per litre.

Phys-Chem param.

Salt (all 0.01 mol/l)	mg/l *	Conductivity μS/cm	TDS factor - mg/l / Cond
NaCl	584	1156	0.51
CaCl2	1110	2310	0.48
NaHCO3	840	865	0.97

We are only interested in SEAWATER intrusion

Many different salts can give us the same conductivity value: that's why we're going to make LAB ANALYSIS on some water samples to understand the real origin of the SALT INTRUSION (if from SEAWATER or IRRIGATION, POLLUTION, GEOLOGICAL SOURCE, etc.).

Samples for lab analysis

- If you are using plastic bottles of water and not clean samplers you have to well RINSE the bottles inside with the same water you're going to collect so:
- FILL and RINSE each bottle you're going to use with the borehole water for almost two or three times (also the cap);
- FILL the whole bottle with the water until it starts to flow out;
- Squeeze softly the bottle before closing it to make sure that there is NO AIR inside;
- WRITE the boreholes ID and the DATE onto each bottle you're going to use;
- TAKE the samples to the lab.

Samples for lab analysis

We cannot perform measure INTO the boreholes (pump, cables, etc.), but we have TO ASSURE that the water sample we are dealing with is so similar to the water inside the well.