

IAH network on “Coastal aquifer dynamics and coastal zone management”

QUESTIONNAIRE

IAH national committees, IAH members and non members from all around the world involved in SWI and SGD research and management are kindly asked to fill in the questionnaire in this page with as many details as possible.

A world database will be set up and made available, with basic coastal aquifer main characteristics.

We expect to gather standard and comparable information on the knowledge level and hopefully the state of the art of the research on SWI and SGD, and coastal aquifer management methods adopted around the world.

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| 1) | Location of aquifer (country, more specific location): | Grande Glorieuse, part of the French Scattered Islands (Iles Eparses), a low-lying Coral island in the Western Indian Ocean. |
| 2) | Reported by: | Jean-Christophe Comte, Jean-Lambert Join, Olivier Banton, Eric Nicolini |
| 3) | Type of medium (karst, porous, fracture) | Karstified/fractured Pleistocene, porous Holocene |
| 4) | Type of aquifer (phreatic or confined) | Phreatic |
| 5) | Main lithology - (e.g. gravel, sand and clay) | Its geology is composed of a Pleistocene fractured/karstified reef limestone covered by Holocene coral sands |
| 6) | Hydrochemistry: fresh or saline | Fresh to probably hypersaline (>seawater salinity in evapoconcentration areas) |
| 7) | Saltwater intrusion: lateral from sea or lakes - upconing | both lateral and diffuse upconing in high evapoconcentration areas |
| 8) | Aquifer geometry: hydraulic characteristics | Hydraulic conductivity: 10^{-5} - 10^{-3} ms $^{-1}$ (Holocene); 10^{-7} - 10^{-3} (Pleistocene +/- karstified). |
| 9) | Aquifer parameters: storage - annual water pumping - (in MCMA - millions cubic meters, annually) | freshwater total volume is estimated at about 20,000 m 3 |
| 10) | Depth of aquifer (water level and bottom) - water level 5- 30 m - aquifer depth - 50-200 m | water table depth 0 - 5m
base of aquifer unknown (pre-pleistocene volcanic basement?) |
| 11) | Major chemistry (anions - ?; Cations - ?): | Na Cl |
| 12) | Major salinity sources: | seawater up to 25 kg/m 3 TDS (total dissolved solids) measured in wells (up to 38 kg/m 3 simulated) |
| 13) | Population: | Island has no permanent population and is classified as a nature reserve |
| 14) | Aquifer status: special features - e.g. thermal springs, major faults,... | |
| 15) | Investigation methods - e.g. water level measurements, EC (electrical conductivity profiles), TDEM (geophysical), | Six observation wells, including five new hand-dug piezometers (GW) and one existing large-diameter well (Pts), were monitored for groundwater heads and salinity. In addition Electrical resistivity tomography (ERT) profiles. |
| 16) | Numerical hydrological modeling, chemical and isotopic methods, age determination, IR survey, seepage meters (for Submarine Groundwater Discharge, SGD) | Spatiotemporal resolution of groundwater heads and salt concentrations was carried out using the three-dimensional (3D), variable-density, saturated flow groundwater code SEAWAT ver. 4. |
| 17) | Monitoring methods applied and duration - water level measurements, EC (electrical conductivity profiles - seasonal) | 2 years of continuous water level/temperature/EC in the 6 monitored wells |
| 18) | Management methods: | |
| 19) | Aquifer management actions: | |
| 20) | Identification of existing or potential problems: | The densely vegetated zones and low-lying zones show great seawater intrusions due to maximal transpiration permitted by the shallow water table. |
| 21) | Annexes: | of fresh groundwater to climate and vegetation changes in coral islands. Hydrogeology Journal 22(8):1905-1920. DOI: 10.1007/S10040-014-1160-Y Join, J-L, Banton, O., Comte, J-C, Leze, J., Massin, F. & Nicolini, E. (2011) |
| 22) | Observations: | The observed increase in salinity of the freshwater lens, especially in the low-lying zones, is mainly explained by the increase in freshwater uptake by vegetation. |