



THE INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS



AQUA 2015 /

HYDROGEOLOGY: BACK TO THE FUTURE!

42nd IAH Congress - ROME

Sapienza University of Rome - 13/18 September 2015

ABSTRACT BOOK

649 - THE USE OF MULTI-TRACERS FOR UNDERSTANDING GROUNDWATER QUALITY CHANGES IN RECIFE (BRAZIL): IMPLICATIONS FOR LONG-TERM MANAGEMENT IN COASTAL METROPOLITAN AREAS

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In a context of increasing land use pressures (over-exploitation, contamination of surface waters), the identification of groundwater quality degradation risk in coastal large cities is a key issue for their social and environmental sustainability. This work focuses on the Recife Metropolitan Region (RMR), a highly urbanized area, located next to an estuarial zone and over a multi-layered sedimentary aquifer system, on the Brazilian Atlantic coast. It investigates the superficial aquifer system (Barreiras/Boa Viagem Cenozoic aquifer), which acts as an interface between the city and the deeper semi-confined aquifers (Cretaceous Cabo Aquifer System), increasingly exploited and potentially connected with the superficial water through leakage. Through a multi-tracer approach (major ions, major gases, CFC's, SF_6 , $\delta^{11}\text{B}$, $\delta^{18}\text{O-SO}_4$, $\delta^{34}\text{S-SO}_4$) carried out during two field campaigns (19 sampled wells, 3 surface waters), hydrogeological, contamination threats and redox patterns were evaluated. The superficial aquifer system recharge is related to modern water (last 50 years), but some participation of upward leakage paleowater (more than 10 kyears) from deeper Cretaceous aquifers is also identified. The increasing mineralization from the inland to the coastal and estuarial wells is attributed to water-rock interactions along with the natural or human-induced hydraulic gradients. Associated with this trend, an environmental pressure gradient takes place, related to sewage or surface channel network impacts. These sources are purveyors of chloride, nitrate and sulfate. These two latter species are also potentially produced or consumed within the system, featured by varying sediment texture and organic contents, and therefore apparent to a patchwork of redox reactors. Further, in the littoral high well-density area, the intensive pumping induces some temporary salinization in shallower wells. Based on these results, conceptual schemes of the current contamination fates are proposed to help a sustainable management implementation.