

Episodic recharge to the Quelo-Luanda aquifer: anticipating the impacts of climate change



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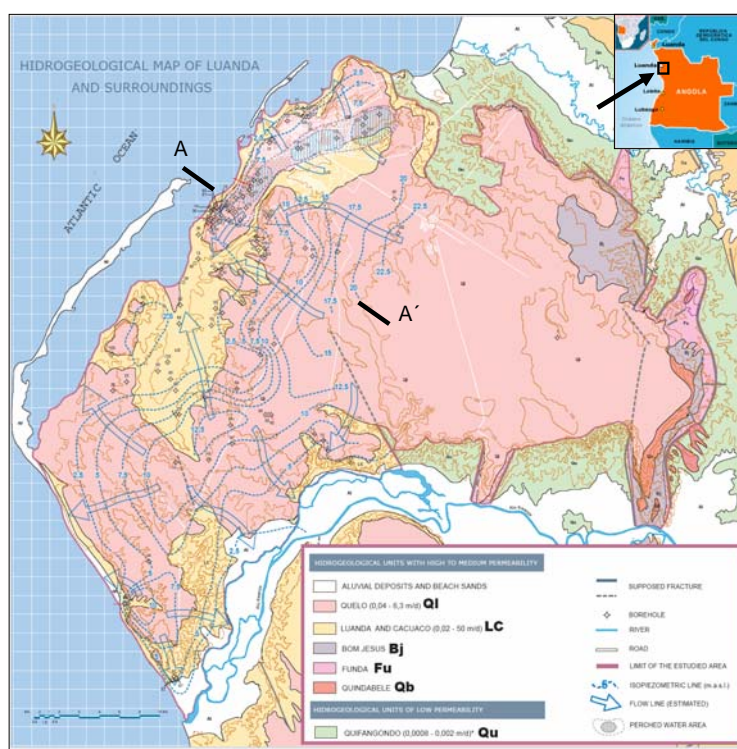
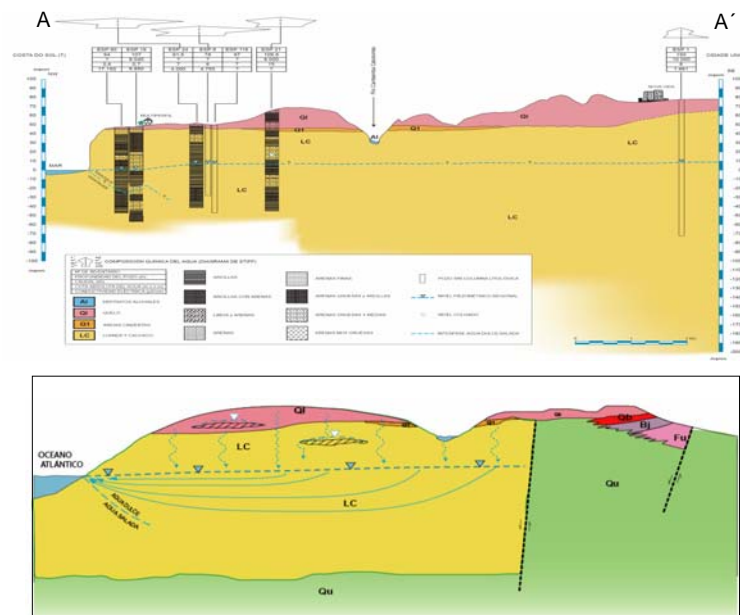


Background

The recharge rate of miocenic-pleistocenic detrital formations than constitute the Quelo-Luanda (Q-L) hydrogeological system (2000 km²) –Luanda, Angola- has been estimated.

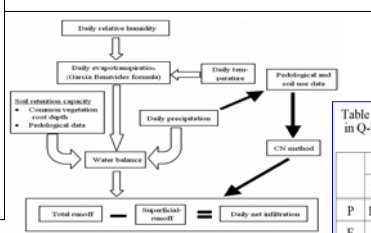
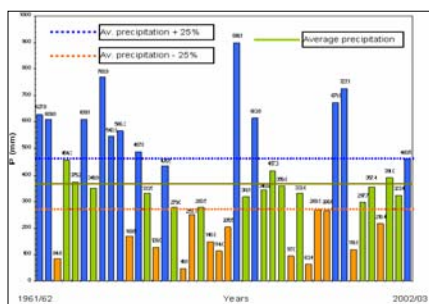
Objectives/Hypotheses to test

The important depth of the groundwater level (60-70 m), the low hydraulic gradients throughout the system (0.1%-0.5%) and the high salinity of the water (800 μS/cm in recharge areas up to 6000 μS/cm) are due to a poor recharge rate of the aquifer.



Methodology.

1. Analysis of the annual precipitation in Luanda for the period 1961-62 to 2002-03.
2. Estimation of daily total run-off through water balance procedures.
3. Estimation of surface run-off through Curve-Number analysis.



Results.

In the Q-L system infiltration occurs just during wet years –once every 10 years- being of about 250 mm. Thus, resources are, in average, about 45-50 hm³ per year; however, freshwater reserves elevates up to 50,000 hm³, due to the big thickness of the Luanda formation.

Table 1. Estimated infiltration for 1968-69 hydrological year in Q-L system (P = Precipitation E = Exceed R = Runoff). All values are expressed in mm.

	March 1969					April 1969					Tot		
	14	15	16	17	20	21	22	17	20	21	22	30	-
P	102	20	44	19	82	14	19	35	59	24	5	73	496
E	9	15	40	15	73	9	14	19	45	20	1	44	304
R	0	0	4	0	22	0	0	2	10	0	0	17	55
E-R	9	15	36	15	51	9	14	17	35	20	1	27	249

Discussion. Despite the big figures of both resources and reserves, the system seems really fragile. A non regulated exploitation scheme in the aquifer could produce an increase of the salinitation of the water, specially near the coast as a result of marine intrusion.

Conclusions.

1. Recharge rate in Quelo-Luanda aquifer system is very irregular (it happens just during wet years).
2. That factor constrains the degree of exploitation of the system (deep water levels, increase of the mineralization of the water, high salt intrusion risk).
3. The actual functioning of the Q-L system can be the fate of other hydrogeological systems in the aquifer under the assumption of future changes in the rainfall variability.