Session: Long term management, protection and use of groundwater resources from urban to rural environments

Maputo shallow aquifer: an opportunity or a nightmare?

Liège (september 2019)

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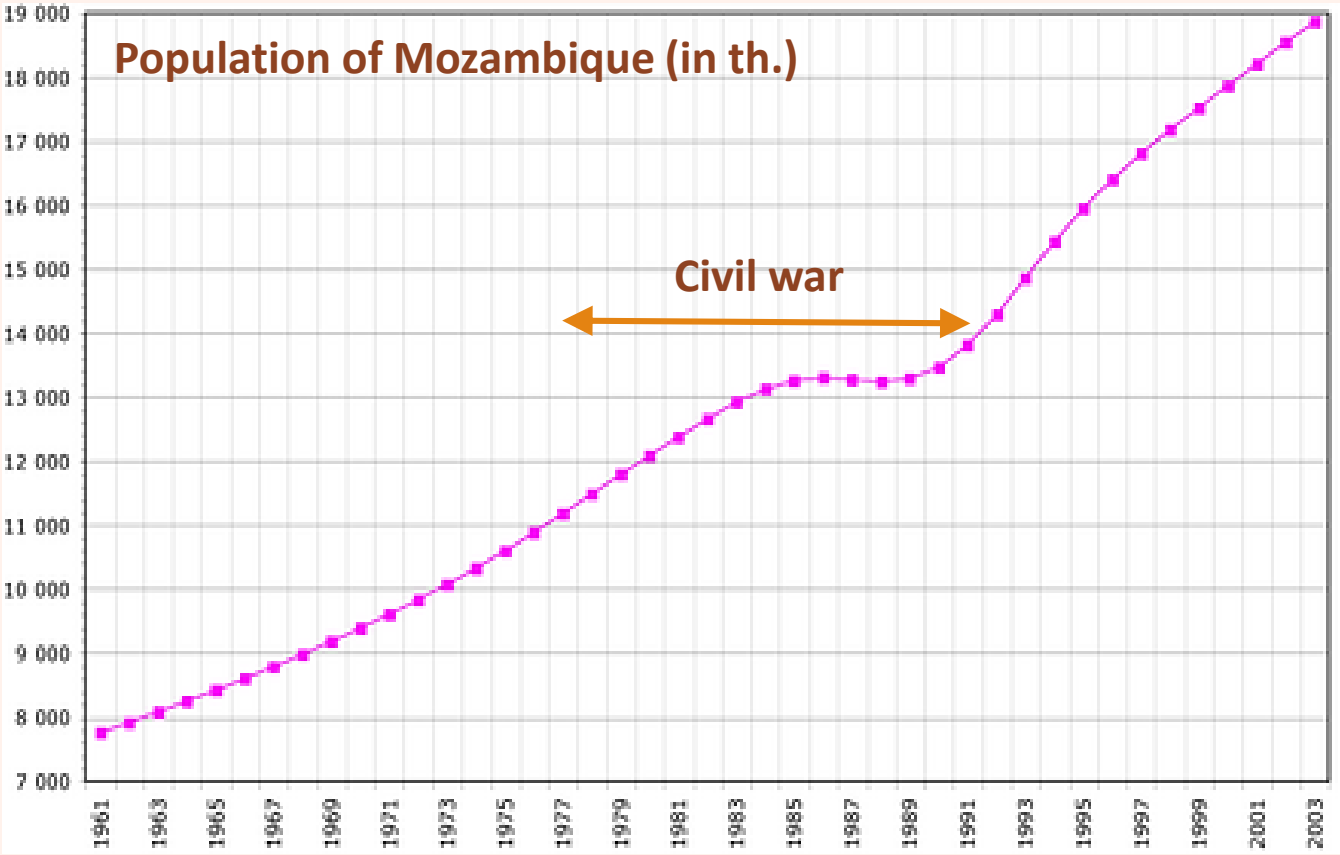
Historical and demographic context

- **Urban population growth rate: +3%/year since 25 years**
- **Civil war: 1975-1992**
- **The collapse of public services in rural areas accelerated the pace of urbanization during a period when the government had limited investment capacity.**



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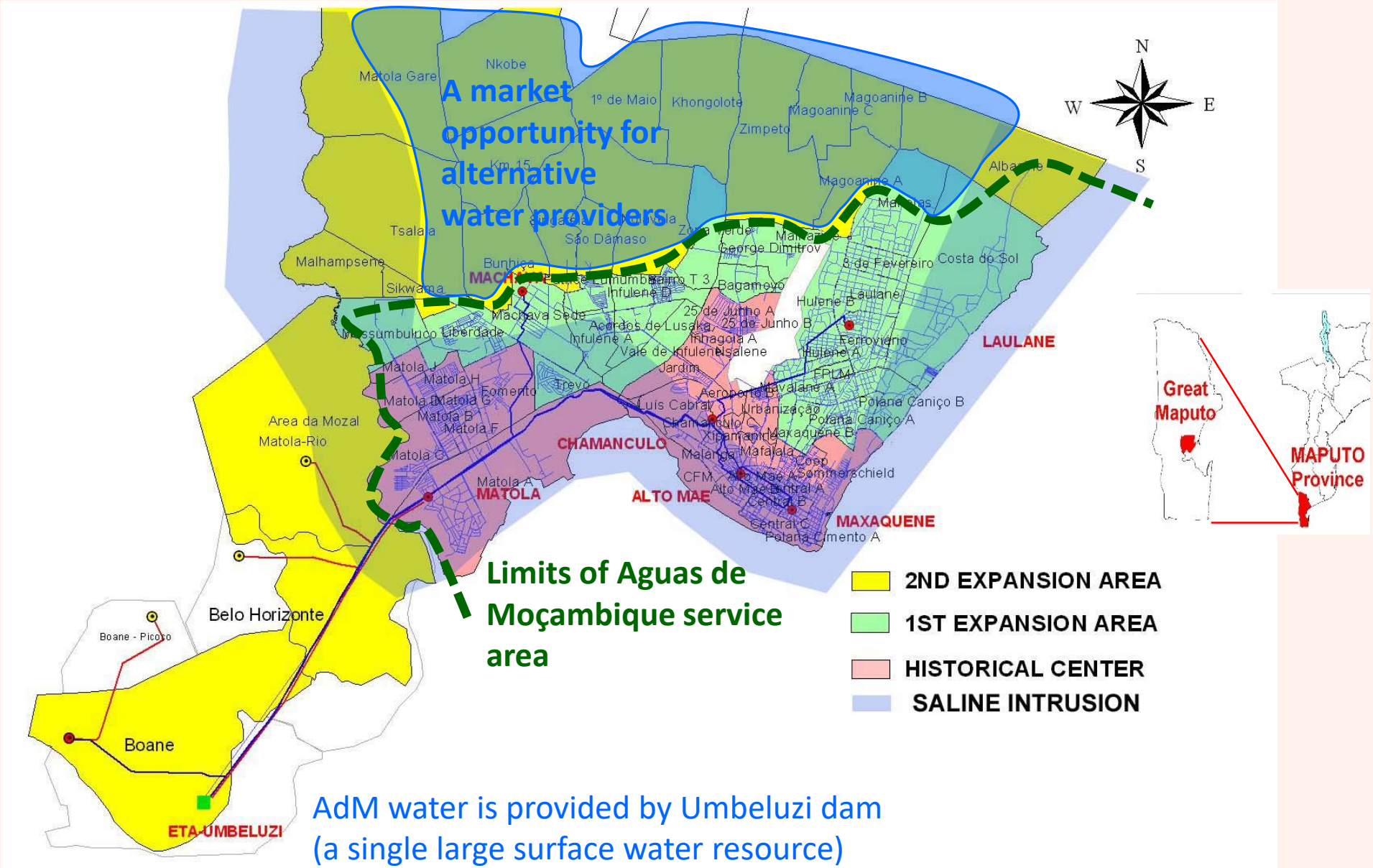
Water service shortage and alternative options



AdM water is provided by Umbeluzi dam (a single large surface water resource)

POPs : Pequenos operadores privados

- The main alternative service to the water public company is provided since 20 years by small private water companies (the so-called « POPs »)
- These companies have been developped by middle-class entreprendeurs who invest in a simple water system (a borehole, a water tank and few km of pipes)
- The standard of service are quite high (24/7 service, house-connection, metered connections, WHO quality standards…)

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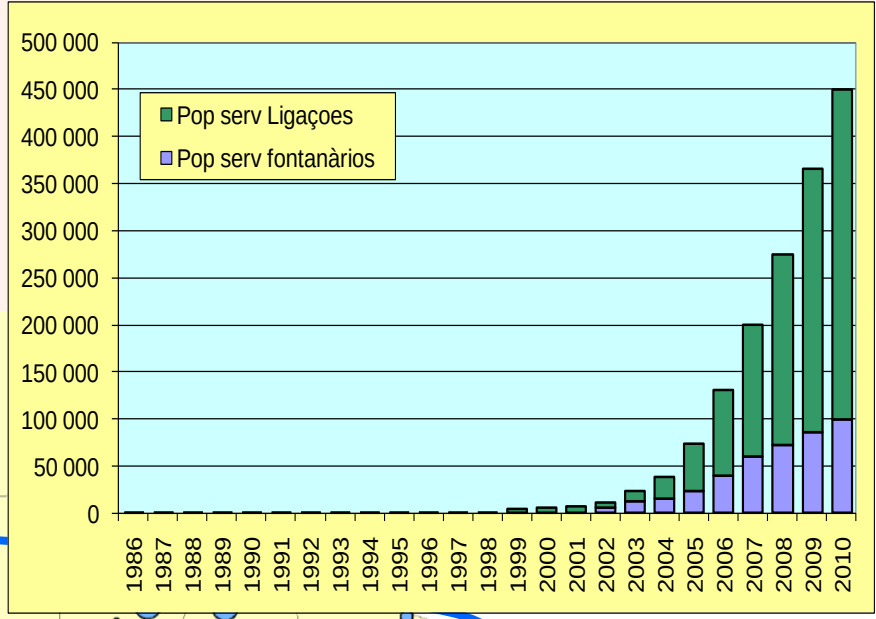
The rising POP business

- 400 POPs operate 500 water systems
- Almost in the northen part of Maputo/Matola city
- Where the water utility had not yet implemented water networks



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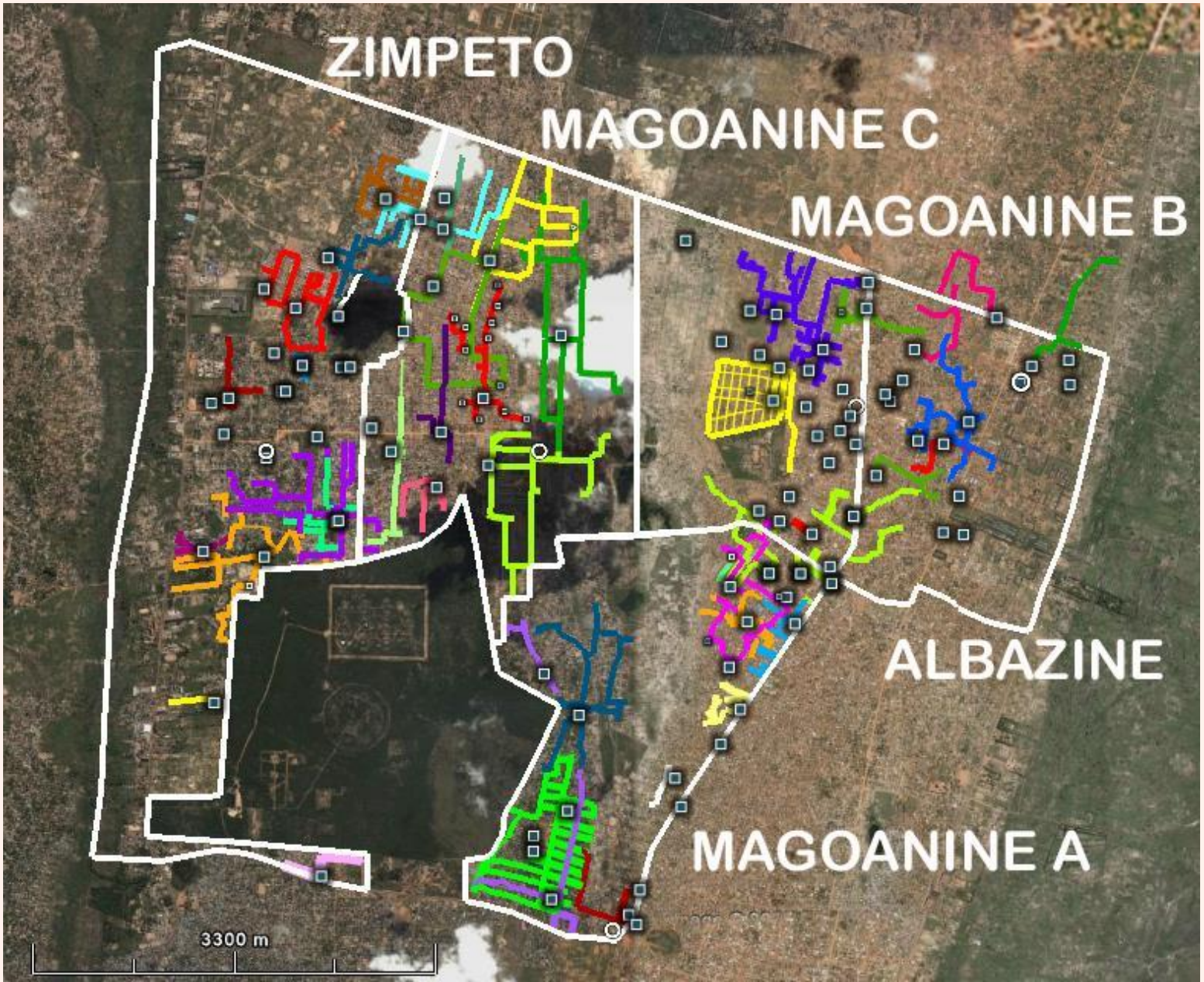
POPs' main service area



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Competition in the market

- No monopoly
- Each POP negociate a license with the local government
- And to its best to increase its customer basis

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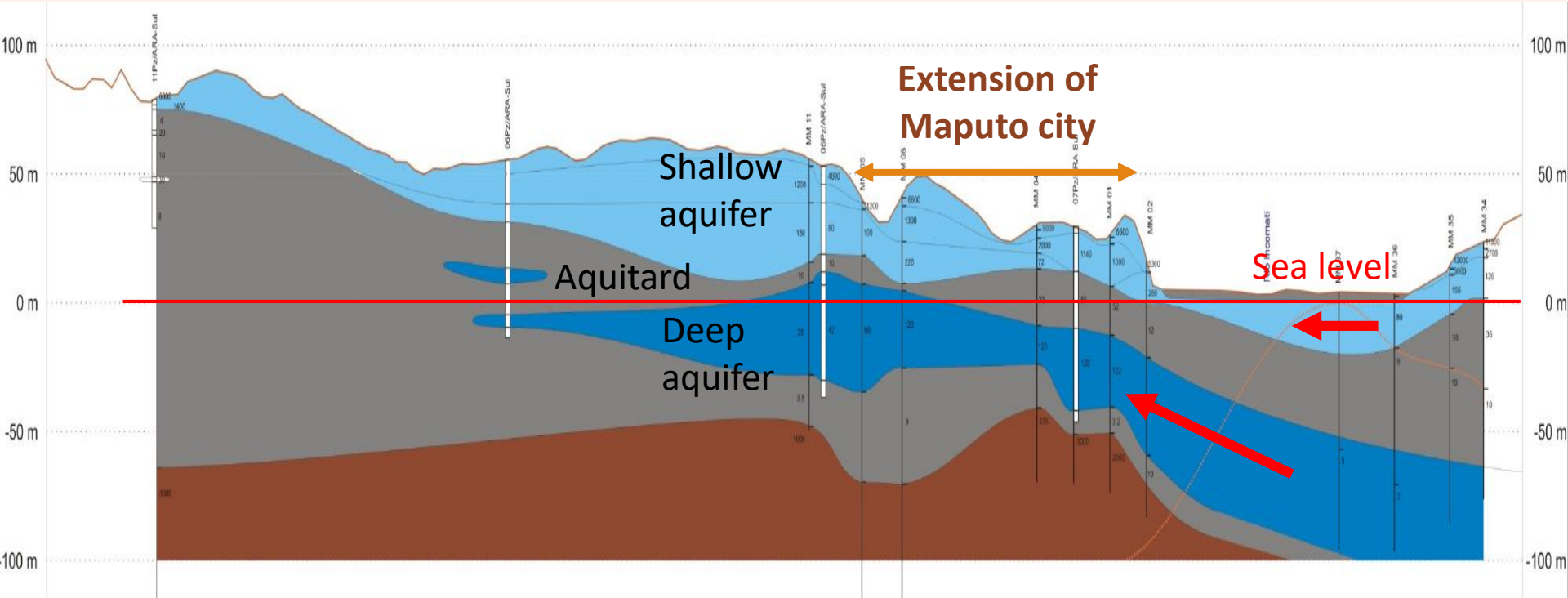
Shallow aquifer opportunity

- What is the magic recipe behind this incredible success? Municipalities that have not hindered private initiatives....and a highly productive and easily accessible aquifer
- The city is located on a sandy catchment (Quaternary) containing a quite good shallow aquifer (majority off wells use this aquifer)
- This aquifer is not vulnerable to sea water intrusion

NB: Recent deeper boreholes (> 80 m) reach a productive second aquifer where sea water intrusion is a major concern



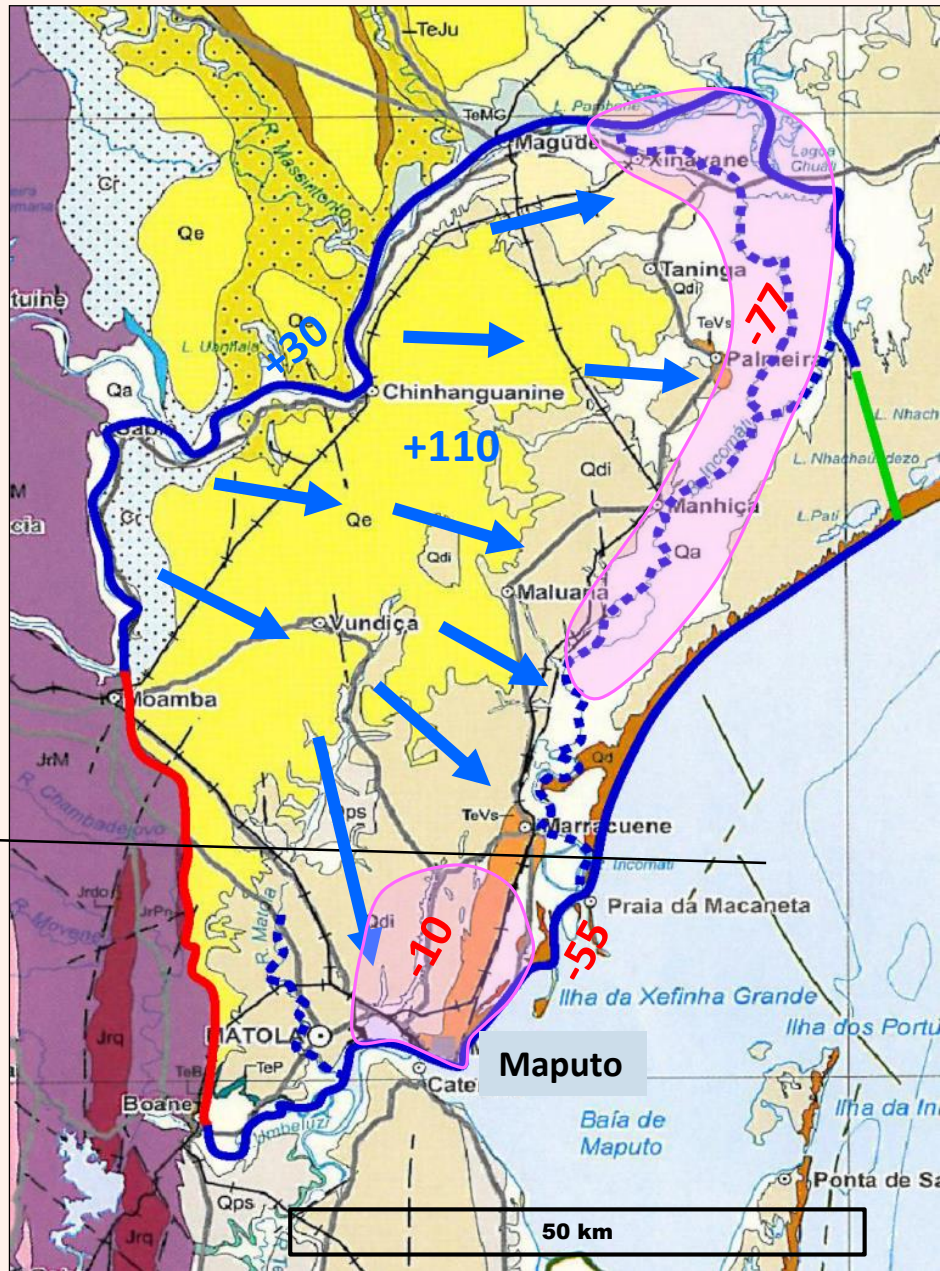
2. Water service shortage and alternative options

Aquifer extension: 4,000 km2

Rainfall: 600 to 800 mm/year

Water balance:

- **Upper Incomati river infiltration: 30 Mm³/y**
- **Rain infiltration: 112**
- **Abstraction for irrigation: -77**
- **Abstraction for urban water: -10**
- **Drainage by lower Incomati river: -55**



Geological cross section

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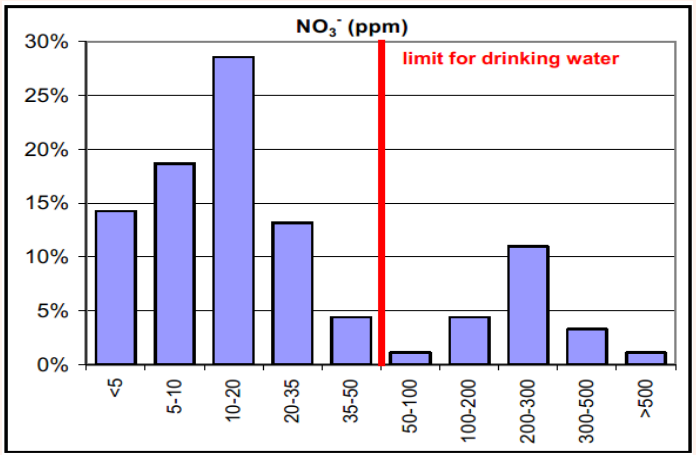
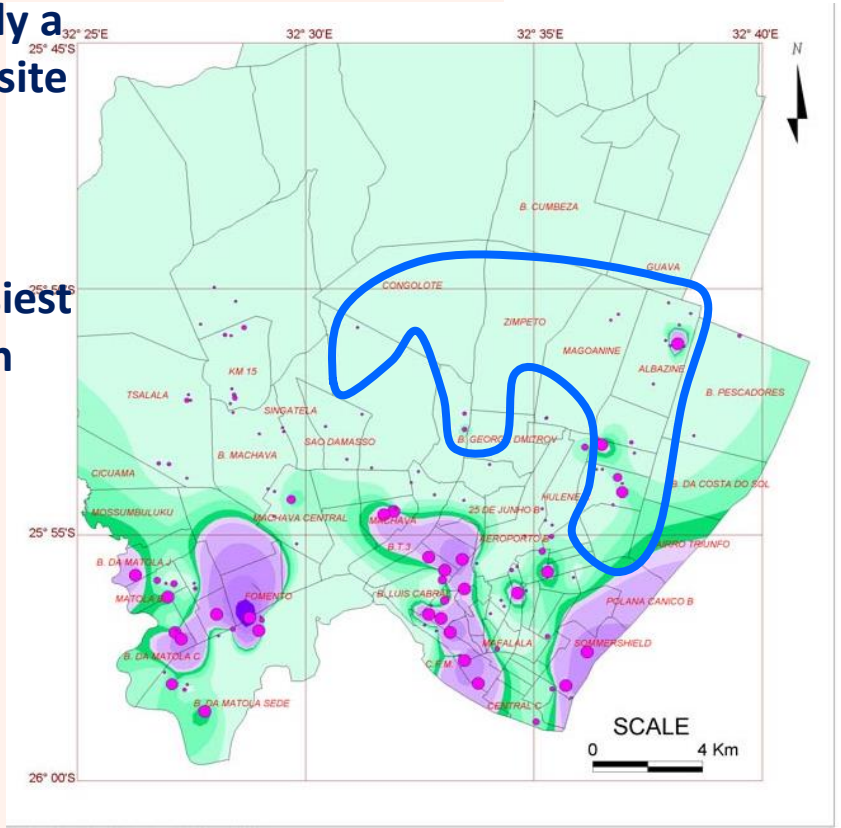
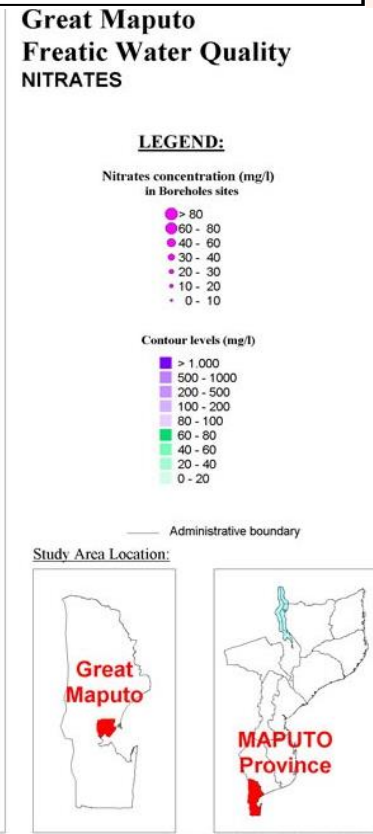
Threats on public health and groundwater

Nitrates

- 20% of groundwater samples content nitrate above WHO and national standards for drinking water
- Most of nitrate has presumably a link with low standards of on-site sanitation (pit latrines)
- The contamination is more intense in the oldest and densiest parts of the city (but not yet in POPs' service areas)







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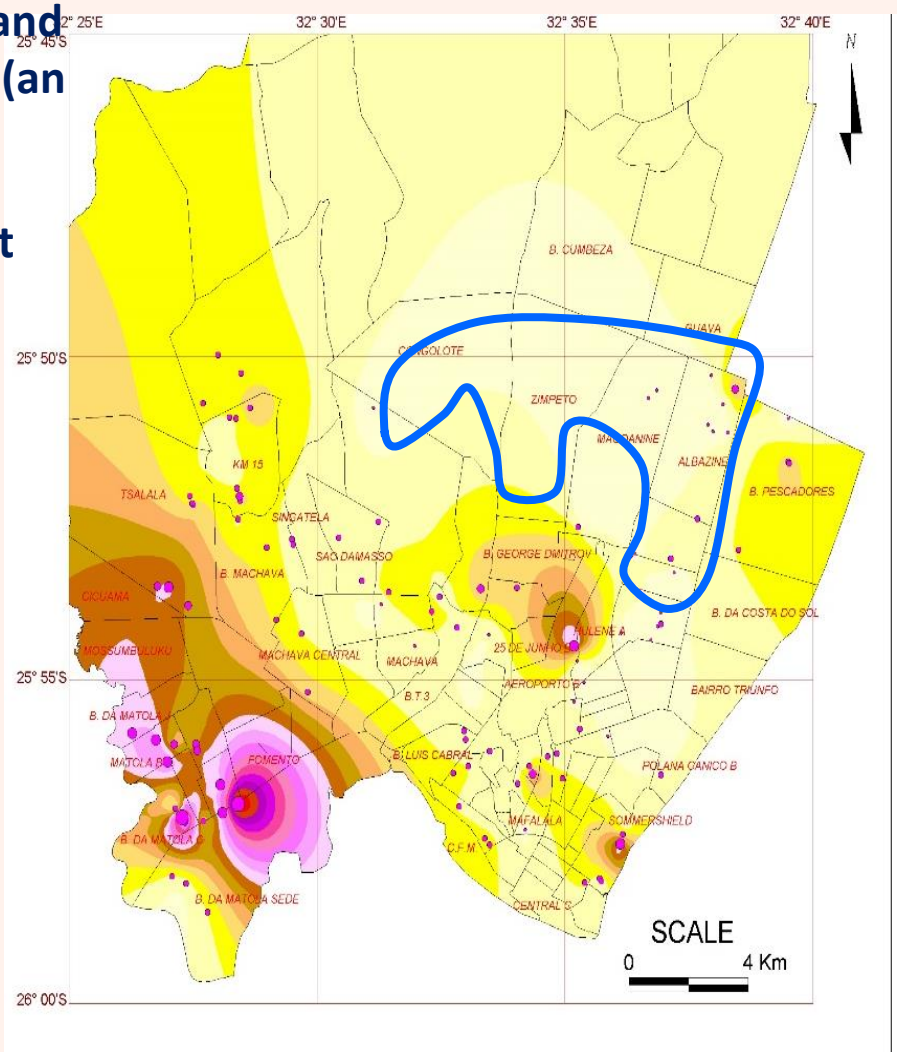
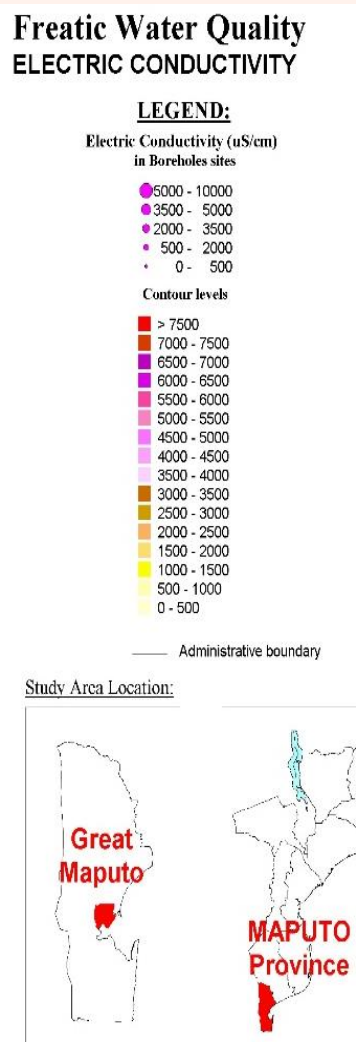
Threats on public health and groundwater

Sea water intrusion

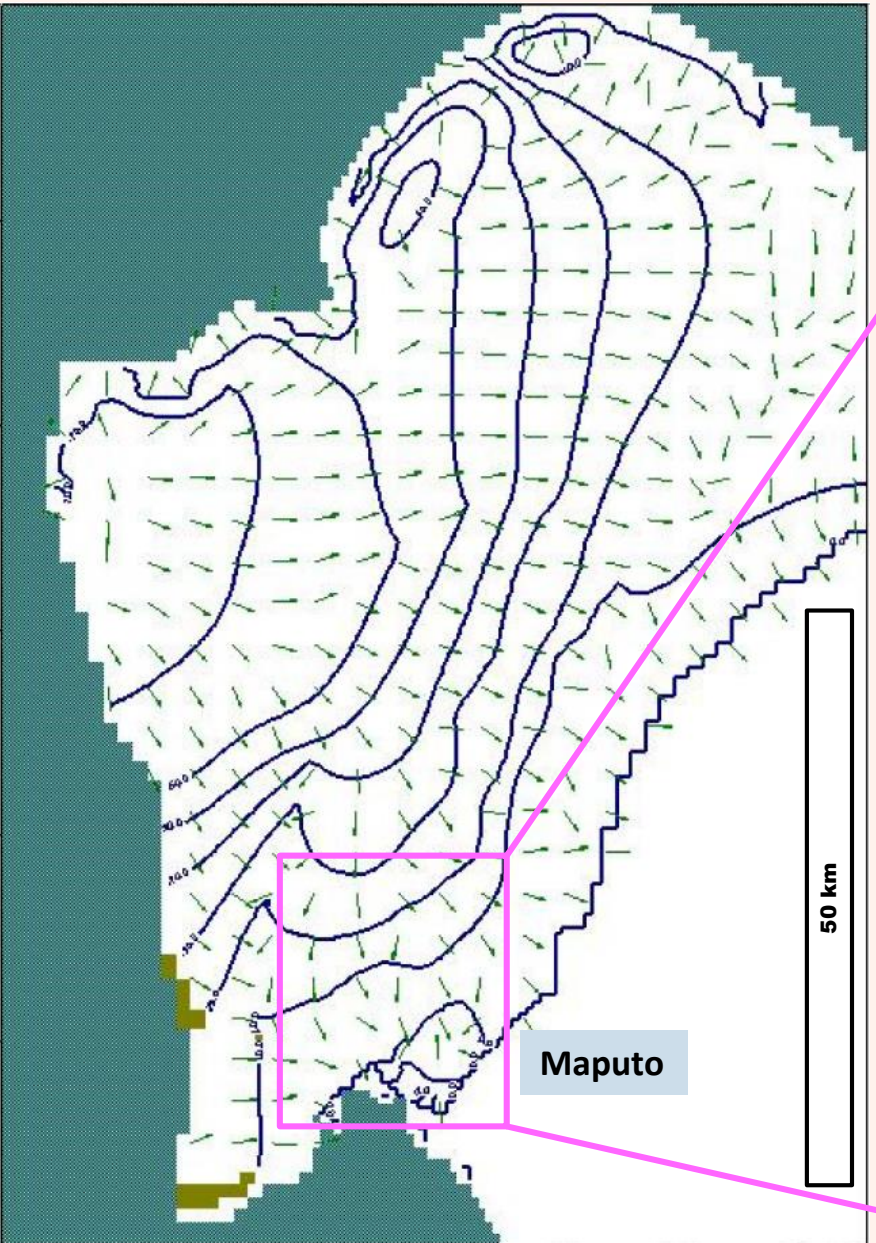
- The contamination is more intense along the sea shore and in the lowest part of Matola (an estuary)
- Sea water intrusion is not yet perceptible in the core POPs'service area

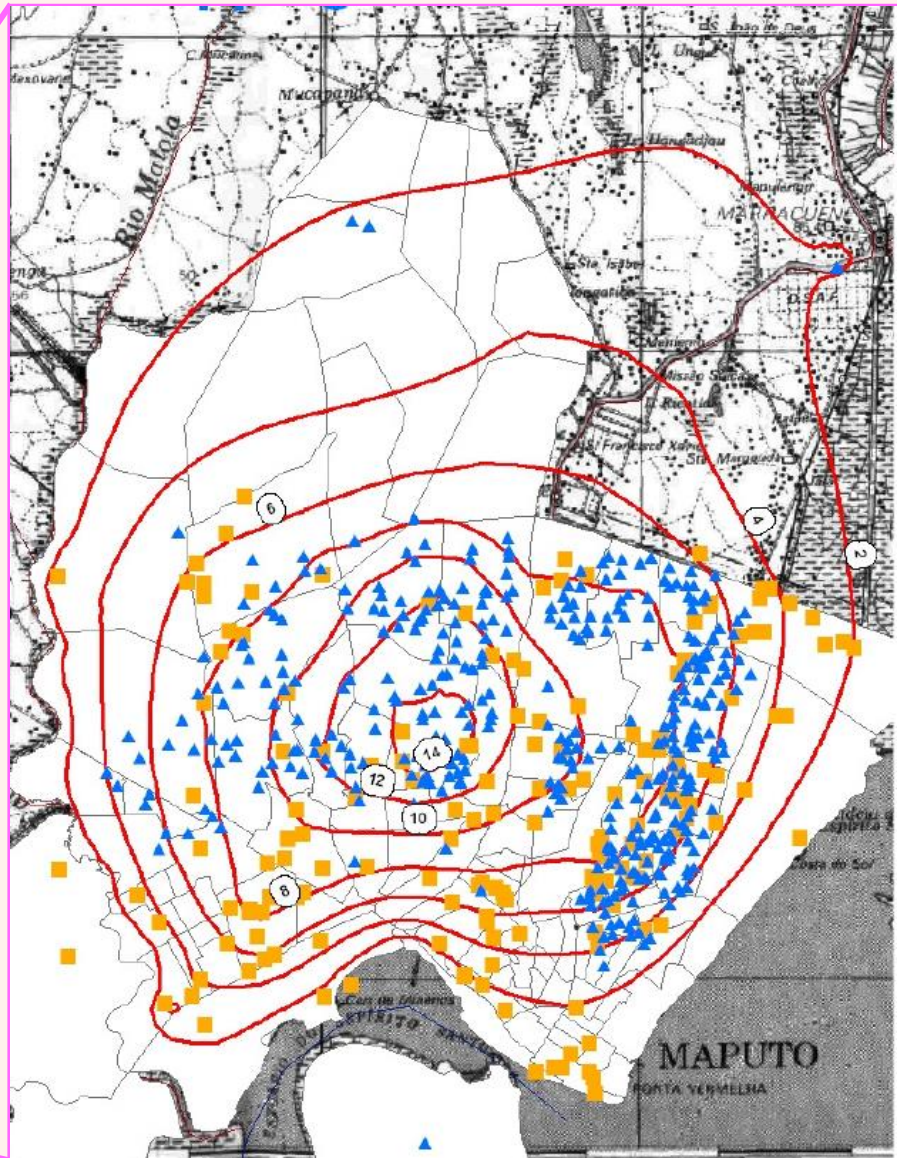




Threats on public health and groundwater

Aquifer depletion





Charybdis or Scylla? What is the worst public policy to supply water to northern Maputo?

- to have 40% of inhabitants deprived from 24/7 water supply ?
- to have 40% of inhabitants using local groundwater sources, for a while (20 years) but compromising groundwater quality on the mid-term ?

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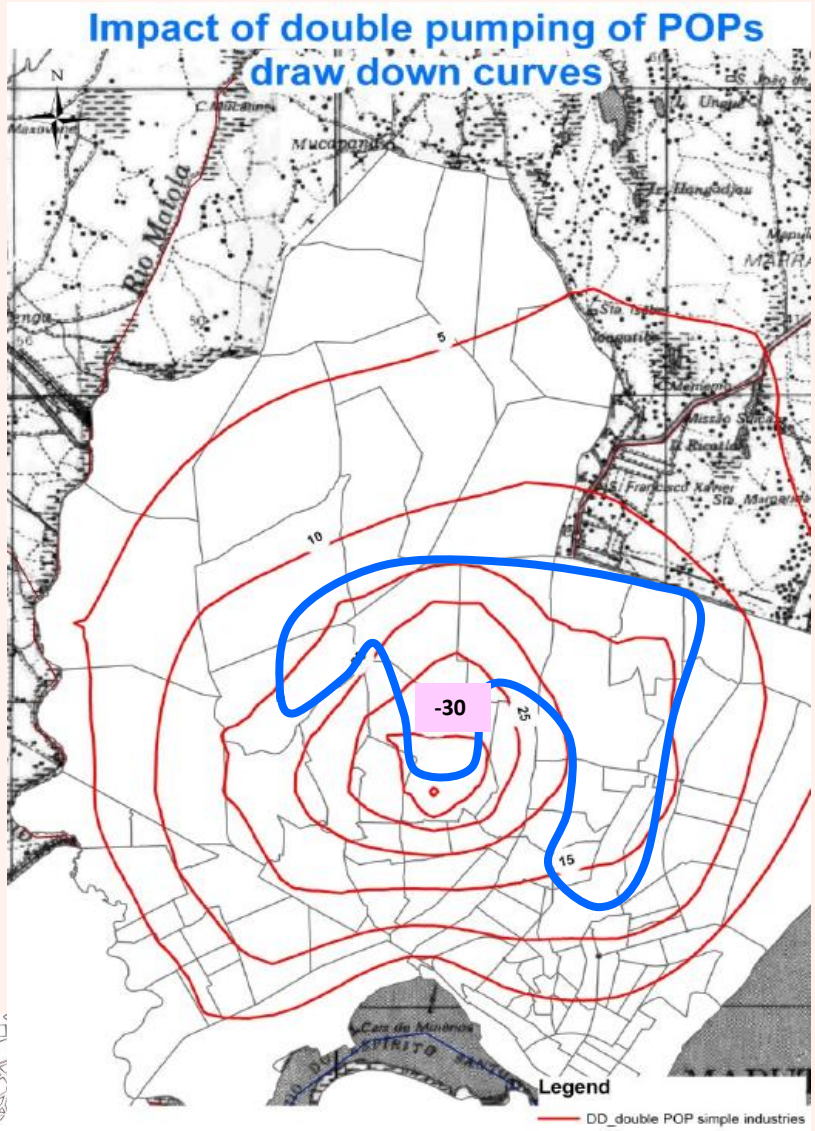
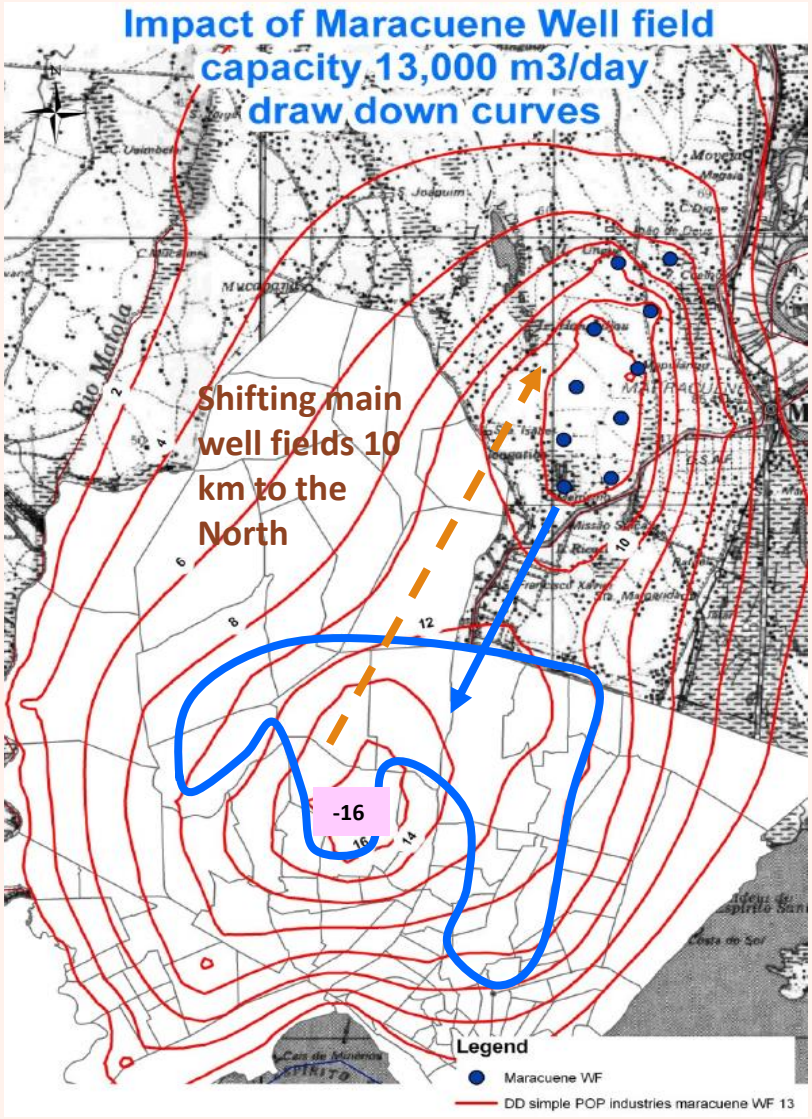
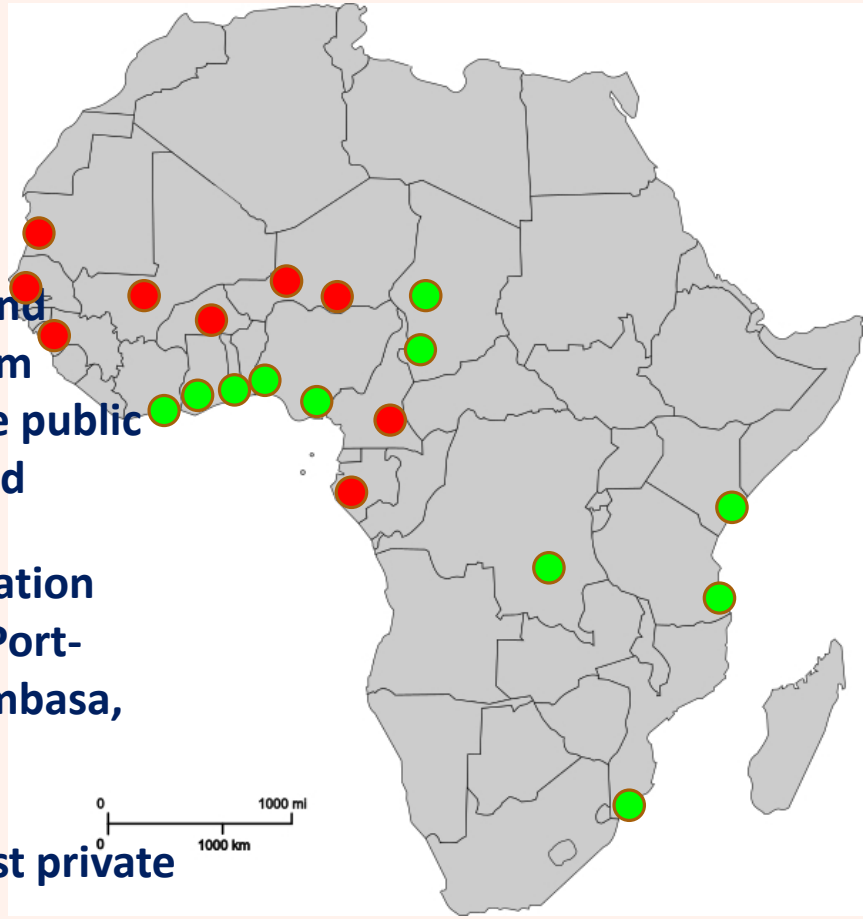
How to optimize POP service provision?

Shifting well fields further to the North





Lessons and potential for replication



- Shallow groundwater, when available (quantity and quality) is an amazing opportunity for a short-term development of water services in cities where the public water utility cannot meet the rising water demand
- Many large African metropolies are in such a situation (Dakar, Monrovia, Accra, Lome, Cotonou, Lagos, Port-Harcourt, Lubumbashi, Moundou, NdjamenaMombasa, Dar-es-Salam)
- The local private sector is able (and keen) to invest private money in small water systems
- Groundwater contamination (by on-site sanitation) is a central issue in most of these cities, with little hope for improvment during the next 20 years
- Regulation of dozens or hundreds of small private companies is difficult but not impossible: it requires to negociate fair deals, preserving the investments made by the entrepreneurs

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Groundwater Quality 2019

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Thank you

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