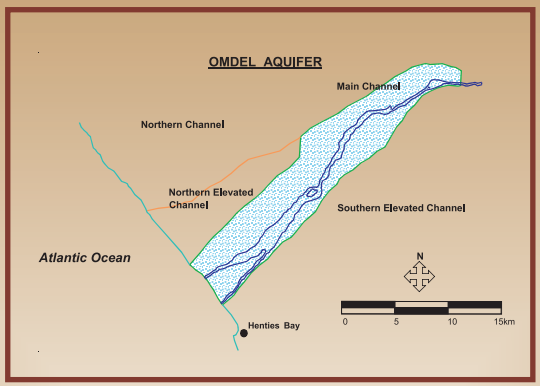
10.5 Infiltration basins in the Namib Desert

(by Surene Zeelie)

The coastal towns of Henties Bay, Swakopmund and Walvis Bay, with a mean annual rainfall of less than 50 mm/a, depends solely on groundwater. These towns are supported by two borehole schemes associated with groundwater in paleochannel systems, of which the OMDEL (Omaruru Delta) Aquifer is used for artificial recharge and abstraction.

Natural groundwater recharge is very low and only occurs when floods occur in the ephemeral Omaruru River. As a result of over-abstraction since the mid 1970's, groundwater levels have dropped tens of metres. The aim of artificial recharge is to reverse this negative trend by rapidly replenishing the aquifer when river runoff is available.

Swakopmund



The Omdel Aquifer

10.5.1 THE HYDROGEOLOGICAL SETTING

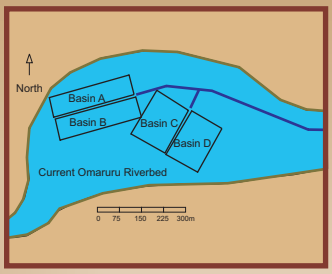
The OMDEL aquifer system consists of an alluvium wedge incised into granite. Of the four paleochannels present, only the Main Channel contains potable water.

Recharge is severely hampered by silty clay layers deposited on the surface of the riverbed, and as a consequence only ~1 million m^3/a recharges the aquifer after an average 14 million m^3/a flood event.

10.5.2 THE ARTIFICIAL RECHARGE SCHEME

The artificial recharge scheme consists of four infiltration basins. These are operated in a routine of infiltrating, drying, scraping and refilling. Infiltration starts at a rate of 1.2 m/d and can be maintained for 2 weeks.

Thereupon rapid clogging (silt) decreases the infiltration rate to 0.5 m/d and the top 5-10 cm of silt is removed with a grader after drying. The entire infiltration cycle normally continues for approximately 3 weeks.



Layout of the infiltration basins

The two western infiltration basins

10.5.3 The effectiveness of artificial recharge

There have been two artificial recharge events since the construction of the scheme. One was in 1997/8 and the other in 2000. In both cases 18 million m^3 was retained in the OMDEL dam for the purpose of recharging the aquifer. It is estimated that 52 - 53% of this volume was successfully infiltrated to the aquifer after each event. This is water that would otherwise have been lost to evaporation. As it is, most of the retained water that did not infiltrate the sub-surface was lost to evaporation.

10.5.4 Conclusions at OMDEL

This case study shows that even in arid areas artificial recharge by means of infiltration basins can significantly increase the stored water reserves. Surface runoff that would normally be lost to evaporation can be safely stored in the underground.

The operation of the scheme is cheap and easy. It is, however, essential to have a dedicated operation and maintenance team to maximise infiltration and the effectiveness of the scheme.

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