

## Salt

Rainwater is nearly pure, with rain washing out only minuscule amounts of dust and salt suspended in the air. Far from the coast, groundwater in the Cederberg is nearly as pure as the rain due to the preponderance of quartz, which is only fleetingly soluble in water. Groundwaters tend to be saltier in coastal areas, as the rain washes salt deposited from windblown seaspray and dissolves calcite shells, which are far more soluble than quartz. Rivers return these salts to the sea. But fully one-third of the rain that falls on land globally doesn't make it to the sea. Instead the water collects within landscape hollows having no passage out. If evaporation exceeds precipitation, then, rather than a lake, a pan forms – the large pans of Magadigadi and Etosha are examples in southern Africa, while smaller pans are scattered throughout the Karoo, as well as the West Coast.

A series of inland salt pans occur among the Darling Hills, for example, fed by a mix of surface runoff and groundwater seeps (Fig. 68).<sup>37</sup> In some instances, the pans occur behind small, lunette dunes, so called because of their crescent shape. The dunes formed during a drier climate around 8 to 10 thousand years ago by sediment windblown off the dry riverbeds. When wetter conditions returned, runoff from the surrounding hills and water seeping out of springs was dammed behind the lunette dunes. In the dry summer months an evaporative salt crust 10 to 20 cm thick is harvested by farmers.

Salt pans are also common in coastal lagoons or embayments that are periodically isolated from the sea. Episodic flooding by seawater can result from changes in sea level, as well as from coastal barriers, either natural (sand dunes most commonly) or artificially constructed for salt works (Fig. 69). Every litre of seawater contains 35 grams of dissolved salts that crystallise out in a specific order as water is removed by evaporation. The two most abundant salts are halite and gypsum. Gypsum is a hydrous calcium sulphate mineral ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) that comes out after 75 to 80% of seawater has evaporated and familiar

to many of us as cretstone or plaster of Paris.



Figure 68. Salt pan in the Darling Hills.



Figure 69. Salt works on the south banks of the Berg River estuary at Velddrif.

Halite (NaCl, common table salt) is the most abundant salt in seawater by far and comes out after 90% of the water has evaporated.

Coastal salt pans can form behind dunes of dammed rivers or from the overwash of ocean storm waves trapped behind coastal dunes. The Yzerfontein salt pan formed during the previous highstand of the sea 120 thousand years ago. The pan was once a coastal lagoon that became cut off from the sea by dunes that were repeatedly breached. The pan became isolated from the sea as coastal dunes grew and is today flooded by winter rains that dry out in summer. Its salt was mined by early European settlers and its gypsum is still mined today. A good example of an active coastal salt pan is Anichab, located in southern Namibia 60 km north of Lüderitz (Fig. 70).<sup>38</sup> Anichab was flooded by the sea 7000 years ago when sea level was 3 m higher than today. Sea level has since dropped to its present position leaving the pan high and dry, isolated from the sea by coastal dunes that are only episodically breached by large storm waves. Each major storm overwash evaporates and leaves another layer of salt behind.

On the edge of the Namib Sand Sea runoff pools into ephemeral lakes, such as at Sossuslei (Fig. 71). The lakes dry out from evaporation until all that is left is a thin white crust of salt. Some of the water soaks into the porous orange sand and slowly flows below the surface, unseen and out of reach, toward the sea. Eventually these brackish waters seep out along the coast. For example, coastal seeps at Anichab Pan support reeds and small herds of gemsbok who dig with their forelimbs through 40 cm of sand to reach the brackish water below. These seeps were also used to grow vegetables by the early German diamond miners.

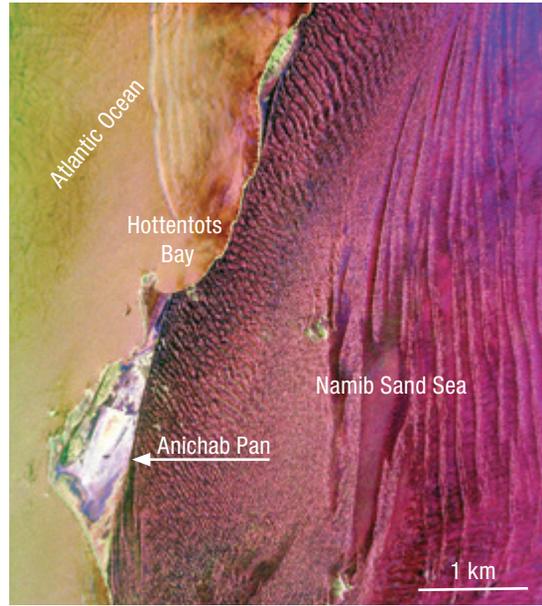


Figure 70. Spaceborne radar image of the Namib Sand Sea (magenta) and Anichab salt pan (white, lower left).

Figure 71. White salt crusts left behind on ephemeral lakes at Sossuslei (people lower left for scale).

