WATER HISTORY

South Africa's first state dam is a memory of greener times

Vanwyksvlei in the Northern Cape is not associated with water. Ongoing drought has turned the landscape to dust, but even before, the region was described as one of the driest in South Africa, already a dry country by international standards. The landscape is now nearly devoid of vegetation, nevermind water but, signs that things were once different are rife. Petro Kotzé reports.

On local farmer, Vasie de Kock's property, tracks of tractors and harvesters are still implanted in the earth. Like his father and grandfather that farmed here before him, de Kock also planted crops like Lucerne. He remembers a time when boat rides were a fun activity. "Eventually you got tired of all the water," he says of the view as they went.

The source of these memories is the Vanwyksvlei Dam, located just outside the town that it was named after. Completed in 1884, it was South Africa's first state dam and was built on the dream of sustainable irrigated farming operations. Now, the near-defunct infrastructure stands as testimony of the complexities involved when man tries to tame nature, and the ripple effect when water is harnessed, and disappears.

The history of the dam

Economy is synonymous with water at Vanwyksvlei, wrote JCS van der Merwe in his 1979 regional historic sketch of the region. The first migrant farmers (***trekboere***) in the region depended on rainwater that gathered in eddies, marshes and pans, and when these dried up, dug holes in the riverbanks to capture seepage. Later, reservoirs were built and water hauled from wells, that were progressively dug deeper as the water table fell.

Garwood Alston, a surveyor that settled in South Africa in 1856, eventually on the farm Botterleegte in Vanwyksvlei, saw the potential for an irrigation dam. At the place he had in mind, the ridges lie close to each other and the valley that would feed the

dam had a large catchment area.

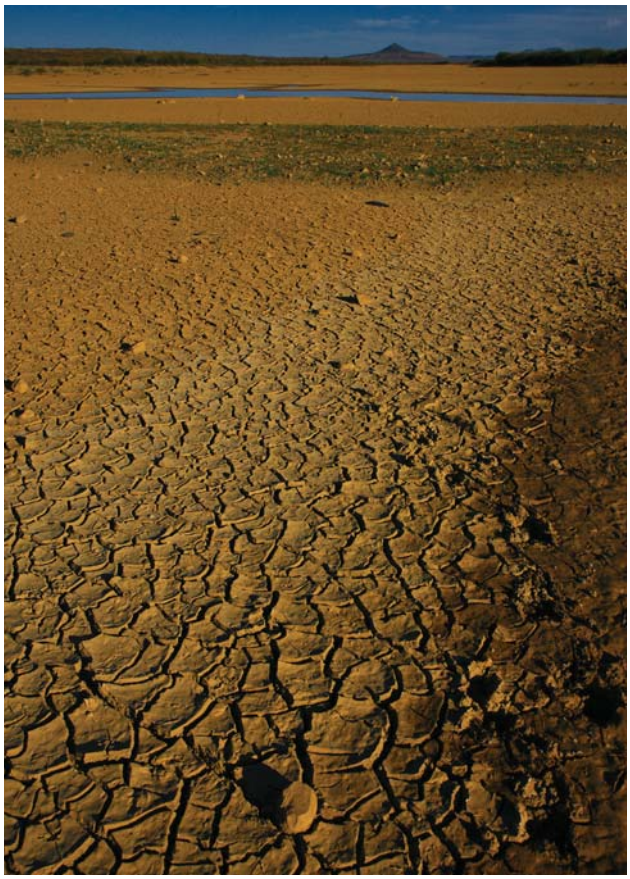
Alston describes the location in an 1891 article published in the ***Transactions of the South African Philosophical Society*** as on an affluent of the main river draining the Carnarvon Division and about seven miles above the junction of two streams.

Designed and constructed by South Africa's first appointed hydraulic engineer JG Gamble, construction started in 1882. The wall was built from gravel and sealed with clay to prevent seepage. Donkeys and oxen pulled bowl graders and wheel graders the haul the building material to the site. Van der Merwe wrote that the roads used by the donkey and oxen-pulled carts were still visible against the slopes of the ridges. Cowhides with wooden carriers inserted on each side could also be filled with soil and carried by two men. The final dam wall was 311 m long and 9.7 m high, with a watermark height of 8.2 m.

The water service was regulated from a tower that was built at the eastern point of the dam wall. Five sluices (from the United Kingdom) were mounted on it, and was opened and closed with a meter-long key. Access to the tower was via 13 iron steps, but once the water level reached four meters it could only be reached by boat. A bridge to the tower was later built in 1883 from the dam wall.

Van der Merwe said that the wall cost £33 000 at the time. According to reports, the large dam was completed in 1883, a six-mile distribution furrow was made in the summer of 1884/5 and the arable lands were put under cultivation in 1885. There was also a supply furrow of nine-and-a-half miles long.

Chris Marais/Karoospace



Vanwyksvlei Dam, in the Northern Cape, was the first dam to be constructed by the state in South Africa

"It is calculated that if filled to the depth of 27 feet (measuring to the sill of the discharge pipe) the reservoir will contain 35 000 000 000 gallons – thirty-five thousand millions! Say even hundred times as much as can be stores by all the Cape Town reservoirs together, or eighty times as much as the Beaufort West dam can contain," writes Alston.

However, at the time he wrote the report, the dam had never saw that much water. The irrigation farming operations that developed were also still at the mercy of the seasons.

"There being no permanent streams in the neighbourhood, the dam is entirely dependent on periodical floods for its catch of water, and the area cultivated is again dependent on the quantity of water at command in April or May (the beginning of the sowing and end of the rainy season) each year," wrote Alston.

Though the land for irrigation was described to be limitless, at least "probably two thousand morgen (1 713 hectares) within the triangle" (formed by the two streams) and another two thousand on the right bank of the main stream, only an average of 300 morgen (257 hectares) per annum were sown for the six years from 1885 to 1891.

In an 1886 report Alston mentions that he limited irrigation to 560 hectares (700 morgen) but that he could add another 616 hectares should the main canal be enlarged three times, especially since the season for ploughing was so short, and all the farmers needed water at the same time.

Six years after the dam was complete, Garston wrote that the experience shows that "drainage from four hundred square miles enables us to cultivate one square mile under wheat crop. The cultivation of garden ground and supply of water stock may perhaps reduce this extravagant proportion to, say, 300 to 1 as effective power of the dam." Then, he said of the area, that "few dams catch so much more water during the rainy season that will be lost by evaporation and soakage during the whole year, as will enable the owner to irrigate more than a small patch below each dam."

Though mention was made of increasing the catchment area to the dam, Garston thought it premature, due to the constant loss of water to seepage and evaporation.

"Under the natural conditions, as stated, the dam is found to catch but little more than enough water to meet its loss by evaporation and infiltration. The loss being provided for, nearly all the water supplied by the canal is a clear gain, and the water at command for irrigation purposes is very much augmented."

He describes the impact of the extra water being made available by the dam as follows: "The difference is akin to that between having just enough to live upon and having enough to live upon and something to spend on luxuries."

Still, originally a farm, the construction of the dam led to the growth of Vanwyksvlei as town. Early developments included residential home, a church, school and store.

More than a century later

Today, the dam still contains water at times but the irrigated agriculture it was meant for is a mere memory. Gawie van Dyk, the DWS Director for Water Use Regulations, based in Kimberley, says that the department is in the process of formally dissolving the long-defunct Vanwyksvlei irrigation board.

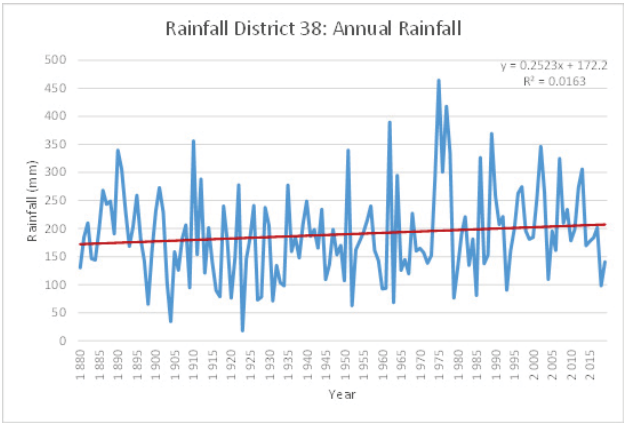
Yet, De Kock remembers very well when they used to tap water from the dam. During a good year, he could cut around 1 600 bales per harvest. "That water came from Vanwyksvlei Dam," he says. Then, three transport trucks drove the Carnarvon road "to dust" careening the harvests to and fro.

De Kock also remembers the 'water fiscal' (named after the bird, also known as a Jackie hangman) that cycled along the water canals on his bicycle, checking that each farmer does not take more water than his share.

"The last lucerne died on the field," he says. "Since then, it just doesn't get water anymore." He says it must be around a decade since they last planted.

Mostly, the ongoing drought is fingered as reason for the demise of irrigated agriculture from Vanwyksvlei Dam. An article in ***The Water Wheel*** (March/April 2020) reports that since 2013, the area has been unusually hot and dry. The lowest rainfall in the province since 1922 was logged in 2019, while that year, with 2015, can be considered to the two hottest in South Africa since at least 1951 (about 1.1 degrees Celsius above the 1981 to 2010 average). The drought is reported to be unusual not only because of that, but also because only the late forties and early fifties, and the first half of the sixties show a similar scale of grouping of dry years since at least 1921.

Data from the South Africa Weather Service (SAWS) allows us to look even further back. Dr Andries Kruger of the SAWS says their data for Vanwyksvlei go back to 1879. Though the past couple of years have been very dry, he says, there is however no long-term decrease of rainfall.



Rainfall data for Vanwyksvlei from 1880.

"Long-term rainfall trends show negative tendencies only in the South-west Cape and the far north eastern parts of South Africa." He adds that dam levels obviously depend on rain in the entire catchment area.

Chris Marais/Karoospace

The Vanwyksvlei Dam is more often than not dry.

The thirsty Prosopis

Alston himself might have unknowingly contributed to water scarcity in the Vanwyksvlei area. In a letter to the editor of the ***South Africa Agricultural Journal***, he writes that he was sent a few seeds of mesquite (***Prosopis dulcis***) and screw-bean trees (***Prosopis pubesceens***) some 35 years earlier by a John Marquard. Their interest was in the plants for fodder and shade in the arid Northern Cape. He notes that he failed to grow mesquite but the screw bean "took kindly to the ***brak*** soil and ***brak*** water, growing and seeding freely on my old homestead."

A 2012 study published in the ***Journal of Arid Environments on Water relations*** and the effects of clearing ***Prosopis*** on groundwater in the Northern Cape, reports that several ***Prosopis*** species introduced to South Africa have become invasive. In fact, the IUCN has declared the plant one of the world's worst invasive species. In the Northern Cape, the report continues, the largest density is to be found in the alluvial floodplains of the province, where their invasion has increased from 127 821 ha in 1974 to 1 473 953 ha in 2007, roughly doubling from 2004 to 2007.

The project's study site was conducted within the riparian zone of the Rugseer River, approximately three kilometres southeast of Kenhardt (about 130 km from Vanwyksvlei). In the study area, mean Prosopis tree density was approximately 700 plants per ha.

However, the density of ***Prosopis*** at and around Vanwyksvlei, including the catchment area of the dam is said to be substantial too.

Through isotope analyses, the study demonstrated that plant is deep-rooted, reduces groundwater levels and leads to a decline in borehole levels. They found that savings of up to 70m^3/month can be achieved for each hectare of ***Prosopis*** cleared.

Source: Water relations and the effects of clearing invasive Prosopis trees on groundwater in an arid environment in the Northern Cape, South Africa by S. Dzikiti, K. Schachtschneider, V. Naiken, M. Gush, G. Moses and D.C. Le Maitre

"There being no permanent streams in the neighbourhood, the dam is entirely dependent on periodical floods for its catch of water."

However, according to Kobus Streuders, Acting Provincial head of the DWS Northern Cape, the drought is a minor contributor the dam falling in disuse. "The fact that all the runoff water that used to flow into the dam is now being used upstream, caused it."

In particular, with the development of sow-dams (***saaidamme***) upstream of Vanwyksvlei Dam in the seventies and eighties, not much water flows from the catchment area to the dam anymore. "Almost all the water is diverted and used upstream," he says. It's only during floods that water now reaches the dam.

Streuders adds that due to salinisation (***verbrakking***) the water is not suitable for irrigation after only about six months. Due to the low inflow and bad water quality sustainable irrigation from the dam, like in the early 1900s, is not possible anymore, he says.

In her blog on life at Vanwyksvlei (karooblog.wordpress.com) author Leonette Smit writes that the dam has been a good place for locals to relax for many years. In a February 2017 post she says that there was not one drop of water in the dam when she and her husband went there for a sundowner. A couple of days later, after some rain fell in the area, the dam had water "as far as the eye can see," driving a visiting journalist to take a dip dressed in his underwear. De Kock remembers this too, noting that he had to wash himself in a nearby dam afterwards because of all the mud.

In answer to how life has changed since the dam does not fill substantially anymore, de Kock says that to an extent, it has led to unemployment, but that they have little choice but to continue nevertheless. "You simply adapt."

Drought the constant companion of Vanwyksvlei

Drought is a constant companion in the Vanwyksvlei area. In the ***South African Irrigation Department Magazine*** (Volume 2 Number 3) of July 1923 the Circle Engineer gave an account of the experience of farmers in the area: "The settlers are in a very bad way, owing to the drought and consequent losses of stock, in addition to the fact that owing to the reservoir [Vanwyksvlei Dam] having been so dry for so long no ploughing has been possible…Many of the settlers are so poor to be living on donkey flesh and as a measure of relief the Water Bayliff was empowered to employ some of the most needy residents as labourers to clean and widen the main furrow from the dam."