

Water and the environment

Jewel of the Northern Cape in fading due to pollution



Kamfers Dam – tourism jewel and once birders' paradise of the Northern Cape, is dying. Raw sewage and stormwater from nearby Kimberley is turning this once endorheic salt pan and important avifaunal habitat into a permanent cesspool.

Article by Phetole Peter Ramollo*.



Around 400 ha in size, Kamfers Dam is an endorheic saltpan situated about 4 to 6 km outside Kimberley in the Northern Cape Province. It is fairly shallow, with a maximum depth of less than 4 m. The wetland, a recognised National Heritage site, is home to a variety of waterfowl, but is dominated by flamingos, which attract tourists and generate valuable economic income for the area.

The pan is one of only four breeding areas in the world (and the only one in South Africa) where the Lesser Flamingo breeds. These beautiful birds, which are classified as 'near threatened' can be seen in their flocks feeding in the pan.

Outside South Africa, flamingos can be found frequenting the pans of countries such as Botswana, Namibia and Kenya where they filter planktonic cyanobacteria together with shallow littoral diatoms as well as a wider range of cyanobacteria and diatoms in temporary wetlands.

They feed by wading in shallow water with their bills upside down and filtering the tiny cyanobacteria from the surface. They also eat small crustaceans such as shrimps and other invertebrates. It is the carotenoids in their food sources that give them their distinctive pink colouring.

Flamingos are nomadic, moving between pans in which they feed in numbers. Their nomadic behaviour at Kamfers Dam has probably changed as a response to the unpredictable dynamics of their food supply in the short term, and the unpredictable status of the pan due to constant pumping of water into it.

Generally flamingos are sensitive to disturbances, and only breed when environmental conditions are favourable. The once safe haven offered to them by Kamfers Dam is now being threatened by urbanisation and resultant pollution. The pan has shown major water quantity

and quality changes with regard to high levels of nutrients and *E.coli*.

The Sol Plaatje Municipality is the management authority of the pan, and is trying to reduce the water levels. At present, water is being directed to Langleg Pan to maintain the water volume of Kamfers Dam.

Avian botulism outbreak

The seriousness of the situation is illustrated by the fact that, in 2013, about 1 500 waterfowl, including flamingos, died at the pan due to avian botulism. Avian botulism is a paralytic disease caused by a toxic produced by the bacteria, *Clostridium botulinum*, when it is ingested. This bacteria is naturally available, widespread and dormant as spores in the soil, especially in areas with high concentrations of organic material – such as with wastewater treatment.

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If conditions are favourable, the bacteria becomes active, the spores germinate and the active bacteria produces toxins. The birds then either ingest the toxin directly or eat invertebrates containing the toxin. The toxin affects the nervous system by preventing impulse transmission to muscles.

The decomposing vegetation at Kamfers Pan, the high recorded water temperature (30 °C), alkalinity (pH 10), high salinity (1 559 mg/l), total dissolved salts of 7 269 mg/l and low concentration of dissolved oxygen (2.4 mg/l) created an ideal environment for the bacteria to become active and start producing toxin. During the outbreak in 2013, the affected birds were unable to propel themselves with their wings, showed failure to use their legs and to keep their heads above the water as they tried to escape – many of them drowned. Others were found close to the water's edge.

Birds were found stuck between the reeds and sedges. At least nine species of birds were affected, particularly the Yellowbilled Duck and Egyptian Geese. In addition to migrating waterfowls, several dead shorebirds and flamingos were also recorded.

During the outbreak it took officials from Sol Plaatje Municipality, as well as the provincial departments of Agriculture, Land Reform and Rural Development and Environment and Nature Conservation to remove the dead and dying birds from Kamfers Dam. The dead birds were collected and incinerated to prevent further outbreaks while live individuals were taken to the Society for the Prevention of Cruelty to Animals (SPCA) where they were treated and later released.

Catfish in Kamfers Dam

A characteristic of the changing nature of Kamfers Dam is the fact that the pan now serves as a home for catfish. No previous studies ever recorded any fish species in the pan, and it was thought that the salinity in the pan would not make it conducive for the survival of fish.

Though it is not known how the catfish got introduced to the pan, during the outbreak of avian botulism, communities

residing next to the pan were seen fishing and collecting some of the sick fish. This was extremely disconcerting to officials as the decaying fish can create a conducive environment for *Salmonella spp.*

However, it proved very difficult to discourage the community from eating the fish due to the possible health risks. Residents simply responded that they had been eating the fish for the last ten years and never got affected.

From 2010 to 2012 the area experienced flooding. The floods coupled with constant inflow of urban waste overflowed. On the western side of the Pan the overflows created a big pool. In 2013, the water levels dropped and a pool was being linked to the main pan through a channel that passes through a culvert over the railway line. The pool is now a breeding place of catfish.

In 2015, the water levels further dropped significantly across the pan and the pool due to extremely high ambient temperatures of the area and the divergence of treated sewage being pumped into Langleg Pan.

In the western side massive fish death occurred due to water level decline that made the pool too shallow (3 cm in depth). At this stage the pool and main pan was no longer connected, so the fish in the pool got trapped in the shallow water. Thousands of fish were gulping for oxygen at the water edges and thereafter started dying in numbers due to lack of oxygen, space and competition of food. Most of the fish that were in the channel survived for days while others managed to move into the main pan.

By the time they reached the main pan (connected through a small furrow/channel) they were already too stressed and started dying. More than 3 000 fish died and three different water bird species. Some started rotting in the channel area further polluting the water. Around 750 fish were translocated to a nearby farm, while the dead fish were removed from the pool and burnt.

The residual carcasses that remained on site triggered a secondary outbreak of avian botulism. During this event only dabbling species died while no sole filter feeders were affected.

The Department of Agriculture & Rural Development and Department of Environment & Nature Conservation officials will continue educating the people especially those living close to the pan and those who fish at the wetland, regarding the dangers of consuming birds and fish in polluted waters.

The pan is not fully researched and more studies like ecology of flamingos, bioaccumulation of metals in fish and flamingos, Persistent Organic Pollutants (POPs) and water quality are needed.

The future of nature is our future, let's protect our nature for our wellbeing and the future of next generations.

Anyone who has interest to conduct future scientific studies at Kamfers Dam can contact the unit manager Ms Elsabe Swart on
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Officials collected at least 1 500 dead waterfowl during the outbreak of avian botulism at Kamfers Dam in 2013.



Communities collecting catfish from Kamfers Dam, despite the health risk.