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GOLDEN GATE

RED HYDROGEN ALERT

Where confusion abounds BETWEEN TREES

KORSMAN CONSERVANCY

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PEOPLE CARING FOR THE EARTH

KORSMAN CONSERVANCY

CITIZEN CONSERVATION AND WATER QUALITY

Korsman Bird Sanctuary is a typical East Rand depression pan in a 220-hectare catchment of a continuously densifying urban area. Sewerage drains towards the pan via a 70-year-old sewer network.

Jane Trembath

In issue 78 (January 2021) of *African Wildlife and Environment,* Jan de Beer reported on Korsman Conservancy's work of rehabilitating the beautiful Korsman Bird Sanctuary in Westdene, Benoni. Our urban Conservancy restored the degraded grassland and successfully tackled weeds, reeds, and litter. Since then, we have built a bird hide (that is wheelchair accessible with assistance) and wheelchair paths up three raised viewing berms on the verge outside the fence, improving facilities and accessibility for birdwatchers. On the environmental side, our focus was forcibly changed to water quality. As before, we have had to learn for ourselves and innovate to manage the challenges as 'Citizen Conservationists'.

In 2021, frequent pump station breakdowns caused massive sewerage spills into the pan. The inflow of nutrients caused a cyanobacteria bloom, followed by a fish kill. We had to conduct the grim but crucial job of collecting over 700 dead carp from the water. Rotting carcasses would have caused a death spiral in water quality as they decomposed. I created a 'fish dinghy' towing a large plastic basin by canoe to collect fish in deep water.

Our own water tests with aquarium test kits showed the ammonia level was extremely high. This was serious, as we were about to start an aquatic food web restructuring project. By my calculation, water bioremediation products would have cost millions of Rands to treat the 27 hectares of open water of the pan. Besides the unaffordable cost, I could not find any relevant scientific literature on whether they actually worked, or potential side effects such as raising the pH. We experimented with spraying low

Netting

Carp netting

concentrations of hydrogen peroxide under water with a backpack sprayer, a treatment with no side effects except releasing oxygen. Then we waited it out and the ammonia level recovered through natural processes in two months.

In January 2022, we were able to go ahead with our aquatic food web restructuring project. The project aimed to raise the population of indigenous fish species and reduce invasive carp, then re-attract bird species which should have been present but were no longer recorded here. We released 2,000 Southern Mouthbrooder fingerlings sponsored by Rotary Club of Benoni Aurora, into an area where carp had been cleared and then excluded by underwater wire mesh fences. Just a few months later, there were new records of Malachite and Giant Kingfishers in addition to the Pied Kingfisher, which had been the only regular visitor before.

The next phase was carp removal. A highly invasive species, carp have a devastating effect on the aquatic environment and contribute to eutrophication. They stir up the sediments while feeding, causing turbidity, and releasing nutrients into the water. Carp have eradicated the submerged aquatic vegetation that would keep the pan healthy. In September 2022 we started removal in earnest with seine netting by a fishery company. Volunteers wade in and hold up the sides of the net to try and prevent fish from jumping out. It instantly became our most popular volunteer activity. We removed 2,200 carp in two months before heavy rains made access impossible. During the next season from September 2023 until May 2024, we removed a further 2,000 carp. Netting is conducted under permit from Gauteng Department of Agriculture, Rural Development and Environment (GDARDE).

As there are confined areas where seine netting is impossible, we bought gill nets in 2024 and cleared densely populated shallow backwaters. We do not leave the gill nets unattended for the risk to terrapins and diving birds, so we developed techniques to use them effectively. We set the nets and drive the carp into them from areas in between vegetation or drag the nets around by hand in water up to waist deep. The more we observe and understand about where the fish

Malachite Kingfisher (Photograph: Louis Swart)

move around, the more success we have. Carp are smart, but we will be smarter!

Data is a valuable tool for outwitting these fish. I determined what size mesh gill net to buy with the data I had already gathered from measuring 130 carp for weight, length, and girth. I keep records of each netting session to monitor our progress. We count how many fish are captured and how many jump out over the net. The area netted is measured on *Google Earth* and the density of individuals and estimated biomass can be calculated. The average number of fish per hectare reduced from 433 to 193 from 2022 to 2023/4. We will have to more than halve that again next season for the aquatic environment to start recovering.

Long-term Co-ordinated Waterbird count (CWAC) records also helped me understand the tenacity of carp: I previously assumed that when the pan dried up for two months in 2004 that all the fish would have died. CWAC records between 2004 and 2005 showed that the population of piscivorous birds dropped but did not disappear, meaning that carp had survived by aestivating in the mud.

Piscivorous diving birds such as cormorants and darters are an asset to carp control. To attract them to areas where we cannot net, we created deep water bird perches. The materials are well-shaped branches supported by a stack of scrap tyres under the water surface. The tyre stack is stabilised with metal fence droppers threaded through slits in the tyres and hammered into the pan floor. We can see where the carp are lurking by watching which perches the birds are using at the time.

As with the bird perches, we upcycle materials for other water quality and biodiversity projects. A basic but essential water monitoring tool for lakes is a Secchi disk to measure clarity. They cost at least R1,000 to buy, but we make them for free using a 20cm circle of off-cut white PVA fascia board, and glue on quadrants cut from black plastic container lids.

Floating treatment wetlands are a trend in nature-based water remediation, but commercial bases can cost thousands of rands per square metre. Why not upcycle for free? We created treatment wetlands with scrap wooden pallets, packed with cooldrink bottles for flotation, and screwed to old gum poles. They are then planted with wetland vegetation from the shore. The roots dangle in the water and biofilms develop, containing bacteria which remediate water. A third of the water surface would have to be covered for floating wetlands to be truly effective, so we only have about 89, 990 pallets to go....

African Darter (Photograph: Jackie du Plessis)

Floating treatment wetlands

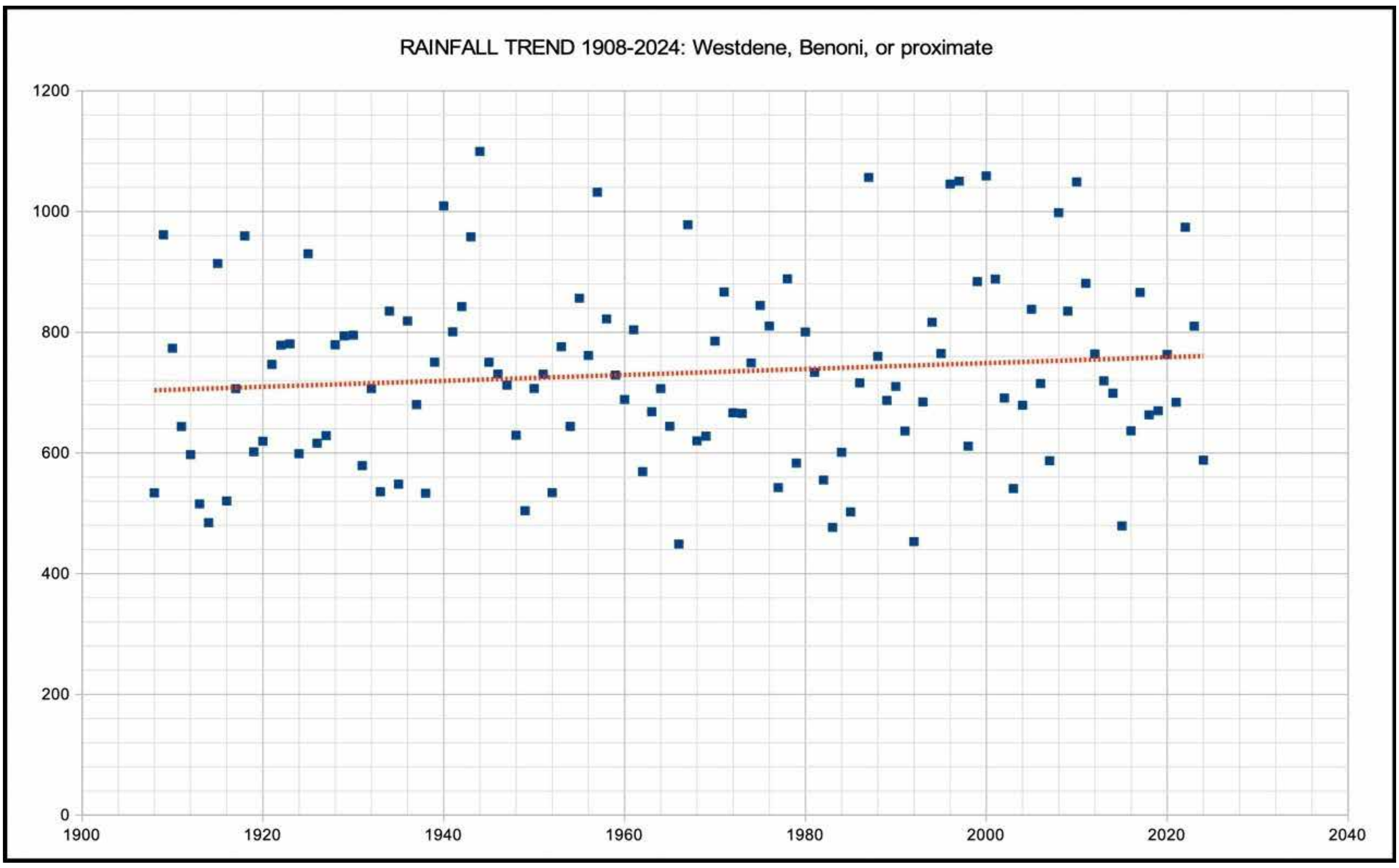
To get sewer and water problems fixed quicker by the Ekurhuleni municipality, I have learnt the local sewer, water, and stormwater network in detail. I motivated for an upgrade of the aged pump stations which was accepted and has so far reached phase 2 of a R9 million project. Sewerage not only brings unwanted nutrients but could have been the vector for an alien planarian that I discovered in the pan: the first sub-Saharan record of *Girardia sinensis*, invasive in many countries. The species was confirmed by DNA sequencing, conducted by the Albany Museum in Makhanda. The tiny flatworms were unwelcome aquarium invaders which had been thrown down the drain, then landed up the pan via a frequently overflowing sewer manhole a few metres from where I found them. To collect planarians for the sequencing, I created traps with small, punctured plastic containers baited with garden snails.

A major water problem is a decades-long massive municipal water leak from 600m away, but within the catchment, which raises the level of the Pan by about 350mm a year. The water flow brings in environmental problems of litter, invasive vegetation, and masks sewerage inflows. The persistent high water level favours carp spawning and limits our other work in the water. Ironically, finding the exact source (it is complicated) is constrained by lack of budget allocated to Ekurhuleni's Water and Sanitation department, even though I have quantified the wasted water to cost the City about R2 million a year!

Climate change affects us all, including Korsman, with higher rainfall and temperatures. We collected rainfall records from 1908 to 2024 within, or proximate to, the catchment. From 1921 to 1963 rainfall was measured within the Korsman catchment when a horse race course was in operation at Dunswart, Benoni. We also tracked down records from the Boksburg Civic Centre, 5km to the southwest, on either side of the Race Course data from 1908 to 1997. From 1997 the data is from community records within Benoni and at Korsman. Although we use cheap funnel rain gauges, we ensured our readings are accurate by calibrating the gauges which can overread by up to 20%. Although Johannesburg International Airport is about 10 km away, we found their rainfall data after 1997 had some suspiciously low readings on heavy rainfall days, so did not use it.

I published a note on the rainfall of the Korsman area which can be found here:
https://www.linkedin.com/pulse/rainfall-trends-citizen-science-adventure-jane-trembath-v0asf/

As shown in the graph, rainfall shows an upward trend, with a greater increase in the percentage of extreme events. Between 1908 and 2024, average annual rainfall has increased 8% from 704 mm to 761mm per hydrological year. Runoff events of 10mm or greater have increased 10.3% from 23.3 to 25.7, and extreme events of 20mm or greater have increased 22% from 9.1 to 11.1 per hydrological year. There is not much we can do about it except sensitise Ekurhuleni municipality to the need to maintain stormwater infrastructure. And, of course, keep up the pressure to find and repair the water leak.



Warmer temperatures affected the Sanctuary tragically this year (2024) when an extended heatwave from end of January to mid-March was a likely trigger for an outbreak of avian botulism. This is caused by toxin-producing bacteria living in anaerobic wetland soils. Birds feeding on invertebrates containing the toxin become paralysed and the majority die within 48 hours. The species most affected at Korsman has been Sacred Ibis, with over 130 birds lost from April to June 2024. We managed to save a few birds in collaboration with the SA Wildlife Rehabilitation Centre. There is no fix; the only measure is collecting dead birds early to break the maggot cycle and prevent floating carcasses from releasing the toxin and bacterial spores into the water. We paddle canoes to the centre of the pan every second day to check clumps of reeds where Sacred Ibis have been nesting.

Water quality will continually be threatened by human influences. As with other communities that care for wetlands, we are not experts and have to figure out for ourselves how to cope with the ongoing challenges. But we love Korsman Bird Sanctuary, and nobody will care for it like us.

For more information
Korsman Conservancy
www.korsmanconservancy.com