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It is not only the elephant that is threatened with extinction, but also the river carrying its name. South Africa's leading researchers, scientists, conservationists and wildlife pathologists have joined forces under a new programme to save what remains of the Olifants River system.

Lani van Vuuren reports.

The initiative, known as the Consortium for the Restoration of the Olifants Catchment (CROC) at present was established following the perplexing death of hundreds of crocodiles in the Kruger National Park's Olifants gorge.

Led by South Africa National Parks (SANParks) it also includes representatives from national government departments, including the Departments of Water Affairs & Forestry and Environmental Affairs & Tourism, research organisations, universities, independent consultants, and the Water Research Commission.

The programme was initiated after it became increasingly clear that the death of the crocodiles was symptomatic of a serious and growing environmental problem in the Olifants River system. The river has been subjected to prolonged and cumulative ecosystem stress as a result of human activities in the catchment, which is thought to have resulted in the deaths of great numbers of this top predator.

"Next to the Vaal and the Crocodile West rivers, the Olifants is probably South Africa's hardest working river," reports aquatic

ecologist Dr Peter Ashton of the CSIR, who is also part of the programme. "The river has been used and abused for the past five decades, and pollution is getting progressively worse. This can be seen in the character of the water quality, which has worsened markedly over the years."

While clues are increasingly pointing to pollution from industrial, mining and agricultural sources as well as the alteration of the Olifants River system through bulk water infrastructure (such as the raised water level in Massingir Dam), the exact trigger that started the process of crocodile deaths remains elusive. This is one of the first questions the programme hopes to answer through multidisciplinary research. Direct poisoning from, for example, persistent organic pollutants and heavy metals, has already been eliminated as the direct cause of mortality.

While no direct threat has been found yet, there is also increased concern over the potential effect of pollution on the health of communities residing in the Olifants River catchment, especially those households still using untreated water from the river. This will also be investigated by the programme.

Crocodile carcasses were first spotted in the Kruger National Park in May last year. To date, at least 160 carcasses have been found, although the actual number of deaths is estimated to be at least double this figure, as crocodile carcasses sink quickly or are consumed by other crocodiles and are then missed. Post-mortem results show that the crocodiles died of pansteatitis, a disease which results in the general hardening of the body fat, mostly as a result of inadequate antioxidant levels (e.g. Vitamin E). The hardened fat causes the crocodiles to become stiff which results in reduction in mobility and the inability to swim. This leads to starvation and even drowning of the affected animals.

“The Olifants River has been subjected to prolonged and cumulative ecosystem stress as a result of human activities in the catchment, which is thought to have resulted in the death of many of this top predator.”

This is not the first time crocodiles have died in the Olifants River system (crocodile and terrapin mortalities also due to pansteatitis have also been reported in Loskop Dam), although the massive die-off of Kruger crocodiles did catch authorities unaware. “We suspected that the ongoing pollution of the Olifants River system would eventually result in some kind of ecological disaster. The large number of crocodile mortalities, however, caught us by surprise,” notes Danie Pienaar, Head of the Department for Scientific Services at the Kruger National Park. “One of the important outcomes of this programme will



Surviving crocodiles in the Olifants gorge are tagged with radio transmitters to track movements.

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Lesions of pansteatitis in a Serrated hinged terrapin (Pelusios sinuatus) from Loskop Dam after a fish kill in 2007.

Jan Myburgh

CRIES OF HELP FROM A DYING RIVER



Jamie Coetzee

The Olifants River rises in the Highveld, flowing southwest to northeast through Mpumalanga and Limpopo. Upon leaving South Africa, the river enters Mozambique and joins the Limpopo before discharging into the Indian Ocean about 200 km north of Maputo.

The Olifants River basin is home to nearly 10% of South Africa's population. People have lived in the basin for hundreds of years, but it is the last couple of decades, signalled by the arrival of intensified irrigated agriculture, as well as large-scale mining, power generation and heavy industry that has seen the river turn from a majestic water resource into little more than a sewage ditch in some places.

Most of the pollution of the river occurs in the upper basin. More than 55% of South Africa's electricity is produced here. It is also the epicentre of the country's coal-mining industry. It is here that about 90% of the country's saleable coal is mined. The Highveld is also home to a significant petrochemical and steel industry.

Return effluent, which includes acid mine drainage (AMD) from a number of defunct mines, releases a deadly cocktail of heavy metals, chemicals and other toxins into the river. The Department of Environmental Affairs & Forestry estimates that around 50 ML/day of AMD discharges into the Olifants River catchment from decanting coal mines.

There are more than 200 dams located in the Olifants River basin, 37 of which are major dams (i.e. have a reservoir capacity in excess of two million m³). Most of this water is used to irrigate an area of about 110 000 ha. Runoff from these lands, which contain pesticides and fertilisers, also find their way into the river.

The river health assessment, conducted on the Olifants River as part of the national River Health Programme nearly a decade ago, already warned of looming ecological disaster. "In the upper parts of the catchment mining-related disturbances are the main causes of impairment of river health. There is also an extensive invasion by alien vegetation, and to a lesser extent alien fauna. Ecologically insensitive releases of water and sediment from storage dams are another major cause of environmental degradation downstream, which is particularly relevant in the middle and lower parts of the catchment," says the report.

The death of hundreds of crocodiles in the Olifants gorge was not the first ecological disaster to hit the catchment. Regular fish



The death of hundreds of crocodiles in the Olifants River basin sets of warning lights not because it will lead to the dearth of the species, but for what it means for the human population in the catchment. Carcasses found in the Kruger National Park are burnt to prevent cannibalism and subsequent infection of other crocodiles.

kills have been occurring in the river for many years.

In 2006, Loskop Dam experienced its largest fish kill to date, with thousands upon thousands of indigenous fish being found clogging the shorelines of the dam, including huge numbers of blue kurper for which Loskop was famous in the past. Crocodile populations at the dam have also been decimated, with at least six of the last remaining dozen or so crocodiles dying of pansteatitis in 2007. This was the first case of the disease ever to be recorded in wild crocodiles. Turtles have been found in the vicinity of Loskop Dam perished from the same disease. Another disturbing fact is that the population structure of the Loskop Dam crocodiles is completely abnormal. There are no mature crocodiles (larger than 2,1 m) in the dam.

Concerted efforts are required to save what is left of this once magnificent river. It is hoped that this can be achieved before it is too late.



be to put in place a rapid response management mechanism should something of this nature ever happen again."

While rangers are still finding sporadic cases of dead crocodiles, the number of mortalities has slowed significantly of late. This could perhaps be attributed to management actions, such as the removal and burning of carcasses to prevent cannibalism. How the mortalities will affect future population numbers remains to be seen. Meanwhile research into crocodile population dynamics, which involves fitting of radio transmitters on surviving crocodiles to track movements, as well as studies of other aquatic species in the river system continue. The quality of the water in the Olifants River is also being monitored closely.

As the Olifants is a transboundary (i.e. shared) river system, active cooperation is being sought with Mozambican authorities. SANParks Honorary Rangers' Rangers Support Services Group have donated two boats worth R15 000 to the Kruger National Park, one to be used for law enforcement, monitoring and research on the South African side, while the other has been lent to the Limpopo National Park in Mozambique to be used for the same purposes downstream in the Olifants River.

Pansteatitis is usually associated with the consumption of rotten and rancid fish. However, no confirmed fish mortalities were observed in the Olifants gorge. Recent investigations by independent fish pathologist Dr David Huchzermeyer indicated that most of the fish caught in the gorge are not healthy and that their internal organs and gills are affected. This is symptomatic of exposure to toxic agents.

It is hoped that the outputs from this programme will not only benefit the communities and wildlife dependent on the Olifants River system, but will lead to the improvement of the management of South Africa's other river systems to prevent such ecological disasters occurring in future and an overall improvement in river health. 



Acid mine drainage spillages from surrounding coal mines contribute significantly to pollution levels in the Olifants River.



A perished crocodile from Arabie Dam on its way to a post mortem.