



The hunt's afoot for Kruger's amphibians in new kiss-and-tell study

Once upon a time, a kiss and a frog were enough for a happy ending. In fact, the humble amphibian has fared well in the realm of fiction. However, show-stopper names like the Golden Leaf-Folding Frog, the Eastern Olive Toad and the Shovel Foot Squeaker have not seen them shine in the area of conservation. Now researchers are looking to save what is left of the Kruger National Park's frog population.

Article by Petro Kotzé.

Indeed, life for a frog is no fairytale. Amphibian population declines and species extinction are occurring around the world. Locally, the picture is just as gloomy. According to James Harrison, project leader of *The Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland* (published in 2004) locally, 25 species are classified as threatened or as near threatened, more than 20% of the total number of species. He adds that as new species are still being discovered and described, the number of threatened species is likely to grow.

During Harrison's study, 14 threats to South African frogs were identified, of which the four most important are habitat destruction

and fragmentation, alien plants and afforestation as well as pesticides and pollution. Threatened species occur predominantly in the Eastern and Western Cape, as well as Kwazulu-Natal. However, the species in the northern parts of the country could also be, metaphorically speaking, sitting in the boiling pot.

Frogs and toads in the Kruger National Park (KNP) may be protected against many of the threats faced by relatives elsewhere, but they are far from unaffected. Dr Andrew Deacon, Programme Manager for Small Vertebrates of the Savanna Unit of the KNP explains that about 10% of the park's frogs live in its rivers, while thousands converge at smaller, seasonal wetlands during breeding seasons. These habitats are especially vulnerable to air and water pollution. Problems with the park's rivers became glaringly obvious after recent, comprehensive media coverage of the death of hundreds of crocodiles in the Olifant's River Gorge (also discussed in the *Water Wheel* edition of January/February 2009). Deacon says that some of the rivers' predicament relates to a decrease in water volume and an increase in the amount of pollution due to continuous irrigation and development outside the park.

Another concern, he says, is the increase in air pollution from nearby industrial areas and Mozambique. It is suspected that the KNP lies in a 'cloud' of pollution as a result of its location. Questions are now being raised about the effect of increased water pollution, and possibly that of acid rain, on the aquatic stages of the amphibian's life.

In 2009, the KNP tasked a group of researchers, under the helm of Dr Wynand Vlok, to find the answers to some of these slippery subjects. Vlok and his team are busy with an assessment of the current biodiversity of amphibians associated with the major river systems and wetlands of the KNP, as well as the physical and chemical factors affecting their distribution. The Water Research Commission (WRC) is one of the sponsors of the project.

ASSESSING THE SITUATION

Vlok, of BioAssets, is no stranger to WRC-sponsored projects. He was previously involved in the assessment of the water quality parameters of the Nylsvley floodplain catchment. He explains that the absence of many of the mentioned common threats to amphibians makes it a good place for a comparison of the current biodiversity

and chemical influences to historical data. An added plus is the sheer diversity of amphibians present.

The study is being conducted across 41 wetlands throughout the park, while 14 sites in the six rivers (winter breeders) are also being studied. The rivers being sampled are the Luvuvhu, Shingwedzi, Letaba, Olifants, Sabie and the Crocodile.

Adult frogs are counted along visual and aural transects. In other words, they are physically counted or through identifying the different species' calls to potential mates and rivals. In addition to the adult frog inventory, tadpoles, often found in larger concentrations at breeding sites over longer periods of time, are sampled. Surface-water and deep-water temperatures are also recorded. This data can now be used to estimate species richness at the sites and to determine which sites are more suitable for amphibians' development. The primary goal of these habitat-based studies is a species inventory but, in addition, other aspects such as the effects of pollution and the presence of predators can be determined.

Chemical factors that might affect amphibian distribution are tested at the University of Johannesburg. Amphibians from some of the most abundant species are dissected for biochemical analysis. Of special importance for this purpose are the livers, adipose tissue and for histological examination, the gonads.

Further tests are done on water and sediment samples from the test areas. Different chemical factors such as metals are identified and quantified, as well as organic constituents and pH levels from the rivers, pans and rainwater. Lastly, the effect of different concentrations of acid water is tested on amphibian eggs and the development of the tadpoles.

Finally, the physical inventory and the biochemical analysis together will create a clearer picture

Top right: The study is concentrated across 41 wetlands and six rivers in the park.

Middle right: Amphibians are most conspicuous at breeding ponds or along rivers during the appropriate breeding period.

Bottom right: A fine example of the tadpoles of the Muller's Platanna (*Xenopus muelleri*) under close inspection.



BioAssets



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Top left: By studying the piospheres surrounding the pans, decisions can be made in regards to broader Kruger National Park management issues, such as grazing patterns.

Middle left: PhD student Clayton Cook at work gathering tadpole samples from a pan in the Kruger National Park.

Bottom left: Clayton Cook assisted by a park field ranger while gathering samples to be used in laboratory testing.



of the distribution of amphibians in the park, as well as the effects of pollution on this. Frogs and tadpoles can then not only be used as indicators of water quality but, says Deacon, to put pressure on decision makers to curb pollution through legislation.

FURTHER DEVELOPMENTS

The study has already yielded some exciting results outside of the expected areas of performance. From the historical list of 37 amphibians that should be found at

FROG FACTS

The four critically endangered frog species of South Africa are:

- Table Mountain Ghost Frog (*Heleophryne rosei*), found only in four streams on Table Mountain.
- Hewitt's Ghost Frog (*Heleophryne hewitti*), found only in the Elandsberg Mountains of the Eastern Cape.
- Mistbelt Moss Frog (*Anhydrophryne ngongoniensis*), found only on a small part of the eastern escarpment in KwaZulu-Natal.
- Micro Frog (*Microbatrachella capensis*), found in a few undisturbed fynbos wetlands in the lowlands of the south-western Cape.

An analysis of conservation hotspots for South African frogs revealed that most threatened and near threatened species are concentrated in five areas:

- Western Cape lowlands (five species)
- Western Cape uplands (six species)
- KZN coastal region (four species)
- KZN midlands (four species)
- Amatola Mountains (two species)

Source: Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland

the breeding sites, an abundance of Ornate Frogs (*Hildebrandtia ornate*) have been found – even though they were thought to be quite scarce. What's more, the Giant Bullfrog (*Pyxicephalus adspersus*), while listed in the historical data, has not been found up to date. At Harpi Pan East, researchers have come across a new species that was not previously listed, namely the East African Puddle Frog (*Phrynobatrachus acridoides*).

According to Harrison, the significance of surveys lies primarily in revealing patterns of distribution and the location of threatened species, in order to identify priority areas for conservation action. In an area like the KNP with unique management problems, research findings can also

be applied to other areas. For example, to cater for specific needs, some of the water supplies are man-made. Vlok and his team are also looking at the piospheres surrounding the pans, and if it is found that a specific water source is under too much pressure, management strategies can be adapted in accordance.

Another important outcome of the study should be information dissemination, stresses Deacon, and creating public awareness of the situation. Vlok adds that an exciting possibility could be the training of KNP field guides to identify the different amphibian calls. In this way, they can continue and update the inventory with GPS coordinates after the researchers have left the field.

They may not be the most glamorous inhabitants of the famed Kruger National Park, but hopefully, with an increase in research into the lives and times of amphibians, they might stand a sporting chance to live happily ever after. ☐

Top right: A school of African Bullfrog (*Pyxicephalus edulis*) tadpoles.

Bottom right: The flamboyant tadpole of the aptly named Red-Legged Kassina (*Kassina maculata*).



Call for Expression of Interest: WDM Projects

The Water Demand Management (WDM) Programme is hosted by the Development Bank of Southern Africa (DBSA), and supported by the Swedish International Development Cooperation Agency (Sida). The Programme is focused on building a WDM culture in the Southern African Development Community (SADC) region to ensure effective and sustainable use of water that contributes to the SADC goals of regional integration and poverty alleviation.

Support from the WDM Programme will be considered for projects which embody the Programme objectives. The Programme Implementation Unit (PIU) invites Expressions of Interest (EOIs) for WDM projects. The EOI should outline the project details, the WDM intervention required, an estimated budget, and proposed time frame. It should be no longer than 10 pages. There are three fundamental criteria an EOI should exhibit, namely (1) pro-poor impact, (2) cost effectiveness, and (3) demonstration value.

The types of projects the WDM Programme will consider supporting include technical as well as community based projects.

Who should apply?

Municipalities * Water Utilities * Water Services Institutions, including water user associations and international water management bodies * State owned enterprises * Government departments.

Once an EOI is received, an assessment is made by the PIU and a decision is taken, in consultation with the Reference Group (RG), regarding support for implementation.

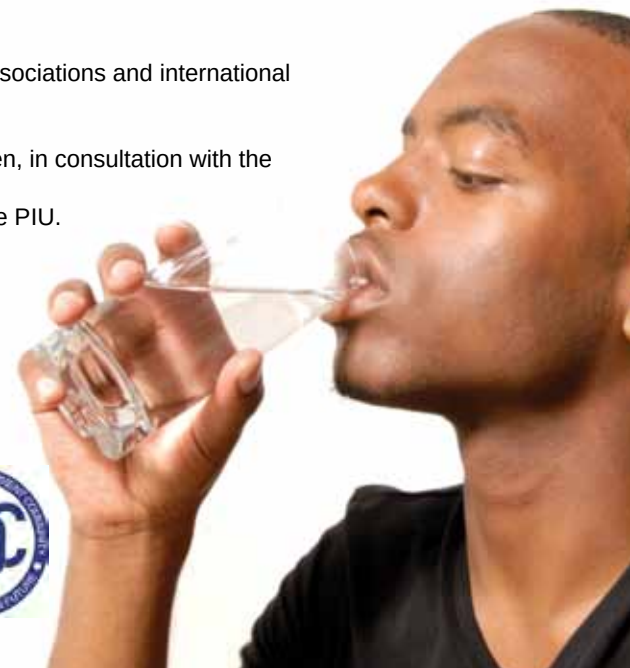
EOI guidelines are available from the WDM Programme website as well as from the PIU. The process is flexible and tailored to each case.

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