How green is the valley?

MONITORING FISH EAGLES ALONG THE BREEDE RIVER

Late on a summer evening, a farm worker sprays pesticide on a vineyard in the Breede River Valley. A wide variety of pesticides is applied to fruit crops by farmers in this area, but we have little information as yet on the possible ecological effects of many of these substances.

ADAM WELZ

The African Fish Eagle is perhaps the continent's most iconic bird species – to most people, its bold presence and haunting cry symbolise 'wild Africa'.

But inevitably there is interaction between man and these large raptors as each seeks out 'territory'. Researchers Adam Welz and Andrew Jenkins are studying the possible effects of agricultural pesticides on the fish eagle along one of the major rivers in the south-western Cape to assess whether intensive farming practices are impacting on this species and, if so, to what degree.

TEXT & PHOTOGRAPHS BY
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For centuries much of the south-western part of South Africa's Western Cape Province has been intensively farmed. The region's wines are internationally renowned and its deciduous fruit crops, exported worldwide, earn South Africa millions in foreign exchange annually.

One of the prime agricultural areas, supporting thousands of hectares of vineyards and orchards, is the Breede River Valley, which lies about a hundred kilometres inland from Cape Town. Most people define the Breede River Valley as the area along the river between Michell's Pass (just outside Ceres) and Bonnievale, about 140 kilometres downstream. The Breede itself continues for quite some distance to its mouth at Witsand, near Cape Infanta. The Breede River ('wide' river in Afrikaans) was so named because it spreads over a large floodplain during the area's winter rains.

Very little natural vegetation remains within the valley, but this doesn't stop large populations of various raptor species from thriving there. Over the past 30 years or so, the African Fish Eagle *Haliaeetus vocifer* has increased in number and is now a prominent resident in the area. It has taken advantage of the numerous fish-stocked irrigation reservoirs dotted through the valley, and it finds choice nest sites in the groves of Australian eucalyptus trees established by farmers as a source of timber.

ANDREW JENKINS (2)

A pair of African Fish Eagles perch together in the Breede River floodplain.

Much of the knowledge about this species has come from research carried out in East Africa – very little work has been done in the south-western parts of its range, and we had no clear idea of what might potentially endanger its survival in the Breede River Valley. In fact, we didn't even know how many fish eagle pairs might be in the region.

An obvious potential threat to 'our' birds would come from the huge quantities of pesticides that farmers have for decades applied to crops in the valley. We decided to test nestlings' blood for a number of common organochlorine pesticides (the adults are tough to catch!), as well as do a basic census and assessment of nest sites in our study area, which stretched along about 140 kilometres of the river from Tulbagh to beyond Robertson. During the several months in late 2003 that we worked on the project we learned a few new things about fish eagles, including the fact that in our region, their nests can be very hard to find.

What previous studies (and our own prejudice) told us is that fish eagles typically nest in prominent trees near large rivers or lakes, control a fishing territory along the water around the structure, and often fish and breed near human activity. Finding nests should be a simple matter of following the birds from their regular fishing haunts to their nests nearby, as one of the pair would take food to its incubating mate several times a day during the early breeding season. To begin with, by using our 'common sense' technique, in a single day we found three nests around a large dam, and shortly thereafter, using information supplied by birders, we found a couple more nests. But then the trail went cold and Adam, who did much of the legwork on the project, struggled to find additional active nests.

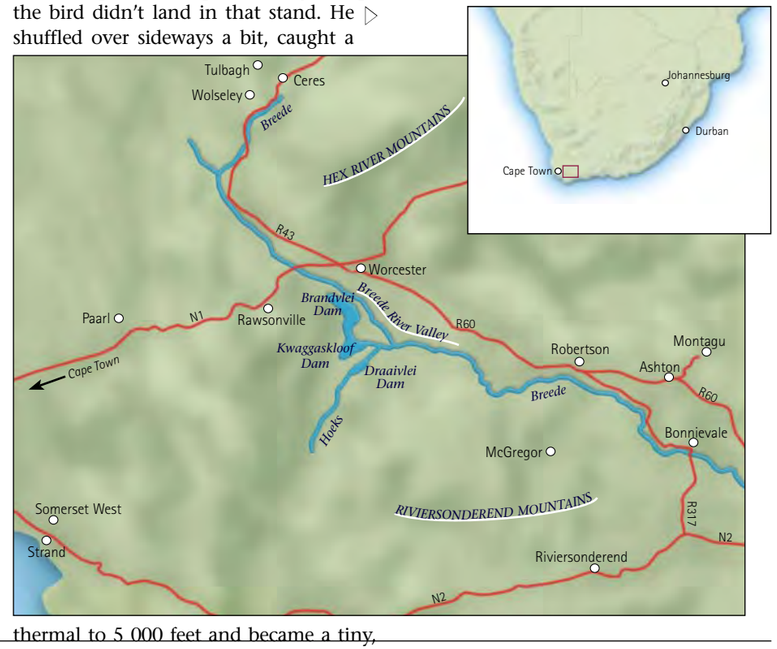
For weeks on end he pursued plenty of fishing, soaring and calling eagles, and was roped into more wild fish eagle chases than he cares to remember in search of 'nests' that farmers were 'sure' had been used for years. He was bitten by 'playful' boerbul guard dogs and chased by vicious guard Ostriches ('Oh, I forgot to tell you, I keep a few of them down in that field.'). Low-flying branches taught him that his GPS receiver and rubber-armoured binoculars really were waterproof and that he would land in the drink with smashed glasses if he spent too much time looking up from a river canoe.

He diligently woke an hour before dawn, day after African day, to stake out known fishing holes with large trees nearby. He also learned that waiting for a fish eagle to do its classic 'swoop-swipe-splash-swish' fish-catching routine can prove somewhat soporific, especially when he has been getting up at ungodly hours for what seems like years and the bird fails to pick up telepathically transmitted 'Go and catch a *%$#@ fish! Now!' messages.

In one typical instance it was already nearly late morning tea-time when the (presumably mated) male bird Adam had been watching since just after 06h00 hadn't so much as turned around on his perch. Aside from a couple of yelping calls in the early half-light, he may as well have been a taxidermist's somewhat dubious practical joke mounted in a gum tree alongside an irrigation dam near Tulbagh. Adam was still hoping that the bird would catch some late breakfast and lead him back to its mate. As he dozed off, he imagined the female incubating a pair of large, white eggs in a well-hidden nest in a nearby stand of trees, or perhaps on a cliff face in the magnificent mountains that surround this fishing hole.

Just as Adam began to nod off, the eagle casually flopped down from his lookout, slid out over the flat water and deftly whipped a fish out from just beneath the surface. As the bird effortlessly headed back towards a thick stand of gums, Adam (now wide awake) expected finally to be led to the nest that had eluded him in an hours-long search the previous day. Except the bird didn't land in that stand. He shuffled over sideways a bit, caught a thermal to 5 000 feet and became a tiny,

The Breede River Valley is intensively farmed, and features a mosaic of vineyards and fruit orchards, and a riparian strip dominated by alien eucalypts and wattles.



The African Fish Eagle – icon of Africa and a valuable indicator of chemical contamination of the continent's waterways.

PETER PICKFORD

jerky chevron-in-binoculars, vanishing somewhere south of Wolseley to deliver a blow-dried carp to his distant and tantalisingly invisible missus.

This, we came to realise, was standard behaviour for 'our' birds. Instead of holding a well-defined fishing territory near nests, many birds used more than one fishing spot, often kilometres from their home base. Instead of breeding obviously in a big open tree, they were constructing their structures in quiet groves, as far from people as they possibly could. Our common sense nest-finding method had clearly outlived its usefulness, and that evening a frustrated Adam flipped open our 1:50 000 topographical maps and randomly picked spots that looked like trees far from people. The next day he found three active nests and this technique, coupled with blind luck and pig-headedness, brought more the following week.

Once more than 10 nests had been found – enough to make our study viable – the next problem was climbing up to them to take blood samples from the nestlings. Getting anywhere between 25 and 45 metres up a slippery eucalyptus isn't a cakewalk (in fact, 45 metres proved impossible), but Andrew's combination of a head for heights and Heath Robinson-like climbing techniques involving ropes, pulleys and whizzing lead weights enabled us to take samples from eight nestlings at six sites. These samples, together with some that we obtained from adult Black Sparrowhawks and a Spotted Eagle Owl chick in the study area, were then analysed by a specialist pesticide laboratory.

We targeted three long-banned organochlorine pesticides in the lab tests: DDT, Dieldrin and gamma-HCH (also known as Lindane or BHC), and Endosulfan, an organochlorine that is widely used in the study area. DDT, still used as a mosquito-control agent in the eastern parts of South Africa, became notorious in the 1970s and '80s for destroying populations of many birds of prey around the world by causing critical eggshell thinning. Dieldrin is an extremely long-lived pesticide that is also highly toxic to birds and was implicated in many raptor deaths before being banned. Gamma-HCH, although not very toxic to birds (it takes less of it to kill a person than to kill a duck, according to lab studies), was used in great quantities across vast areas of the Karoo in the mid-1980s to control locusts, and we wanted ▷

A well-feathered fish eagle chick, temporarily removed from its nest on the Breede for ringing, measuring and blood sampling.

ADAM WELZ

to see if any had made its way into our study area and persisted there. Endosulfan has been comparatively little studied, although one reference claims that in warm-blooded animals it breaks down quickly to harmless substances.

The good news is that although we found traces of both DDT and Dieldrin in the blood of the eagles, the levels were below those known to cause harm. Local birdwatchers told us that there seemed to be many more raptors in the Breede River Valley in the past five years than there had been previously. It is highly likely that DDT and Dieldrin impacted raptors prior to cessation of their use in about 1980, and that this negative situation persisted for some time afterwards as the chemicals in question take a long time to break down in the ecosystem. However, we are probably now at the point where they are no longer harmful to birds of prey.

We also found trace levels of gamma-HCH, even though, according to our information, this pesticide was never widely used in the valley. Scientists in Britain found that it evaporated easily and made its way up to cloud level. High levels of gamma-HCH were found in rainfall away from areas where it was applied to crops. Although the prevalent weather patterns would suggest this route from the Karoo to the Breede River Valley to be unlikely, it is possible that some was washed into the Breede from the Ceres Karoo.

Gamma-HCH was banned for agricultural use in western Europe and North America a long time ago. However, it was used in lice shampoo until very recently, when it was banned in California and much of the EU as a result of medical studies implicating it in childhood anaemia. Interestingly, our fish eagle nestling blood analyses showed some birds to have extremely low red blood-cell counts. At this stage, however, it is impossible to link the very low levels of gamma-HCH we found to the anaemia in our study birds, as the condition can be caused by many factors, including disease and lead poisoning. It may also be entirely normal for young fish-eating birds to have low red blood-cell counts; studies in the USA have found young Ospreys in unpolluted areas to be anaemic and apparently healthy, as have the staff at SANCCOB in Cape Town with young African Penguins.

We found no trace of the widely-used Endosulfan in any of our blood samples, which supports the contention that it degrades quickly in warm-blooded animals and does not seem to be directly affecting the raptors in the study area. However, it is known to be extremely toxic to cold-blooded aquatic organisms, and further study is needed to determine its impact on the biota of the rivers and impoundments of the area.

Despite our preliminary work indicating that organochlorine pesticides do not seem to be affecting birds of prey in the Breede River Valley, the raptors of this area are not completely safe. Recently, two fish eagles were found dead in a vineyard – they may have died after accidental exposure to newer organophosphate pesticides, but we cannot be sure as the carcasses were heavily decomposed when found. During the study period we also heard of three fish eagle nests being destroyed in the south-western Cape as a result of alien plant eradication programmes. Alien clearing is also proceeding apace in the Breede River Valley, and as all the nests we found were in alien trees, chiefly eucalyptus, it would seem that this poses a real threat to African Fish Eagles (and many other birds of prey) in parts of the south-western Cape.

We hope to be able to broaden the scope of our work to include other raptors in the valley, and other, more modern pesticides. We would also like to enlarge the study area in order to chart the flow and impact (if any) of pesticides from the source to the mouth of the Breede. More study can give us a better idea of the types of habitat different raptors use in the area and how farmers can promote their survival and profit from their presence. Black Sparrowhawks, for example, feed on the crop-damaging Common (European) Starlings, and the presence of a pair may well benefit farmers by being an effective deterrent to these feathered locusts. One dream is to link some fish eagle nests to live webcams: scientists can get reliable data on food delivery to the nest, and local tourism organisations can show live wildlife on their websites.

In today's globalised economy where many agricultural industries rely on increasingly health- and environment-conscious consumers, getting a reputation for selling impure goods can seriously harm a business. Recently, news of suspect additives in South African wines made their way into international news magazines, and Coca-Cola suffered massive losses in India after it became known that the water it was using to make soft drinks was contaminated with pesticides.

It's not enough for farmers to wait for a scandal to hit them – they must actively ensure that the chemicals they are using are indeed harmless to people and do not untowardly destabilise ecological processes. Studies like ours help them do that.

African Fish Eagles are easy to see and hear. Everybody, even the most trigger-happy, eco-unfriendly farmer, seems to like them. As ambassadors for the ecosystem, and as a way to educate farmers and the public about the health of the environment, they probably have few equals. We hope more people use these fantastic creatures for that purpose. □

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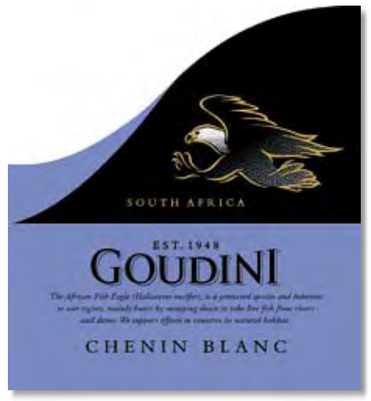
ANDREW JENKINS

A downy fish eagle chick in its nest in a pine tree near the Brandvlei Dam. A half-eaten carp lies on the edge of the nest.



Goudini Wine Cellar, a wine producer from Rawsonville in the heart of the Breede Valley, funded the Western Cape Raptor Research Programme at UCT's FitzPatrick Institute to do a preliminary study on the African Fish Eagle. They are keen to ensure the long-term well-being of this charismatic creature, which they use as their logo.