Thousands of lesser flamingos at Lake Naivasha?
Thousands of lesser flamingos being poisoned?……Not really

Many of you will have read recent newspaper reports about the sudden increase in lesser flamingos at Lake Naivasha, and that they are dying in large numbers there and at Nakuru, because of pollution and toxic water. Those of you with a more cynical disposition will suspect that, yet again, the only news that newspapers like is bad news and if bad news doesn't exist, then reporters can twist the facts around. In this case, you would be dead right.

The belief that lesser flamingos are being poisoned by humans has been around for about 15 years. A mortality of several thousand birds occurred at Nakuru in the early 1990s and WWF, who at that time were trying to run a conservation project there, put out in the press and on the Internet that heavy metals were causing the mortality. But then neither they nor anyone else published proof of this statement. A second mortality occurred in the mid 1990s and then between 1999 and 2000 a very large mortality occurred at Lake Bogoria. I was studying that lake during this mortality. There were about a million birds there in early 2000, dying at a rate of about 700 a day. All ages died, even birds recently fledged. There are no sources of heavy metal pollution at Bogoria and it is highly unlikely that some birds could pick it up in Nakuru, fly to Bogoria and then just die in front of hundreds of healthy birds.

A flamingo lives for about 40 years or so, roughly 15,000 days. As a 'back-of-the-envelope' calculation, that means from a million birds about 70 are dying each day, naturally. But no animal populations have have regular deaths, so what if flamingo mortality events are part of this irregular fluctuation of their environment? Is it a coincidence that each mortality event occurred at a lake where the numbers of flamingos were around a million and during or at the end of a long drought in the country?

From about 2002, scientific papers from a group of German-Kenyan scientists started to emerge that levels of toxins, naturally produced by cyanobacteria (commonly called blue-green algae), had been measured in Kenyan soda lakes and hot springs that might be high enough to kill lesser flamingos. A few dead flamingos were found (there were no big mortalities at this time) that when analysed, had levels of these toxins high enough to perhaps have killed them. These high levels were not found on a repeat visit in 2004. Inevitably, this "bad" news was picked up and amplified so that every dead flamingo now means poisoned water.

Earlier this year, in March at both Nakuru and Elmenteita, lesser flamingo numbers suddenly increased. Elmenteita's went from nearly nothing to 70,000; Nakuru's from a few hundred thousand to about a quarter of a million. The increase in numbers of healthy birds was accompanied by deaths – in the case of each lake a tiny fraction, about 2% of the numbers. The mortality lasted for about 2 weeks. Is it likely that a tiny fraction picked up poison in the lake and others did not? It is much more likely that those birds were weakened by their travels that brought them to the lake, had weakened immune

systems, and were susceptible to the diseases which the birds carry but which a healthy bird can resist. Research by my colleague, Dr Lindsay Oakes, last year identified quite a number of bacterial and fungal diseases which individual birds very dying from – all of them displaying the same symptoms that have been claimed as evidence for heavy metal poisoning and cyanobacterial toxin poisoning.

The story of exactly why flamingos die periodically is complex and almost certainly involves the combination of several factors. We must distinguish between those factors which cause the birds' immune systems to weaken – stressors – and those factors which kill weakened birds. For the first time ever, in November 2006, I shall lead a research team at Lake Bogoria in partnership with the Professor Kenneth Mavuti of the University of Nairobi, National Museums of Kenya, Kenya Wildlife Services and also the Tanzanian equivalent bodies, which will have both a veterinarian (Lindsay Oakes) and a cyanobacterial toxin expert (Dr Tomacz Jurczak from Poland). We shall endeavour to conduct post-mortems on birds that have died and examine all three theories of flamingo mortality – microbial disease, cyanobacterial toxins and heavy metal poisoning. Perhaps after that, the scientific and conservation community will have a better idea of flamingo population dynamics.

To come back to Naivasha. This is a fresh water lake which has many surprises, but thousands of lesser flamingos is not one of them, neither is it likely to be in the near future. It holds a few hundred greater flamingos at times, because they can find food there – greaters are carnivores feeding on insects and crustacea and Naivasha has an abundance of water boatmen that make good greater flamingo dinners. Lesser flamingos stop by in smaller numbers, because they at least can drink there.

The event that has led to the stories though, is an abundance (about 20,000) of lesser flamingos that have settled on Oloidien Lake. Oloidien, or 'Little Lake' is at the south west corner of Naivasha. It is a volcanic crater lake which used to be connected to the main lake (sadly many maps are sold to tourists which still show this because they are based on the last-published Survey of Kenya 1:50,000, which mark the lake's high water level) but has not been directly joined since 1979. I have been conducting research in the Lake Naivasha basin since 1982 and I have recorded Oloidien steadily go saline as it loses more water by evaporation than it receives in seepage.

This slow increase in salinity meant that it became greener and greener, for perfectly natural reasons. Lakes with high pH (alkaline lakes) have their phosphorus chemically more available, so the algae and cyanobacteria which can tolerate the pH, thrive on the phosphorus. But these species were all single celled species, too small for anything but tiny invertebrates to feed on. In July 2006, it passed the magic salinity mark that made it suitable for a much larger species, Spirulina (actually called *Arthrospira fusiformis* to those in the know). Hey presto, the few lesser flamingos that regularly dropped in by chance stayed, because they could feed and as the numbers grew, more dropped in to join them.

This is now not only an exciting spectacle for the lakeside residents, which include many well-known Nature Kenya members, but its exciting to scientists too. Oloidien water, though far to saline for humans or cattle to drink, is NOT too saline for flamingos to drink. So you have the remarkable spectacle of groups of lesser flamingos feeding, next to groups which are drinking, next to groups which are bathing. Nowhere else in the world can this be observed in the same water, I believe.

And the deaths? A few hundred, not long after the 20,000 moved in, once again about 2% of the resident population. That does not mean the lake is polluted, it does not mean the lake is toxic. It just means the marabou storks will not go hungry.

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