

Nagarhole National Park. Apart from the old male none of the other tigers which died had been fitted with radio-collars.

After the third tiger death itself the Ministry of Environment and Forests of the Government of India conducted an inquiry through its regional deputy director for wildlife preservation based at Madras. This inquiry absolved Karanth of any responsibility for the death of the tigers. Later, Karnataka's chief wildlife warden also stated that there was no connection between the deaths of the tigers and Karanth's research project. Nevertheless, in June, the state's minister of forests openly accused Karanth of causing the deaths of the five tigers through overdosing with tranquillizers and issued orders withdrawing permission for the research project. He further threatened to fine the researcher Rs 50,000 for each of the tiger deaths and even confiscate his personal property. Karanth initially obtained from the state high court a stay on the research ban, whereupon the government withdrew its orders, only to reissue another ban order on 10 July. Currently the matter is once again back in the high court. The research project has essentially ground to a halt since June.

The issue became even more curious when the (then) minister asserted at a conference of veterinary doctors at Bangalore on 17 August that he had stopped the research because Karanth had already killed 11 tigers. If this were true, what became of the carcasses of the remaining six tigers that the minister alleged had died is a complete mystery.

Are the tiger deaths unusual?

The controversy throws up a number of issues for the scientific community in the country. Firstly, there is the crucial issue of the causes of the tigers' deaths. If overdoses of tranquillizers had indeed been responsible for any of the deaths, then there would have been cause for the government to react. In this case not an iota of proof has been offered by the government to show that the deaths were in any way related to use of tranquillizers. Even the old collared male tiger died some two and a half months after it was darted. A tranquillizer-related death would normally

have occurred within one day of the darting. Post-mortem examinations of the other dead tigers did not in any way implicate the tranquillizers. One might argue that the examinations were not thorough enough, but this merely emphasizes the point that the government's approach to the matter has not been very scientific. There are certainly capable scientists and institutions who could have been asked to investigate the affair, but no such thing has been done by the state government. It has proceeded in the matter on mere suspicion that drugs were responsible for the deaths.

This raises a related question as to whether the deaths of five tigers over a two-month period within a 641-square-kilometre area is unusual. Such an occurrence would be unusual if we expect tigers to die at random throughout the year. Karanth estimates that the tiger population within this area may be 40-50. The deaths thus seem to represent an approximately 10% mortality within a 2-3-month time span. However, there have been no other reported deaths of tigers other than these five (the minister's assertion of eleven notwithstanding) during the past year. The mortality of 10% should thus be taken as the rate for a year—certainly not an unusual death rate for tigers in the wild. Wild animals do not die off with regular clockwork precision. Spurts in deaths during the dry season due to lack of uncontaminated water and food for instance are well known for many wild mammals. The role of stochastic (random) processes on demography is indeed receiving increasing attention in recent years in the context of risk of extinction of endangered species⁴, but this may not be applicable to the Nagarhole deaths.

In fact it could be argued that a 10% annual death rate is actually a low rate when we consider that mortality rates for wild tigers may average 50% per year for the first two years of life^{1, 5, 6}. If we assume that just five tigresses in Nagarhole littered during the year, of the 15 cubs born (mean litter size is about 3) about 7-8 could have died before attaining one year of age. It would thus be safe to say that some more tigers should have normally died in Nagarhole, assuming that tigresses were breeding normally, but that their carcasses would have gone unnoticed in the dense jungle. (We should not cloak the tiger with immortality!).

Ironically, the entire controversy seems to have in a way resulted as an inevitable consequence of the management of the Nagarhole National Park during the past decade. Strict protection of the park against poaching by the forest department officials has meant a steep increase in the populations of herbivorous mammals such as spotted deer, sambar and gaur, upon which tigers largely prey. The biomass of mammals here is very high, about 15 tons per square kilometre, and comparable to that in the famous wildlife parks, such as Serengeti-Mara in Africa. This has led to an increase in the populations of carnivorous mammals, including the tiger. It is no secret that the best chance of seeing tigers in the wild in southern India (very difficult indeed) is at Nagarhole.

Both male and female tigers are territorial. With such a high density (one tiger per 12-15 square kilometres) of tigers, comparable to or higher than those attained in prime tiger habitats elsewhere in Asia, it is conceivable that the stage is set for intense intraspecific competition and aggression. Males compete for territory and dominance in the social hierarchy to ensure better access to tigresses for mating¹. Young males dispersing from their natal territories are especially vulnerable and so are old males who may be ousted by younger and healthier rivals. When a male tiger gains access to a tigress it may also try to kill her young cubs from a previous litter. The death of even one dominant male tiger could for instance trigger off a series of events as the remaining males shift territories. A spurt in aggression during a short span of time is thus a distinct possibility. Tigresses also establish territories to ensure access to food, cover and other resources needed for their own and their cubs' survival⁷. Aggression between tigresses is also known. Aggression-related death is thus entirely plausible for the tigers of Nagarhole.

The persistent sceptic may still ask whether the tigers could have died owing to use of tranquillizers; that is, some tigers may have been darted but not collared. Certainly, there must be some risk involved in the use of drugs. In studies carried out during the seventies and eighties in Chitwan in Nepal, over 50 dartings of tigers, representing 26 tigers (some tigers were