Why the tiger cant change it's stripes? – Dr K U Karanth, Down to Earth , June 2005

The tiger's ecology is entirely rooted in its four canine teeth. This index-finger-sized weapon enables the tigers (and four other big cat species) to single-handedly subdue prey animals five times their size. Two related biological traits, large body size and a diet of pure meat, have thus predetermined the tiger's fate. How tigers evolved as specialized predators of large ungulates, colonized large parts of Asia in the next million years, only to teeter to the brink of extinction having lost 95% of their range in the last few centuries, are all determined primarily by the tiger's size and diet.

Just to survive, a tiger must kill, on an average, a deer-sized animal every week. A tigress raising cubs kills 60-70 such prey animals annually. Because tigers live off the 'interest' rather 'capital' in the form of their prey evolution has shaped them to crop about 10% of their prey population annually. Therefore, a single tiger requires a prey base of 500 deer-sized animals sustain it. Consequently, tiger numbers are primarily determined by prey abundance. Tigers can attain population densities of 20 animals for every 100 square kilometres in prey-rich forests. Their density can dip down to just one or two tigers if prey is scarce. At densities lower than this, tiger populations cannot persist without periodic colonization from some other high-density source populations.

Such source populations of tigers consist of clusters of several neighbouring tigresses, where each matriarch maintains a home range that she defends against intruders. However, she shares it with her cubs until she evicts them at two years of age. Adult male tigers compete with each other to gain mating opportunities with these tigresses. A male tiger's home range may, on an average, overlap three female territories.

During a female tiger's lifespan of 10-15 years, she may hold a breeding tenure of 6-10 years. During this tenure she produces 3-5 litters of about three cubs, once every two to three years. Male tigers generally have shorter tenures of just 3-5 years. The size of the female territories required to successfully raise these cubs varies enormously, primarily depending on prey densities: home range sizes of tigresses can vary from 10 square kilometres to 500 square kilometres or more.

Usually there are more adult tigers in a healthy population than there are available territories. The 'surplus' tigers become floating transients that sneak about, looking for opportunities to subdue any weakened resident or to disperse into new habitats. This tiger society is fiercely competitive and mortalities are high: fights, cub-killing by new territorial males, injuries suffered while hunting prey, starvation and conflict with humans, all impose a heavy toll on tigers at all ages.

Therefore, even in healthy tiger populations, about 10-15% animals die every year. Only about 20% of all tigers born may end up breeding. However, as long their inherently high reproduction rates are kept up, tiger populations keep producing surpluses. This population dynamics of tigers explains why, despite heavy hunting pressures – about 100,000 tigers were legally hunted during 19th and early 20th centuries – tigers managed

to survive. The key to their survival were source breeding populations in remote tracts inhospitable to agricultural settlement because of disease, adverse climate, poor soil or primitive technology.

As the Twentieth century advanced, increasing numbers of humans and livestock, expanding agriculture, better firearms and more efficient technologies increased access to such remote areas. Hunting for tiger body parts, meat of their prey, forest product collection, and development projects in general, acted synergistically to shrink, fragment, and degrade habitats where tigers could breed. Tigers and humans competed fiercely for the same land, and the cat retreated steadily.

Although tigers are now estimated to occupy about 300,000 square kilometres of habitats in India, populations with reasonable reproduction rates perhaps occupy only about 10% of this area. These are mostly restricted to wildlife reserves. The rest of India's landscape is just a huge 'population sink' in which the small surplus from the breeding populations perishes.

As the recent 'tiger crisis' has once again clearly shown, the small, fringe populations of tigers – such as the one in Sariska - can get pushed over the brink for any number of reasons, and, not just from commercial poaching of tigers as is often thought. But these driving forces of tiger declines will eventually catch up with even larger populations that appear relatively more secure now.

The central biological challenge in recovering tigers is clear: To sustain as many clusters of breeding populations as we can, each with at least 25 tigresses. The central social and political challenge then becomes setting a goal of how many such tiger populations we are willing to tolerate. There is an unavoidable cost to recovering wild tigers in terms of compensating humans who have to make room for tigers.

Regardless of the social tactics we employ to recover wild tigers, we cannot ignore essential biological factors. To do so would be a recipe for certain failure. The tiger cannot change its size or its diet, as surely as it cannot change its stripes.

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Dear Dr Karanth,

Thank you for sharing your experience the other day at the consultations as well as meeting Sunita. I wish I would have got to spend more time with you as well. Sometime should escape Delhi to work with your team in field.

As part of our process of opening the debate on these issues further, we are trying carry a set of essays on different issues relating to wildlife conservation and forests in the next issue of *Down To Earth. *We are keen to put the entire gambit of issues together at one go, because I firmly feel that they cannot be looked at in isolation.

I would be thankful if you could write an article for us as part of the same series. We would like you to look at and deliberate upon where the science of tiger conservation rests today. The science of tiger conservation is more of a technological reaction to loss of tiger and tiger habitat but the tiger as a players in the habitat in ecological context? How it plays its role in the forest and what it means for the forests where it is found. Can we get a piece, very detached, that looks into a tiger as a scientific animate object? And maybe, a short paragraph at the end indicating technology of tiger conservation.
These, is a general outline of ideas we are keen you write for us on. But we do not wish to restrict it to just this. If you feel that there are other interesting issues in the same bag of ideas to pick up, we would be more than keen that you incorporate them as well.

I know 750 words is a tad tight but the idea is that we get people to read it from across different work communities – a typical human right activist should get to read this while a typical conservationist read about the sociology of forest dwellers perhaps. Therefore we want to keep it tight one-page articles by each one.

I write further with the presumption that you kindly agree. We would be glad if you can write about 800-850 words. Our editors will edit it and send it back to you for confirmation before it goes to publishing. Would it be possible to send an article by the 2nd june of next month. Our issue closes on the 7th of June so that should give us just about adequate time to edit, send it back to you and design it out.

I hope you can spare the time to write at this crucial juncture.

With warm regards,

nitin
ps: sir, could you also fax a copy of the guidlines for research again. Our office seems to have misplaced it while filing it. sorry for the trouble.

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