Research description for Shyam Thapa

Doubling tiger numbers means doubling the prey-base: but how?

The Terai Arc is landscape lying between the Ganges Plain and the foothills of the Himalayas. Biogeographically it is the most northern part of the Oriental Kingdom, and zoologically it is characterised by a mixture of Tropical species, like the Indian Rhinoceros, the Indian Tiger, the Asian Elephant, the Gavials or Hornbills and Palearctic species, such as the many migratory bird species but also mammals such as Wolves and Wild Boar. Botanically, the Oriental Floral Kingdom is a mixture of Pan-Tropical species, and shares Ethiopian species with Africa and Indo-Malayan species with the tropical Far-East.

The Terai, which stretches from the area bordering Assam and Myanmar to the Punjab, was till recently nearly one hundred percent forested. Malaria eradication programmes in the 1960s enabled settlement by non-malaria resistant people, and the Terai quickly filled up with settlers from the foothills of the Himalayas to the North and from the Gangetic Plain to the South. This *landnam* resulted in a very fast deforestation of this stretch of land of some 1200 km E-W and 60 km N-S and now, in 2017, only little of the original vegetation still exists in a few isolated remnants which got legal protection as National Parks, both in India and Nepal.

In these ever-shrinking pieces of forest an ever-shrinking population of tigers occurred. At the start of the 21st century, the world-wide number of tiger remaining in the wild approached 2000 in total in the so-called 'range states' (e.g., Russia, Nepal, China, India, Malaysia, Indonesia). At a range state conference in St Petersburg the governments of these states decided to strive for a doubling of the word-wide but also country-wide 'doubling of the tigers' by the year 2022. This pledge by the Government of Nepal resulted in a major impetus for tiger conservation in Nepal, also in Bardiya National Park. Importantly, the Himalaya Tiger Foundation quickly realised that doubling the tiger implies doubling the prey so as to prevent the built-up tiger population start preying upon livestock outside the Park. The Nepali conservation authorities have embraced this now, and measures are underway to achieve this.

Bardiya's prey-base for tigers is comprised of five species of deer. Some of those are quite large (sambar, barasingha), others are intermediate in size (chital), and the rest even small (hog deer, barking deer). Besides these deer, wild boar forms an important prey too. Nilgai (bluebuck) must have been an important prey in the past, but this species is now nearly extinct in the Park. Gaur, blackbuck and possibly arni (water buffalo) are already extinct. A likely explanation for the extinction of gaur and arni must be found in excessive hunting, but the (near) extinction of nilgai and blackbuck must be ascribed to the removal of cattle from the Park when it was declared a National Park. People maintained grazing lawns in the Park though grass collecting, cattle and domestic water buffalo grazing. These lawns were of great importance for nilgai and black buck, but also deer (mainly barasingha and chital) were favoured by these lawns too. It thus appears as if the continued existence of a large prey base for the tigers is at stake, and it is felt that to double the tigers the management must find ways to "double the deer". Yet it is not desirable at all to bring domestic cattle ad water buffalo

back into the Park: chances of political turmoil are simply too big. One thus has to create new grazing lawns. Good places for these in the present core area of the Park (970 km^2) are mainly on former agricultural lands. Recent experience in South Africa in a comparable climatic area may point the way on how to create this, but experimental research in Bardiya is needed to find out whether the approach from over there is applicable to Bardiya too.

Research questions are the following:

1. What is the current vegetation in different places of the Park that appear to be suitable for lawn formation? Which grasses are present, in which proportions, and what is their potential to form lawns?
2. How do lawns look like in the Terai area of Nepal, both inside this Park and adjacent protected areas, and outside the Park in communal lands? What is their grass species composition (both botanically and structurally), and what are chemical characteristics of grazed vs. ungrazed grasses that form lawns (chemically; digestibility)?
3. What is the best practice concerning lawn formation elsewhere in the tropics, and what local knowledge is available? Can fire be used as a management tool, and if so, how? Or is mowing necessary?
4. What are the limiting factors for deer maintenance and milk production in Bardiya, and are grasses in the area (and in the communal areas) of sufficient high quality to enable maintenance and recruitment (birthing, lactation) of deer?
5. What happens to grass quality and deer intake rates if areas in the park are mown and fertilized, and which mowing regimes and fertilizing regimes are needed for boosting deer productivity?
6. How long are management interventions needed before deer can sustainably maintain lawns, and if they cannot, at which stage is the reintroduction of gaurs and possibly arni indicated?
7. When, and under which conditions could blackbuck and nilgai maintain themselves again?