A Bird's Eye View

By Vivek Ramachandran

There is a slight drizzle on this wet January morning, and it is time to go. Leaving the warm confines of the field station, I start my bike and brace myself for an icy cold ride through the swirling fog to my field sites, hoping not to run into a herd of elephants or gaur. The headlights detect a pair of luminous orbs belonging to the brown palm civet, a Western Ghats endemic, peering at the noisy contraption on which I make my way through the undulating terrain of this magnificent rainforest.

A brief stop at the Nalmukh tea estate to pick up my field assistant Johnson and a strong cup of tea at the local shop whose proprietor Rajan, is ever ready to serve with a smile even at this early hour, and I am on my way again. On reaching Kakachi, one of my sampling sites, we sling our heavy bags over our shoulders, switch on our headlamps and slip and stumble through the dense wall of vegetation. The sheer size of the trees and the steep terrain never fail to take my breath away. We are soon at the base of a 35 m. tall *Cullenia* tree, one of the dominants in this forest. We check to see if our guide wire is in place and then proceed to raise our climbing rope. After it is safely anchored, I wiggle into the harness, check the equipment and start my ascent. It is hard work, but five minutes later I am perched 30 m. up on a wooden platform just in time to greet the first rays of the sun as they kiss the treetops. Such has been my routine since the beginning of 2006, when I started my field work on canopy birds at the Kalakad-Mundanthurai Tiger Reserve.

TOP OF THE WORLD

Referred to as KMTR, this is the southernmost tiger reserve in the country almost at the tip of the peninsula. Declared a tiger reserve in 1988, it is located within the recently-declared Agasthyamalai Biosphere Reserve, an invaluable repository of biodiversity of the southern Western Ghats. With an altitudinal range from sea-level to 1866 m., the diverse terrain hosts forest types ranging from thorn-scrub to montane wet evergreen. Home to many endemic plant species, the reserve is also known for its diverse assemblage of mammals and birds. It is the southernmost home of the tiger and the Nilgiri tahr and also one of the few places in South India where five species of non-human primates occur.

The avifauna of the reserve is diverse with 278 species recorded, though the rainforests are home to only about 84 of these. They include 12 of 15 endemics of the Western Ghats and 13 winter migrants. Forest canopies provide abundant food resources for birds in the form of flowers, fruits, arthropods and other organisms. High structural complexity, high species diversity, and pronounced fluctuations in microclimate and resource availability in the canopy have a profound effect on the avian community. Despite this, little work has been done on birds inhabiting and using this realm.

KALYAN VARMA

In India, bird studies have largely been restricted to ground-based observation. Our study, to the best of my knowledge, is the first attempt where canopy access has been employed to study bird communities in India.

Undisturbed primary forests (below right) in the Kalakad-Mundanthurai Tiger Reserve are invaluable repositories of biodiversity in the southern Western Ghats. Home to frugivores such as the rare and elusive Mountain Imperial Pigeon *Ducula badia* (below left) and magnificent predators like the Black Eagle *Ictinaetus malayensis* (facing page, top), lush canopies provide abundant food for birds in the shape and form of flowers, fruit, arthropods and other organisms.

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VIVEK RAMACHANDRAN

My field assistants Chian, Johnson and I began work in right earnest by putting up platforms in the canopy at an average height of about 25 m. We now have 18 such platforms spread across the Kakachi-Upper Kodyar area of mid-elevation evergreen forests. This encompasses forests of varying structure, from undisturbed primary, selection-logged and forests clear-felled for tea that have regrown to an average canopy height of about 10 m. Bird censuses are carried out throughout the day from these platforms. Observations on fruiting, flowering and other behavioral observation are also made.

LIFE IN THE CANOPY

One of the most striking things brought to light is that even though species encountered while sampling from the ground and canopy are similar, canopy sampling consistently reveals a greater abundance of birds. Insectivores like warblers, nuthatches and flycatchers that are distributed across the vertical profile of the forest were detected uniformly in the canopy and understorey, whereas frugivores and necter-feedingbirds such as barbets, black bulbuls, pigeons, sunbirds flowerpeckers and spiderhunters seem to prefer the upper canopy where the resources they utilise are more abundant. Sampling from above could well change our perception of abundance, behaviour and the conservation status of several species that dwell in this stratum. In fact, bird species considered rare may not actually be so when observed from the canopy.

Habitat structure plays an important role in determining the composition of bird communities. The clear-felled areas were avoided by many insectivorous birds, which prefer the mid-storey, because the canopy is stunted in these areas. This susceptibility to habitat modification could be referred to as 'guild compression'.

Of the many fascinating experiences in the canopy are mixed-species flocks (*Sanctuary* XXVIII Vol. No. 4, August 2008). Their arrival is usually announced by the Racket-tailed Drongo with its rambunctious calling. And before you know it, you are amidst warblers flitting from tree to tree, Velvet-fronted Nuthatches gleaning for bugs among the moss/lichen covered branches, Grey-headed Canary Flycatchers sallying after insects and, once, a White-Bellied Woodpecker perched right next to me to hammer away at the tree I was on. All these species and more were often virtually within touching distance and they seemed quite unperturbed by the presence of a curious scientist watching them. Black Eagles, Crested Serpent Eagles and Rufous-bellied Hawk Eagles regularly flew past us and we were sometimes even able to observe the undisturbed behaviour of rare raptors like the Jerdon's Baza and Black Baza.

Other regular visitors included Nilgiri langurs and the more inquisitive lion-tailed macaques. The latter sometimes came quite close and one actually tried to open my rucksack, while I was looking the other way! Graceful Malabar giant squirrels leaping from tree to tree present an amazing sight at eye level. I would invariably hold my breath as a squirrel launched itself with ease and agility across gaps in the canopy, almost making me wish I could do the same. I was sometimes able to spot particularly rare denizens such as the Malabar spiny dormouse, scurrying along branches. On some lucky occasions we also spotted the elusive Niligiri marten (see page 38), stalking its prey through the canopy.

TREE TOP SCIENCE

Canopy science has grown in leaps and bounds in recent years from exploratory forays to serious scientific endeavors. KMTR is one of the few places in India where such work is being systematically undertaken. Previously, work on pollination, frugivoury and phenology of canopy trees had been carried out by Dr. T. Ganesh and Dr. M. Soubarda Devy (See *Sanctuary*, Vol. XXV No. 1 February 2005) and this study would add to the available information on the ecology of canopies in India.

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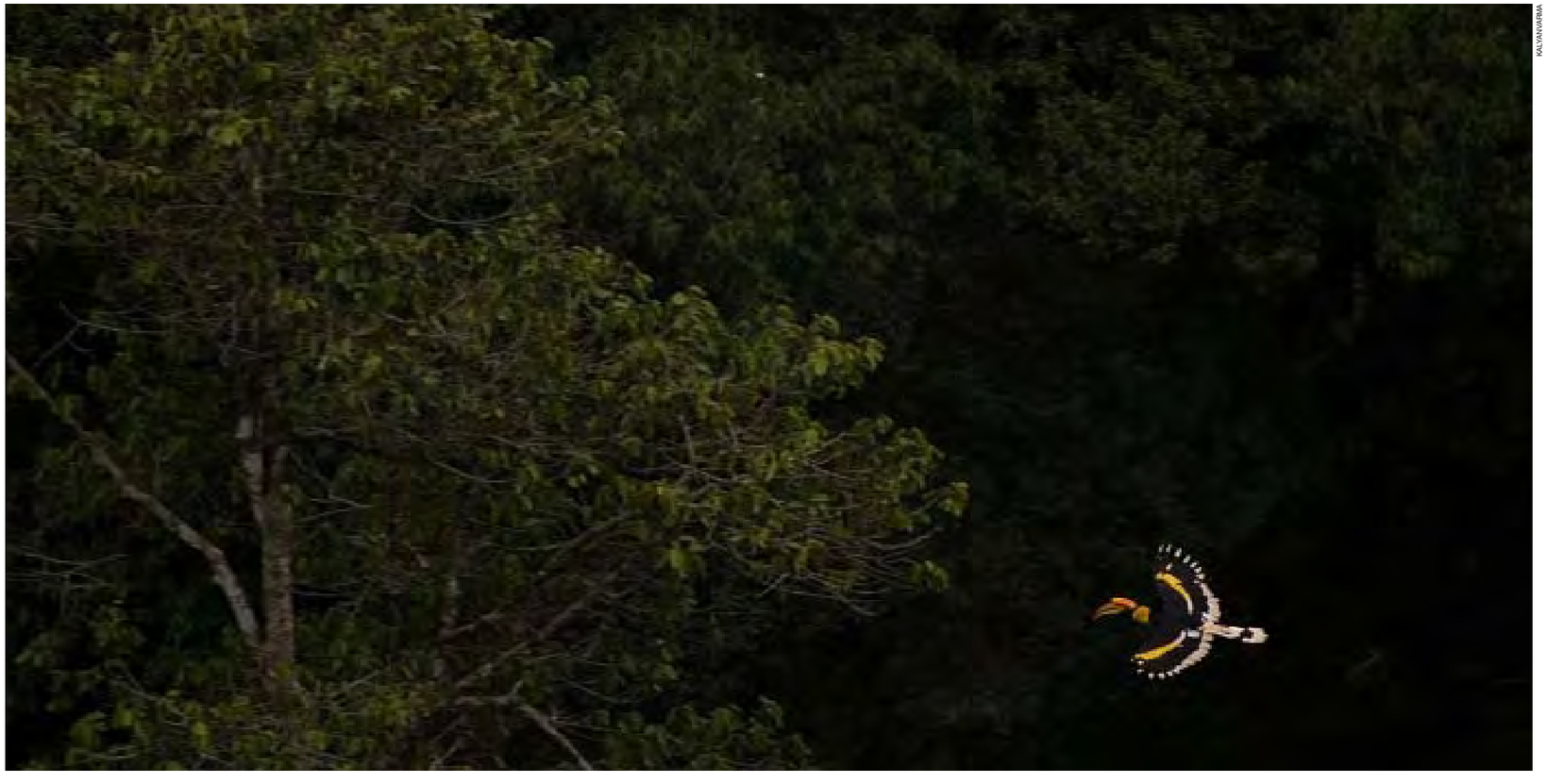
In the early years of canopy research, studies were restricted to ground-based sampling using monkeys and the odd opportunistic foray into the canopy. With advances in climbing techniques, borrowed from disciplines like



KALYANVARMA

A Velvet-fronted Nuthatch *Sitta frontalis* (facing page, right) forages for insects and arthropods amongst the bright yellow tubular flowers of *Cullenia exarillata* while a Great Hornbill *Buceros bicornis* (below right) glides through the treetops in search of ripe fruit. The Jerdon's Baza *Aviceda jerdoni*, (below left) is a shy, secretive avian that feeds on reptiles, large beetles and grasshoppers.

S.V.KUMAR

MAP NOT TO SCALE

speleology and rock climbing, canopy research has received a much-needed boost. The Single Rope Technique (SRT) has been popular with scientists over the world for the past three decades. SRT has been successfully used by scientists and adventurers to access the canopies for a multitude of research and recreational pursuits. The use of large construction cranes and walkways to gain access to the canopy has recently emerged as a favoured method as well. There are 11 such cranes in operation around the world in tropical as well as temperate forests.

Being the interface between the earth and the atmosphere, many important interactions take place in the forest canopies. In the recent scenario of climate change, this acquires significance for understanding elevated CO_2 concentration and its effects on the forest canopies as well as the cascading effects it may have on the plants and animals that live and depend on it. Canopies play an essential role in the hydrological cycle at the local as well as regional scale. Atmospheric interactions of the canopy contribute to the carbon cycle and canopies are key habitats for monitoring global change drivers such as CO_2 and habitat degradation. Additionally, our knowledge of ecosystem processes such as pollination and herbivory has been significantly enhanced by canopy research. The mechanisms underlying these processes may be critical for the survival of these forests in the long-term as extreme specialisations are essential for the perpetuation of certain species.

Canopy scientists have been coming together in recent years at the International Canopy Conferences held once every four years and the fifth one will be hosted by ATREE (www.canopy2009.org) in Bangalore from October 25 to 31, 2009. Organisations like the International Canopy Network (ICAN) and the Global Canopy Programme (GCP) have played a major role in fostering communication and partnerships between canopy researchers worldwide.

Moist forests around the world are threatened, and there is urgent need to systematically study the canopy biota. With increasing accessibility of the canopy and a variety of newly-evolved techniques, canopy science has become a valuable tool for studying inconspicuous, hard-to-detect species and is sure to throw up new and exciting insights and discoveries in this relatively unexplored realm.

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Canopy science has opened new frontiers for scientists documenting species diversity and has ushered in a great understanding of interaction and interrelations in the ecosystem. The dense canopy shelters a wide array of creatures, great and small, including the brown palm civet *Paradoxurus jerdoni,* seen here feasting on ripened figs. The civet is an important seed disperser and plays an integral role in the renewal of the forest.