"Yet another continent of life remains to be discovered, not upon the earth, but one or two hundred feet above it, extending over thousands of square miles..."
— William Bebe, American naturalist

Life on tree-tops

Often considered the eighth continent of our planet, canopies across the world harbour more than 30% of the Earth's living fauna, and yet remain one of the least studied areas till date, especially in India. In this special feature, two pioneering scientists share their passion for canopies, science, and the possible ways ahead for future researchers.

TEXT: BHASKAR KRISHNAMURTHY

DHRITIMAN MUKHERJEE

Mist rises through the canopy of a rainforest in Nagaland.



DHRITIMAN MUKHERJEE

The lush canopy of Brahamagiri forest located in southern Western Ghats.

Rarely seen at the eye level, tree canopies are essentially the crowns of the trees, and are often considered the last frontier of environmental exploration with their abundant life forms and unforgettable panoramas. From the vast green ocean of the Amazonian rainforest to the Valley of the Giants in Western Australia, life on top of trees is an enigma that has not been explored much by humans. This is even more so in India, where canopy science is still in its infancy.

Inside a forest, researchers and visitors who are caught up in watching the bears, tigers and many other ground fauna, rarely lift their heads to see the top layer of a tree. Man invented satellites and looked beyond the canopy, all the way to the moon and Mars, but missed an exciting world just 200 feet above the land. It is only in the last 15 years that few dared to soar high and float on the surface of the forest crown. And they did it in great style, building steel towers, going up through ropes, hovering on airships, and even building walkways between the trees at the top. No surprise then that canopies are described by some of the most interesting metaphors—air castles, hanging gardens, canopy oceans, aerial continents, or highway in the trees.

CANOPY SCIENCE IN INDIA

The wildlife habitats of India are biodiversity hotspots. Thick tropical forests not only help sustain biodiversity, they also add value to the modern issues of climate change, cultural conservation, and provide invaluable ecosystem services. This understanding and some of the research initiatives from outside the country has encouraged a few scientists and organisations within India to explore the top surface. Climbing trees is is not for the faint hearted. It is an exploration, and on occasion, an intimidating experience. Braving heat, height, parasites, and insects, canopy scientists go beyond the frontiers to unravel a territory occupied by eagles and monkeys.

India has come a long way in canopy science. For those who brave the gravitation, thorns and pains, it is the last biotic frontier and the Indian canopies offer great opportunities and limitless understanding of its top layer. In the following interviews with Dr. Meg Lowman and Dr. Soubadra Devy, the two pioneering scientists discuss their love for canopies, assuring that just like the depths of our oceans, canopies too offer a vast and unexplored research site all across their range.

Dr. Margaret Lowman
Chief of Science and Sustainability, California Academy of Sciences, USA

Among all the titles that have been bestowed on her, "Mother of Canopy Research", is possibly one of the coolest. For more than three decades, Dr. Margaret Lowman, also known as Canopy Meg, has pursued her fascination with tree canopies authoring books, designing hot air balloons, building walkways and pioneering canopy conservation. Through her education and outreach initiatives she has been inspirational to people across the world. We caught up with her climbing trees in Baker University, Kansas.

DKB: Meg, you are a pioneer of canopy research and education. For budding youngsters in India, could you share a story that enticed you to take up climbing trees?
Meg: I grew up in a rural small town, where there were no movies or computer games or shopping malls. I played outside a lot with my favourite friend, Betsy. We made tree forts! We also tried to rescue baby birds that had been deserted by their parents or fix earthworms cut in half by lawn mowers! But most of all, we loved nature and most other kids in our school did not think that was very cool. Even more amazing, Betsy's brother was also a fairly un-cool guy -- named Tommy Hilfiger! He loved clothing (and most boys did not love clothes) at a young age. He grew up to be an international fashion mogul owning Tommy Hilfiger Corporation, and I grew up to be a forest biologist -- all things we were passionate about in our youth.

DKB: What are the challenges that face a canopy scientist like you?
MEG: Challenges include safety issues such as using good equipment (helmet, harness, ropes that are in good condition); but the biggest challenge is avoiding stinging ants or wasp nests in the canopy. However, the chances of encountering a dangerous insect are probably as rare as getting hit by a car in Delhi! The long-term and ultimate challenges of canopy biology are



Dr. Margaret Lowman ascends using her climbing gear to study the canopies.

to understand what makes a forest healthy before they are destroyed — we are in a race against time for many areas of global forest.

DKB: You love building walkways and they are truly one of the best ways to experience the top of the canopies. Have you seen any such walkways in India or is there anything coming up?
MEG: I was funded by Fulbright to meet with different forestry groups throughout India, and talk about the magic of forest canopies. There was big hope that this would inspire the notion of a canopy walkway somewhere in an Indian forest, but it did not. However, there are some amazing canopy researchers in India — at places like ATREE and up in Dehradun at the Institute. So hopefully a walkway is in India's very immediate future — it would be a fabulous tool for making children hone a love for trees, for making money through ecotourism, and for sharing forests with Indian citizens; and yet one that does not trample the forest floor. And besides, it is really fun to be in the treetops!

DKB: India's tree diversity is quite extraordinary and there is a religious belief associated with them. You have been there many times. What are your observations?
MEG: The culture of India is -- in a sense -- more advanced than the USA because there is a religious value for trees. The notion of a sacred tree in a village means that people care about trees and conserve them. This also means that the notion of forest conservation has good traction in India as compared to other countries. And why not — trees are sacred since they house biodiversity and conserve water and soil, and store carbon, and produce energy and do all sorts of useful things for human beings!

DKB: Any correlations to canopies with climate change?
MEG: The forest canopy is at the direct interface of earth and sky. So it is no surprise that canopies experience changing climates first -- extreme drought, heavy rains, increased temperatures, all affect forest canopies and make them a "canary in the coal mine"

DKB: India has invested on mega projects for Tigers and Elephants and so on. Conservation of trees and large woodland forests are so crucial for a healthy environment and ecosystem. Your take on it and how India should look ahead with its conservation programs?
MEG: India is very fortunate that approximately 20% of her primary forests are already conserved. Now, the issue is how to share them with citizens in a meaningful way, and allow visitors to appreciate the trees and wildlife. Canopy walkways are ideal for India, and it places more emphasis on ecotourism where visitors can enjoy wildlife, hiking, and lodges in forests — great for the economy as well as for conservation.



Indian students learning how to access the canopy at KMTR.

DKB: How important is education outreach on canopies? We have an information overload and it is equally challenging to entice young people to go out, experience and engage in nature. They are enamoured while viewing it on television, but they dare not go out and do it themselves.
MEG: Kids need Mother Nature! There is medical evidence that experience in the woods and outside in nature gives kids increased ability to learn, do well in school, and be healthier. So it is very important to allow kids access to India's forests and natural places. This is tough for kids in big cities (similar in New York City) -- so parks and weekend field trips from school, and field courses for kids are increasingly important. With technology such as iPhones, kids can also discover biodiversity in cities -- photographing birds, weeds in sidewalk cracks, and weather data are all information that can link kids to nature inside of cities. I'd written something similar on by website as well called "Let your kids get muddy once in a while". (www.canopymeg.com)

DKB: Like collaborative whale researchers, do you think canopy research can be better understood between researchers across different continents, perhaps from the rainforest of India and Africa to the Amazonia to Australia?
MEG: Absolutely, yes! We have the 7th international canopy conference coming up in London in 2016, which will bring canopy scientists together from all over the world. Although unusual, I have worked in canopies across the globe (not just in one place) and this has given me many insights about comparative forest health, creative solutions for conservation, and knowledge about how different cultures deal with economics relating to forests. I think it is vital that we recognize "one Earth" and work collectively to conserve forests worldwide!



DHRITIMAN MUKHERJEE

Right: A perspective of the canopy of a rainforest on Little Andaman island.
Below: A view from the ground level at Kalakad Mundanthurai Tiger Reserve

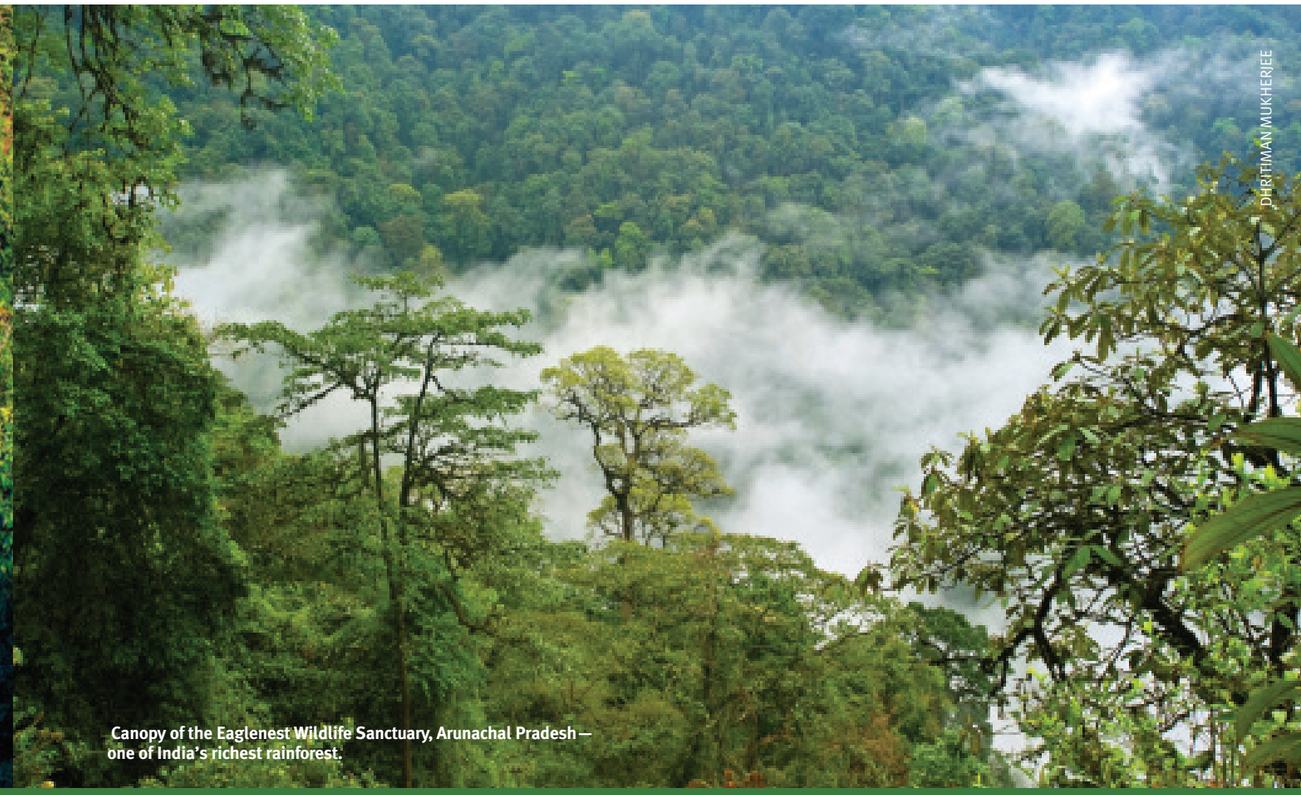


SOUBADRA DEVY



DHRITIMAN MUKHERJEE

A mixed rainforest canopy from Nagaland displays a riot of colours with various shared of greens, with a splash of autumn hues.



DHRITIMAN MUKHERJEE

Canopy of the Eaglenest Wildlife Sanctuary, Arunachal Pradesh—one of India's richest rainforest.

Dr. Soubadra Devy,
Fellow, Ashoka Trust for Research in Ecology and the Environment

Dr. Devy has been accessing the canopy of a wet forest site in Kalakad –Mudanthurai Tiger Reserve (KMTR) for various pollination studies. As most canopies of Indian forests remain unexplored, she is keen on taking this experience further by developing a canopy programme to assess the biodiversity of this unexplored realm in collaboration with other experts.

DKB: Canopy science in India is still in its infancy. Climbing trees in India, especially as a woman, is not the most sought-after field. How did it all begin for you?
SOUBADRA: I was initially interested in plant-pollinator interactions. One of my colleagues was working on an understory community of plants in the Western Ghats. As an intern, I followed her around and found the understory to be dark and dull. She used to watch flowers for hours and hours, hoping that something will land on them; while I felt everything was happening up above my head—the buzz of the bees, the crackle of the birds, the cries of the Lion-tailed macaques and Nilgiri Langurs. The longing started then. After a year of roaming in Andaman I returned to build the first ladder up the canopy. This served as a periscope for future canopy studies. Later on, thanks to Meg who got us the first climbing gear, we managed to train a load of youngsters. This led from one project to the other.

DKB: What fascinates you most when you are on the top layer of the vegetation—adventure or science or exploration?
SOUBADRA: In KMTR, which is familiar ground, a more science-focused approach seems more appropriate. In Sikkim, it was fun to train mountaineers to climb trees for a change. Here, my future work would be combination of adventure and exploration, while at the same time, we are hopeful of finding a great deal of new species as well.

DKB: There have been projects that drive mega fauna in India. Where is India placed in terms of forest conservation in which Canopy becomes so important?
SOUBADRA: Funding isn't the biggest problem as people are convinced that it is the last frontier. The nightmare is getting the necessary permissions within our reserves where the best forests are sitting today. Imagine, China has three cranes and India has none. If I were to set up one it would only be inside reserves. I don't want a crane in empty forests, that is bereft of animals, particularly mammals.

DKB: How good are the education outreach programs in India for canopy understanding compared with other countries? Do you see more youngsters interested in this field?
SOUBADRA: We have to accept the reality that youngsters who would want spend time in the field are getting lesser and lesser. So this challenge is just not for canopy science but overall field biology.

DKB: In India there is a growing awareness on conservation education. Yet, I think it is not easy for children to rough it out and be outside let alone be on the canopy braving the heat, dust and insects.
SOUBADRA: I agree that it is tough for kids to pursue this on their own. One method could be of popularising it as adventure sport to start with. We include a canopy component in all courses, be it for school children, undergrads and above.

DKB: Please talk a bit about the canopy of walkways in India and for an average visitor/enthusiast, where are some of these located?
SOUBADRA: We do not have the long, sweeping canopy walkways that are found in Costa Rica and other places. There are however some short-distance ones in Kalimpong, Andamans, Coorg and Thenmala.

DKB: Do you conduct any training workshops and how can one connect to get that experience of seeing the canopy and be trained?
SOUBADRA: We recently had a workshop in Darjeeling for Eco-tourism guys to popularise it as adventure sport. If we are successful with a proposal for Sikkim we plan to conduct a series of workshops and build a team for the NE region, which remains unexplored.