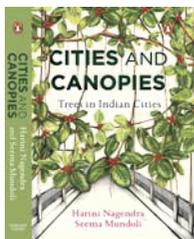


Democratizing Science and Redefining Education*

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Cities and Canopies: Trees in Indian Cities

Authors: Harini Nagendra and Seema Mundoli

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Cities and Canopies: Trees in Indian Cities by Harini Nagendra and Seema Mundoli of Azim Premji University, is one of the most unusual books I have read in a long time. In this brief essay, I wish to say a few words about the research that has gone into the book, about the book itself and more importantly, about what we can do with their book – we must read it of course, but I think we can do much more, we *must* do much more.

The Research

A great deal of research and of a rather unusual kind has gone into writing *Cities and*

Canopies. Most ecologists like to study forests (preferably pristine forests, whatever that means), exotic species and habitats, or rare and obscure species that no one has heard of, let alone seen. They take great pride in studying the unusual and the uncommon. Like many scientists I am afraid, they revel in researching what is unfamiliar and rather uninteresting to common people. That is what they believe, puts them on a pedestal and gives them prestige and power. This is sometimes known as the ‘ivory tower’ and better characterized as the ‘fear of being understood’!

Harini Nagendra and Seema Mundoli are refreshingly different. They research the common and the mundane, the familiar and the apparently well-known. They conduct their research in our backyards, our gardens, our streets, our temples, mosques and churches, our graveyards and cemeteries, our schools and our homes. And yet, they produce new knowledge that is at once, eye-opening, fascinating, understandable by everyone in the age group of 10 to 100 years and supremely relevant. Clearly, they are not afraid of common people, and they have no fear of being understood. Their prestige and power come, ironically, from the absence of a pedestal. They so effectively bridge the gap between scientists and the public – a gap that should have never existed in the first place.

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The Book

Cities and Canopies is a work of science and art par excellence. It is a beautifully produced book with an elegant design and layout and clever and innovative illustrations. You will discover, or at least your children will, that it is also a colouring book, extending the age of enjoyment even below the 10-year lower boundary I have mentioned. Its text is more remarkable still. The 22 chapters alternatively cover general tree-talk and factoids about iconic trees found in Indian cities. You will not just read the book, you will live it every day of your life because it touches on everything in your life, you cannot escape it. In short, it is a guide to living in cities. It succeeds in breaking all boundaries. It is at once about trees and canopies, about towns and cities, about gardening and horticulture, about fun and games, about cooking and eating, about history and geography, about botany and zoology, about worshipping and faith, about ghosts and myths, about legends and stories, about kings and commoners, about ecology and environment, about past and future, about Vedas and Ayurveda, about Greeks and Buddhists, about Hinduism and Christianity, about Silicon Valley in California and in Bengaluru, and much more. I could go on and on. And yet, everything is connected to everything else.

Doing research and communicating it to a general audience are two very different enterprises. Research needs concentration and focus and digging deep at chosen points. Writing a book about the research requires tak-

ing a distant view of the matter and making connections and interpretations and seeing the whole as being greater than the sum of the parts. There is almost inevitably a trade-off between the skills needed for these two enterprises, if you are good at one and then almost by definition, you are bad at the other. The genius of *Canopies and Cities* and of Harini and Seema lies in how they avoid this trade-off – you don't know where their research ends, and their communication begins – it's a Möbius strip.

What Can We Do With It?

We should all read *Canopies and Cities*, that goes without saying. We cannot only admire the drawings but customize our copy of the book by coloring the drawings in our own unique way, so that there will be no need for us to write our names on it in order to recognize it as our copy. This also means that every member of the family deserves a separate copy if you can afford them – I suspect that there will soon be an inexpensive paperback edition. There is already a Kindle edition which I have used, and I also hope that there will be an audio book, read alternately by Harini and Seema, in the not so distant future. The book is designed to be a companion in many of our daily activities, whether you are cooking, eating, gardening, teaching, travelling or even on a holiday. If you have read the book once, many of the memorable nuggets contained in it will come to mind repeatedly and I suspect every day because it refers to so many relevant things that comprise our world. This is all



pretty obvious, and I suspect that most owners of a copy will do all of this more or less automatically. I want to suggest that we do much more, but this won't happen automatically – it will require effort. It won't even happen deliberately unless we are willing to change our mindset about education.

We treat our students in schools and colleges as empty and passive containers into which we can dump all kinds of facts more or less in any order and in any quantity, at any time. The task of the student is to memorize and recall. This does a very effective job of killing all curiosity and initiative, and with time, students just get better at being passive receptacles. To change this mindset, we must banish teaching from education altogether and replace it with learning.

The purpose of education must not be to teach but to help the students learn. Learning should be an active process largely under the control and direction of the student. If that is our goal, then we should get rid of all existing textbooks and replace them with books such as *Canopies and Cities* and thus help our students to learn. With the widespread availability of the Internet, our textbooks have become absurdly outdated and inappropriate; it is a mystery to me that we have not yet understood this obvious reality. There is nothing in our textbooks that is not more readily and more accurately available on the internet. So, we must get rid of one of them, and I suggest that we ban textbooks rather than banning the internet as they do today in many educational institutions!

If there is one thing that cannot distinguish between the rich and the poor, the young and the old, the smart and the dull, the beginner and the initiated, it is the internet. What the internet cannot provide, however, is a narrative of the kind that is contained in *Canopies and Cities*. Armed with copies of books such as *Canopies and Cities* and access to the Internet, students of all ages can undertake their own journey of discovery. They will then be completely innocent of the artificial and destructive divisions between arts and science, humanities and commerce, between botany and zoology, between history and gardening, between cooking and studying, indeed between work and pleasure. If I were to use *Canopies and Cities* as a replacement for a textbook, all I would do is it to highlight some 20 or more words or phrases in each chapter to serve the students as starting points for their daily journey into cyberspace to explore the vast Venn diagram of facts, knowledge, utility and wisdom. As an illustration, these are some of the words and phrases I would highlight in Chapter 2 of *Canopies and Cities*, for my students to use as cues: Hinduism; Jainism; Buddhism; Jambudwipa; Vishnupurana; elephants; Charaka; Ramayana; Lord Muruga, Cholas; Babur; Mohammad bin Tughlaq; tannins; wine; chocolate; anthocyanin; antioxidant; mouth ulcers; dysentery; IIT Roorkee; fluorosis; honey; vitamin C; Rajpath; parakeet; astringency; sherbet, and I could add many more. Pick what takes your fancy and run away into cyberspace, I would tell my students.





The authors of *Cities and Canopies* Seema Mundoli (left) and Harini Nagendra (right) with the author of this essay, at the launch of the book in Bangalore on 20th June, 2019.

We should not underestimate the value of the students' own unguided exploration of the meaning, history and ramifications of words they come across in their reading. Besides, I do not know of any teacher who can predict the outcome of such an exercise, and let us not forget that there will be as many outcomes as there are students multiplied by the number of days. The only 'danger' is that there will be surprises galore and much for the teacher to learn. No teacher by herself can learn even a small fraction of what she will learn by taking a peek at the findings of her students. There will be learning all around, and the students will generate more knowledge than the teach-

ers, not only because there are so many more of them, but, let us face it, they are better at navigating through cyberspace.

This I guess is the real use we must put books such as *Canopies and Cities* to, and this is the real use that we must put our students to! Are we up to the challenge? In my experience, students are. What about the teachers? I very much hope so.

In summary, *Cities and Canopies* provides a roadmap for democratizing science and re-defining education. We must congratulate Harini Nagendra and Seema Mundoli for undertaking this remarkable project, Azim Premji University for encouraging them to do so and facilitating their work, and Penguin-Viking for producing an extremely attractive and elegant product. Their efforts will go in vain if we do not put this product of their labour of love, to full use.

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