

to controversy. Ray observed that a part of monochromatic X-rays while passing through carbon, nitrogen and oxygen undergo a change in frequency and appear on the longer wavelength side of the primary radiation. He was of the opinion that this effect was a similar to the Raman effect, which was theoretically predicted by Kramers and Heisenberg.

M. Boetzkas in Germany and J. M. Cork in USA repeated Ray's experiment and both got negative results. However, M. N. Saha came out in support of Ray. The experiments were carried out by research students of Saha – S. Bhargava, R. C. Majumdar and J. B. Mukerjee – in Allahabad University, in support of Ray's effect. Even Sommerfeld wrote a letter to A. H. Compton, which appeared in *Physical Review*, suggesting to re-interpret Ray's experimental results. Despite all this support, controversy over the 'Ray effect' failed to die down.

Ray's social and political activities

According to Rajinder, Ray did not belong to the Bengali intellectual elite by birth, but was well connected with Bose, Saha, Raman and other scientists of the Calcutta School. After his marriage, Ray came in contact with Rabindranath Tagore, the first Indian Nobel laureate. During his second trip to Europe, Ray went to Germany and met W. Heisenberg. There is reference to a meeting between Ray and Subash Chandra Bose, the great Indian revolutionary, in this monograph. According to evidence gathered by the Rajinder from D. Ray (Member of Ray Family): 'Netaji Subash Chandra Bose met Dr B. B. Ray before his great escape to Germany to have an introduction letter addressed to Prof. Heisenberg to meet Hitler.'

In his correspondence with Bohr, Goudsmit and Nishina, there are oblique references to the political situation in India, but Ray had poor opinion about Indian politicians. In one of his letters to Nishina, Ray wrote: 'You know I was once interested in politics, and I did a little bit when I came back here, but I have found out that the politicians are as a rule scoundrels, and I have given it up as hopeless, and returned to my laboratory, only to find also a horrible mess.'

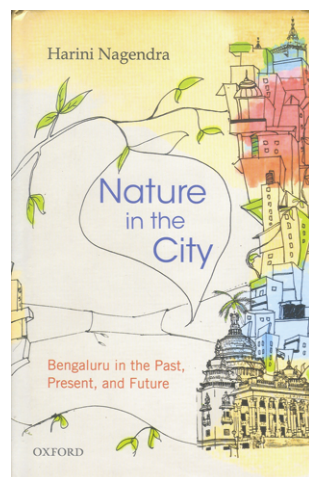
The most intriguing part of Ray's biography is his relationship with Raman and Saha. It is a well-known fact in aca-

demical circles that both Indian giants had no love lost between them. Ray was a research student of Raman, who always supported him in his academic pursuits, namely, visits abroad and entry into the University of Calcutta as a physics faculty. However, later on Ray was won over by Saha and he turned against his mentor, Raman. Does it have to do with the Bengali versus non-Bengali trait which was being hammered into Ray's mind by Saha? It is a predicament which needs better explanation.

On the whole, the monograph is a valuable resource material on Ray's life and his scientific achievements, as the unsung hero of the Calcutta School. I swam through this volume of 150 pages in just one sitting. It reads like a fiction story inter-woven with scientific facts, social and ethical values of pre-colonial Indian society, and predicaments of a young Bengali scientist who had lost his moorings. The author deserves appreciation for bringing out this biography as a volume under the 'History of Science' series.

HARDEV SINGH VIRK

*SGGS World University,
Fatehgarh Sahib 140 426, India
e-mail: hardevsingh.virk@gmail.com*



Nature in the City: Bengaluru in the Past, Present and Future. Harini Nagendra. Oxford University Press, New Delhi. 2016. xvii + 224 pp. Price: Rs 750. ISBN 9780199465927.

As a scholarly work on the ecological history of Bengaluru, the capital of Karnataka in southern India, this book

breaks new ground and makes for a refreshing read. It is interdisciplinary in scope, bringing insights from fields as diverse as ecology, urban planning, history and sociology.

Nature in the City is distinctive in several ways. First, as a book written by an ecologist, it is refreshing and unusual in that it addresses nature in cities, rather than in forests or wilderness areas considered a more typical domain of all things natural. With over half of the world's population today residing in cities, or increasingly living in rapidly urbanizing spaces, the focus of this book is timely and relevant to contemporary concerns over how to integrate nature and sustainability with urban development. Second, the book delves into archival and historical material from the 6th century CE to recent times without relying solely on these sources. Instead, Nagendra blends into the work findings of primary field research conducted by her students, co-workers and herself in the present-day city, which traces nature in the city's parks, wetlands, slums, streets and sacred spaces. Further, the voices of different groups of citizens presented as quotes and findings of interview surveys add a significant dimension to the work, illustrating how perspectives vary among the different segments of society ranging from the underprivileged and marginalized poor, the middle-class apartment dwellers, other interest groups and members of civil society, to the wealthy elite. Finally, Nagendra writes in an easy, clear and flowing style, almost free of jargon, with each chapter winding down with a summary of the main conclusions. The book makes for an intelligible and illuminating read by non-specialists and non-academic readers, without compromising on the scholarship. This makes for a reading experience marked by ease and clarity which is rare among scholarly works in ecology, sociology and environmental history.

The book opens with a chapter that sets the wider context of urbanization and changing perception of nature in cities from being a productive commons to a more constrained and privatized space that provides regulatory 'services' or recreation for urban citizens. The second chapter takes a closer look at the ecological history of Bengaluru itself. The landscape where the city is embedded even today is marked by thousands of years of human presence, going back

BOOK REVIEWS

to the middle Stone Age. Nagendra presents a view of how Bengaluru came to lie in a semi-arid tract of the Deccan plateau between the *malnad* (hills) to the west and the *maidan* (plains) to the east, an undulating landscape amenable to cultivation and human settlement. She traces the history of settlements, landscape features and human uses, from the 6th to the 16th century through a review of historical material, particularly epigraphic inscriptions found on copper plates, stones, and temples around present-day Bengaluru. She then traces the changing landscape of the city, founded in 1537 CE, under the reign of the Yelahanka Nada Prabhus, the Bijapur Sultanate, and Hyder Ali and Tipu Sultan, until it finally came under the British colonial administration at the end of the 18th century. The third chapter traces the ecological history of Bengaluru from the 19th century to the present day. From a more open landscape with few trees and gardens (such as the 'Cypress Gardens' of Lal Bagh established in the 18th century), the city developed more tree cover and gained its reputation as a 'Garden City'. Nagendra notes that while this derived from the city's tree-lined streets, parks, bungalow gardens, and lakes, the transition to a garden city was not entirely due to English influence and aesthetics. It was also shaped by earlier rulers and older influences where people viewed nature as sacred, alive and a source of livelihood. Yet, in recent times, the city in its rapid growth has consumed many of these natural elements, as lakes were drained for buildings and golf courses, rock outcrops were smashed for quarries, commons converted to markets controlled by private traders, and tens of thousands of trees were lost to road wid-

ening. With water piped from the River Cauvery and supplies trucked in from afar, Bengaluru has become more disconnected from nature than in the past, which as Nagendra points out has serious consequences for the future of the city and its citizens.

In the succeeding six chapters, Nagendra details nature in various parts of the city: home gardens, slums, along streets, parks, places of worship and lakes. These chapters do an excellent job of weaving together historical material with contemporary studies, including the field research of the author and her team. The chapter on nature in the slums is exceptional, not just in its focus on an area largely ignored in the discourse on nature in cities, but in the revealing detail presented of the diversity of species, uses, and values that persist. These chapters present primary research findings in relation to their implications for the city, as when the author describes abundance and diversity of street trees and their role in sustaining urban biodiversity, reducing heat and pollution, and providing shelter for pavement dwellers, small traders and artisans. Here, and in other chapters such as the one on lakes, Nagendra also deftly portrays the tussle among segments of the populace due to urbanization and failure of governance. Some lakes die as they are drained for 'development'; others are revived notably through civil society activism and efforts by middle-class and upper-class citizens, yet they fail to integrate traditional and more marginalized people, users such as fishers, graziers and *dhobis*, who depend on the water bodies for their lives and livelihoods.

The book closes with a chapter envisioning an 'inclusive future' for nature in

Bengaluru. The introductory and concluding chapters act as bookends tracing the influence of nature in cities from past to future. Although there are some references to broader aspects and the experience of other cities in India and elsewhere in the developing world, these are few. One is left with the feeling that a wider discussion is warranted, including a more focused questioning of prevailing paradigms of urban design and development, and whether these allow the ideal of inclusive nature to become integral to future cities. Another lacuna in the work is the inadequate attention paid to a wide range of natural history and ecological studies and documentation carried out in and around Bengaluru by scientists and naturalists over the years. An overview of this would have presented a better picture of the present-day biological diversity in Bengaluru, a city where over 340 bird species have been documented, where one can even today see endangered species and rarities such as Blackbuck (*Antelope cervicapra*) and Lesser Florican (*Sypheotides indicus*) on the fringes. The role played by naturalists, citizen-scientists and other groups in such nature documentation, awareness creation and conservation, deserves both mention and analysis. Still, these are minor quibbles about an outstanding work that deserves to be read by scholars, urban nature enthusiasts, planners, and members of civil society and academic institutions.

T. R. SHANKAR RAMAN

*Nature Conservation Foundation,
3076/5, 4th Cross, Gokulam Park,
Mysuru 570 002, India
e-mail: trsr@ncf-india.org*