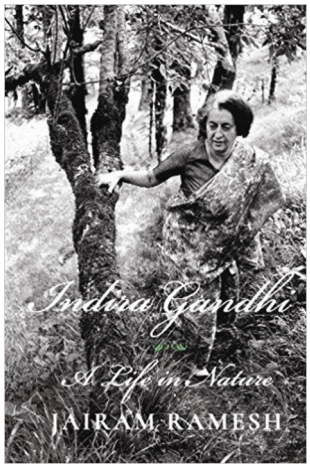

Indira Gandhi: A Life in Nature. Jairam Ramesh. Simon and Schuster India, New Delhi 110 001, India. 2017. 437 pp. Price: Rs 639.

Indira Gandhi had a remarkable life and career. Sometimes inspiring, sometimes polarizing, everyone had an opinion on her, ranging from outright adulation to scathing critiques of her political philosophy and practice. In one respect, she was and continues to be largely admired in her contribution to nature conservation.

Viewed through the lens of protection, what she achieved was remarkable. She pushed through two conservation laws, the Indian Wild Life (Protection) Act of 1972 and Forest Conservation Act of 1980. Hundreds of sanctuaries and national parks were established, numerous species were listed under the schedules of the Act, and various initiatives such as Project Tiger and Project Elephant were launched. Under her leadership and representation, India became a voice for environmental conservation in the global community in the early days of the movement (a position it has rapidly lost).

Conservationists of her generation speak of her tenure with utter reverence. Never before or after have those concerned with environmental issues had such access to the Prime Minister's (PM's) office. Even today, many ecologists and conservationists maintain (perhaps rightly to some degree, perhaps not) that India's natural heritage would have been totally lost if not for her interventions. However, there are two ironies here. One, some of these interventions were made in the same undemocratic fashion as a few of her deeply controversial political decisions, and yet the liberal left conservation community feels comfortable with them. Second, these were oddly at contrast with the rest of her people and poor-oriented policies.

But what made Indira Gandhi such a nature lover. Jairam Ramesh's book brings to the fore how she became a naturalist, and how much it was a part of her life. The book begins with chapters titled 'The wellsprings (1917–1943)' and 'The companionship years (1950–1964)'. This part of the story is told largely through letters between daughter and father. It is remarkable how much of these were devoted to the description of birds, trees and nature in general. As daughter and later companion, Indira Gandhi imbibed many of her father's values and certainly his affinity for nature.

The letters describe her early efforts to identify birds, for which she is tersely reprimanded for providing too vague a description. In later letters, she had learned to identify them using Salim Ali's *Book of Indian Birds*. Amusingly, when she was incarcerated in Naini Central Prison, Allahabad, she named the cats after British politicians and Ramesh wonders how they made it past the censors.

The letters talk about her love of the mountains. She spent many idyllic holidays in Mussoorie, Panchgani, Matheran, Mahabaleshwar, Nainital and Almora. A remarkable story concerns her first visit to Bhutan. When Nehru was invited to visit, he decided to trek there from Sikkim, a journey of 10 days on which he was accompanied by his daughter. They flew to Bagdogra, and drove to Gangtok then Sherathang, at 12,000 ft, and then climbed to Nathu La Pass at 14,000 ft. From Nathu La, at the border of Tibet, they trekked for five days to Paro in Bhutan.

The Nehru residence in Delhi, Teen Murti House, was a veritable menagerie with dogs, squirrels, birds and other rescued animals, but also a red panda, crocodiles and several tiger cubs. Indira Gandhi also enjoyed visiting the country's wildlife areas – from Gir in Gujarat to see lions to Kaziranga in Assam for the rhinos. Sometimes, their love for wildlife had less than positive consequences. When they visited Gir in 1955, the lions were baited so that the PM could see them in the short time he was there. The practice continued till 2001.

Indira Gandhi became Prime Minister in 1966. While she was initially primarily concerned with India's food production and other issues such as family planning, she slowly began to assert herself as the 'Naturalist Prime Minister' as Ramesh refers to her (the first stint being from 1966 to 1977), both in India and abroad. With her support, India held the Tenth General Assembly of the IUCN in New Delhi. Her speech at the IUCN meeting, with over 300 conservationists from around the world, was passionate and announced to the world her commitment to the conservation of nature and India's wildlife.

Through her time as PM, Indira Gandhi was associated with the protection of many natural areas. The first of these was the Koeladeo Ghana Bird Sanctuary in Bharatpur, Rajasthan and of course, much later Silent Valley in Kerala. She was the first PM to visit the Andaman and Nicobar Islands (in 1968), and remained concerned with its ecology for the rest of her life.

She was instrumental in the passing of one of India's landmark legislations, the Indian Wild Life Protection Act of 1972. Following the drafting of the bill by M. K. Ranjitsingh, she wrote to all Chief Ministers urging them to support the national law. She pointedly noted that it was not a political issue, but concerned 'the survival of our famous natural heritage'. That year, with her support, the tiger was declared as the national animal on the recommendation of the Indian Board for Wildlife, which argued that it was more appropriate than the lion as tigers were found in many parts of the country. Project Tiger, another significant step in the India's conservation history, was then launched in 1973.

Indira Gandhi delivered one of her most famous speeches at the United Nations Conference on the Human Environment in Stockholm in 1972. Lauded by various commentators as one of the most influential speeches of the time, she said 'Are not poverty and need the greatest polluters?' She argued eloquently that it was unfair to blame the world's problems on over-population when a small fraction of people consumed most of the resources. Of the poor, she said, 'How can we speak to those who live in villages and in slums about keeping the oceans, the rivers and the air clean, when their own lives are contaminated at the source?' One of the outcomes of the conference was the United Nations Environment Programme and, for a while,

New Delhi was considered as its location.

The naturalist PM was concerned with all wildlife, not just glamorous tigers and lions. In 1975, Indira Gandhi launched Project Crocodile, this time at the urging of a Scottish biologist, Robert Bustard, who had been working in Australia. Bustard had also discovered the mass nesting grounds of olive ridley turtles in Gahirmatha in Odisha, which would reappear later in her life.

Following a brief account of her time 'out of office', Ramesh turns to her second stint as the 'Naturalist Prime Minister (1980–1984)'. At the very outset, she had to deal with issues surrounding big dams in Tehri and Silent Valley. The protests over these were to become iconic. Despite having a different party than her own in power in Kerala, she worked hard to convince the state that Silent Valley needed to be protected. Her efforts and those of all the national and international conservationists eventually ensured that it would be. Similarly, she succeeded in stalling work on the Tehri Dam, but it eventually went forward despite the efforts of the activist Sunderlal Bahuguna and others.

During this term, Indira Gandhi also passed the Forest Conservation Act, and discussions were initiated on a coastal regulation zone for the protection of coasts. In 1982, the issue of olive ridley turtles in Odisha was brought to her notice. Thousands of turtles were being caught in offshore waters and shipped to the markets in Kolkata. She wrote to her officers directing them to engage the Coast Guard in the protection of turtles (called Operation Geeturt), which marks the first occasion where armed forces were called into service for protecting the environment.

Indira Gandhi received many awards for her commitment to nature conservation, including the Order of the Golden Ark from the Government of Netherlands, and the John C. Phillips Memorial medal, the highest accolade of the IUCN, which was received posthumously by her son, Rajiv.

Through her time as PM, many stalwarts played a key role in advising her on wildlife conservation – Karan Singh, Billy Arjan Singh, Kailash Sankhala, Zafar Futehally, Salim Ali, Anne Wright, Ranjitsingh and Ashok Khosla. She always had time to listen to concerns about nature and conservation, and respond to both national and international conservationists who wrote to her on the subject. As Chair of the Indian Board for Wildlife, she made it a point to attend all meetings and was attentive to issues, something that no other PM has done.

Indira Gandhi's engagement with nature is absolutely fascinating. It was a study in both commitment and passion. The book under review provides a vivid account of her 'life in nature' told largely through her correspondence with friends, family, bureaucrats, politicians, conservationists and biologists. The book provides rich details of the many battles she fought, and her own struggle to balance issues of environment and development. Though Ramesh claims to take an objective stance, there is an unbridled admiration of her courage and determination to defend nature. At the end, he says that while she was enigmatic, 'the *essential* Indira Gandhi was [a] committed conservationist'. All those who read this book will have to agree.

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Annual Review of Nuclear and Particle Science, 2016. Barry R. Holstein, Wick C. Haxton and Abolhassan Jawahery (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 66. vi + 473 pages. Price: US$ 102.

A framework that encompasses all known elementary particle interactions, namely the strong, weak and electromagnetic (unified into an electroweak) interactions has been established over the last several decades. This framework which does not include the gravitational interactions has come to be known as the 'standard model'. It is a theory of interactions between quarks and gluons, which make up the strong interactions, and quarks, charged 'leptons' (an electron being one, and muon and tau lepton being the other two), and their electrically neutral counterparts, which are known as neutrinos of the electron, muon and tau type, which interact via the exchange of photons, and the so-called W and Z bosons. The fact that neutrinos are electrically neutral has rendered them very challenging to be probed in experiments. In particular, even today we do not know their masses; we only know that they can flip back and forth between the various types; that there are mass differences between them, taken two at a time, and we do not yet know the sign of this mass difference. We also do not know whether they are 'self-conjugate' or not, in that we do not know if they are their own anti-particles. Turning to the force carriers, the gluons and the photon are massless, while the W and Z bosons are massive and it is the famed Higgs mechanism that gives rise to their masses, and in turn to the Higgs boson, something that was needed for the consistency of the theory, and discovered in 2012 by the CMS and ATLAS experiments at the Large Hadron Collider (LHC) in CERN, Geneva.

The standard model constituents and their interactions are known at the microscopic level. In order to make up the known matter out of them which are, for example, protons and neutrons made up of light quarks, and nuclei made up of protons and neutrons, which themselves fuse and make larger and larger nuclei, indeed to give rise to all the matter in the world that we see. One has to solve these theories, in various environments, including such as the Big Bang, a singularity from which the Universe is said to have arisen, or in stellar interiors. The Big Bang is a consequence of the Einstein equations for a homogeneous and isotropic cosmology first proposed by Friedmann and described in detail by Robertson and Walker, and supported by the observation of Hubble expansion, when the clock is made to run backwards. The validity of Einstein's General Theory of Relativity can also be checked in other extreme environments in the Universe, such as in the merger of neutron stars or of black holes, or neutron stars and of black holes, which gives rise to gravitational radiation. Indeed, the first observation of gravitational waves has now been made by the Advanced LIGO collaboration, which marks one of the most exciting scientific discoveries of the era.

The above said, it is also true that the picture of elementary particle physics we have must be in concordance with our