Sharad Narhar Rajaguru (1933–2022)

Professor Sharad Narhar Rajaguru was born in Pune, Maharashtra, India on 26 November 1933 into a traditional middle class family with modest means. He entered the ninth decade of his life on 26 November and passed away on 14 December 2022 due to age-related complications. He had a small build, was lean, yet physically fit for arduous field work. Rajaguru studied M.Sc. geology under K. V. Kelkar at Fergusson College, Pune. For a brief period he was employed at the National Metallurgical Laboratory, Jamshedpur, and later at Khandelwala Ferro Alloys, Nagpur. Due to his gentle disposition and demeanour, Rajaguru could not adapt to the bureaucratic Government organizations that compelled him to look out for an opportunity to pursue further studies. His desire to obtain a Ph.D. brought him into contact with late H. D. Sānkalia of Deccan College, Pune, in 1958. He joined the faculty of the college in 1960. This ushered in a tremendous academic career that literally lasted till his demise[1]. He retired as Joint Director of Deccan College (Deemed University) in 1994. Nevertheless, post retirement, he completed a DST-funded major research project on Quaternary stratigraphy and palaeoenvironment of the Thar Desert (1995–2004), and continued to be associated with numerous research projects in West Bengal, western and southern India, and Bangladesh.

The 1960s was a decade of major methodological and theoretical changes in the earth sciences and archaeology. The new perspectives necessitated a revision of the existing models and the application of latest scientific techniques. Many new areas of study were identified, including littoral, aeolian, fluvial and offshore environments. Sānkalia had envisioned a multidisciplinary department of archaeology at Deccan College and the vast scope for the emerging environmental archaeology in India. He advised Rajaguru to initiate Quaternary geological studies at Deccan College and carry forward the legacy of Robert Bruce Foote, H. de Terra, T. T. Paterson, V. D. Krishnaswami, F. E Zeuner, R. V. Joshi and others. He advised him to focus on Pleistocene and Holocene archaeological sites studied by the Department of Archaeology at Deccan College. Rajaguru was initially filled with trepidation. Sānkalia's encouragement helped him develop confidence and competence to switch from hard rock geology to Quaternary studies. During this decade he obtained his Ph.D. under the guidance of G. G. Mujumdar on the Late Quaternary history of the Mula-Mutha Valley of the Bhima River Basin and carried out fieldwork in the Upper Godavari and Krishna River basins. In order to address the complexity of the Narmada Quaternary stratigraphy, Sānkalia advised Rajaguru to initiate an integrated approach to the study of Quaternary stratigraphy and Palaeolithic archaeology. Several of Sānkalia's Ph.D. students benefitted from Rajaguru's growing expertise in Quaternary geology and acknowledged his insightful advice in their fieldwork. Rajaguru and his students revisited the Narmada Valley several times during the post-Sānkalia era and addressed a

series of geoarchaeological problems, including site formation studies. His survey of geomorphic features in the central Narmada Valley revealed that the present course of the Narmada is not older than early Late Pleistocene, while some tributary streams appeared to predate the Narmada.

The 1970s witnessed a major turning point in the academic career of Rajaguru when in 1972, came the offer of a postdoctoral fellowship from the Australian Institute of Aboriginal Studies at Canberra. He was part of the Lake Mungo expedition led by J. M. Bowler, a dominant figure in the field of Quaternary studies in both the hemispheres. He had discovered the 42,000–47,000-yr-old fossil aboriginal hominins, Mungo Lady (1968) and Mungo Man (1974) in the Central Australian desert. Now the Australian authorities have decided to rebury both these remains along with 106 other hominin remains to respect the wishes of the Aboriginal people, who were of the opinion that the remains were exhumed without their permission. Rajaguru was associated with the study of some of these remains. Working with Bolwer, Rajaguru experienced the intellectual stimulation and excitement that invigorated his latent scholarly talents. He developed perspectives on desert geomorphology and environmental reconstruction, in particular on the evolution of climate, landforms and soils in arid and semiarid regions. Upon his return to India, Rajaguru wanted to initiate such expeditions to the Thar Desert, in collaboration with peers in the field of desert studies, which he eventually did and was successful in elucidating the history of the Thar dune fields and man–land relationships during the Quaternary.

Fresh from his field work in Australia, Rajaguru continued guidance of his first two Ph.D. students, viz. Ashok Marathe on the geoarchaeology of the Hiran Valley in Saurashtra, Gujarat, and M. D. Kajale on the bioarchaeology of the Ghod Valley, Upper Bhima Basin, Maharashtra. The two papers that were published based on their work[2,3], eventually laid the basis for further multidisciplinary studies in western India[4,5]. During the three decades between 1975 and 1994, Rajaguru carried out Quaternary research across mainland western India (including the Thar Desert and coastal Saurashtra), along the west coast of Maharashtra and Goa, the central Narmada, the Kashmir and the Manipur Valleys, the Garo Hills of Meghalaya, upland Deccan rivers north of the Kaveri Valley, and the southeast coast in Tamil Nadu. He identified Quaternary problems in all these regions and successfully guided not only his Ph.D. students[6], but also some of his colleagues.

Rajaguru was keenly interested in the tectonic aspects of landform evolution and was particularly interested in the evolution of the Deccan Volcanic Province, the associated tectonic events and the formation of laterite plateau. His work revealed that the laterites occurring in the Western Ghats were formed close to sea level, and subsequently uplifted to their present position. He emphasized that tectonic stability of the Deccan land mass was a myth and that fluvial records of the Deccan river basins, despite being thin compared with the Himalayan and sub-Himalayan basins, have the potential for reconstruction of the Quaternary history. Rajaguru and his collaborators have carried out detailed study of

Quaternary landforms, their chronology and man–land relationships set in an absolute timeframe. Our understanding of India's palaeoenvironment has therefore been placed on a fairly strong foundation. Their work has established that the changes in fluvial environments and climate during the Quaternary in India coincide with global events within the inter-tropical zone[7].

The Thar Desert project carried out in collaboration with V. N. Misra, D. P. Agrawal, Gurdip Singh, Robert Wasson, R. P. Dhir and Ashok Singhvi was the most productive Quaternary research on the dynamics of man–land interactions, evolution of the Desert and its geochronology. Multidisciplinary studies on the playa and dune sediments around Didwana, Nagaur district, Rajasthan, India, helped in reconstructing the evolutionary history of the Thar Desert along its eastern margins. Rajaguru's focus was on the integration of palaeomonsoon and human activity in the area[8–10]. He was deeply interested in relict soils, including laterites, ferricretes, calcretes and vertisols in different parts of Rajasthan and western Maharashtra, ranging in age from Early Tertiary to Early Pleistocene. Another area of his particular interest was buried soils interstratified with loess silts in the Kashmir Valley, India. His study of vertisols in the Deccan Volcanic Province and hardpan calcretes in the Thar Desert revealed that the monsoon pattern over the Indian Peninsula was established during the Tertiary period. This was further confirmed by Gregroy Retallack's work in the Siwaliks[11].

In the 1990s, Rajaguru joined the international expedition working in the Narmada Valley with the aim of assessing flood hazards and environmental change. This expedition was led by Victor Baker, an acknowledged authority of palaeoflood studies. Rajaguru introduced Viswas Kale, his former student to Baker, who carried forward this work in other river valleys of peninsular India[12].

As a fluvial geomorphologist, Rajaguru had been studying the natural processes affecting the preservation of archaeological sites of the Holocene in western Deccan. When in the 1980s, the study of site formation processes was developing in the West to delineate how past natural and cultural processes and present natural processes along with modern human activity contribute to the formation of archaeological sites, Rajaguru and his colleagues initiated such studies in India. It was emphasized that such studies provide the basis for interpreting the duration and intensity of human occupation and post depositional alterations. He identified a student to work on the newly discovered Middle Palaeolithic site of Samnapur in the Narmada Valley. This study identified the role of natural processes in the formation of fluvial-context Pleistocene sites. Similar studies were carried out at the early Palaeolithic sites in the Hunsgi–Baichbal Valleys of Karnataka and at Attirampakkam in Tamil Nadu[13,14]. He extended this study to the Bengal region[15] (including Bangladesh) and built up a young team of archaeologists, former students of Deccan College, to pursue integrated archaeological and Quaternary studies.

Undoubtedly, Rajaguru's[1] 'contribution to our understanding of man–land relationships during the Quaternary has been recognized as seminal – both within the country and abroad. While guiding and supervising the research of his numerous doctoral students, he was able to put many of the different environmental regions of this subcontinent on the Quaternary map of the world. He has been deeply involved in the fields of palaeoclimatology, the palaeomonsoon, sea level changes, fluvial geomorphology, duricrusts, palaeopedology, sedimentary geology and the geoarchaeology of humid and arid environments, as well as, periglacial environments… he brought together people of different disciplines, established a pattern and mode of interaction and realized the coming age of an interdisciplinary approach to archaeological studies'[16].

Rajaguru was member of the Research Advisory Council of the Wadia Institute of Himalayan Geology (WIHG), Dehra Dun (1985–88); Member, Central Advisory Board of Archaeology, Government of India (GoI) and Member, Expert Advisory Committee on Palaeoclimatic Research in India (1988–89), Department of Science and Technology, GoI. In 1990, he was elected Fellow of the National Academy of Sciences of India, Allahabad. He was member of the editorial board of *Geoarchaeology International Journal*, *Journal of Archaeological Science*, *Geomorphology*, editor of *Man and Environment* (India), and Chairman of the Indian Society for Prehistoric and Quaternary Studies, Pune. He was recognized research guide in the disciplines of archaeology and geology by the University of Poona (now Savitribai Phule Pune University). He received the Robert Bruce Foote Plaque from the Asiatic Society, Kolkata. Since 2008, Rajaguru was made Life Fellow of the International Union for Quaternary Research, Switzerland.

On a personal note, I must add that my relationship with Rajaguru lasted for more than 50 years. As a teacher he was par excellence; as a human being the most endearing; as a friend and philosopher the most dependable and as a guide he advised his students to live a simple life, work hard, be adventurous, but not over ambitious, and reminded them to strictly observe academic ethics. He never undermined the competence of his students. He was a reluctant administrator: even when best of his friends occupied the positions of power, he preferred to keep away or maintain minimum interaction with them, that too on matters of academic interest. His only lament was that he could not sit down to write his vast field experience into a book. Nevertheless, his print quality longhand field notes are an excellent encyclopaedic source of India's Quaternary history, worthy of a serious study to produce a document of his field observations on Quaternary landforms across the length and breadth of the country. Way back in 1998, I had the privilege of presenting the Quaternary research to the global readership[17]. When I last met Rajaguru on 3 December 2022, he was happy to note that during the last three decades Quaternary research in India has come of age and that Birbal Sahni Institute of Palaeosciences, Lucknow and WIHG, Dehradun are in the forefront and also that I had made the study of volcanic ash in India a global problem. However, his wish to visit the Robert Bruce Foote Sanganakallu Archaeological Museum in Ballari, Karnataka, remained unfulfilled.

Rajaguru was an altruistic person and rejoiced at the success of his students. He was the happiest man when I discovered a volcanic ash marker bed at Bori on the Kukadi River near Pune and when I picked up a cleaver at Morgaon on the Karha River. I was his third Ph.D. student. Despite the lack of exciting findings, he was happy to remark that my 'Ph.D. dissertation was an achievement by Indian standards'. The words of Einstein on Mahatma Gandhi, viz. 'Generations to come will scarce believe that such a one as this ever in flesh and blood walked upon this earth' aptly apply to Rajaguru as well.

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