

BOOK REVIEWS

findings³, these rivers are considered perennial systems at the time of expansion of urban settlements in the area.

It is to be noted that in the vast majority of archaeological studies in India very little attention has been paid towards reconstructing dynamic behaviour of the rivers or the landforms with which the sites are intimately associated (in other words changing hydrology, denudation, etc.), tectonic framework of the river basins and ground water resources. Of these, the latter is more important for interpreting the patterns of settlements and human exploitation of natural resources. On the southern Indian Peninsula there are several hundred Neolithic settlements, (contemporary with the Harappan Civilization), perched on tops of granite hills (granite inselbergs), surrounded by rolling pediments devoid of channelled drainage network. Hence surface fresh water resources under monsoon precipitation were short-lived shallow water holes on the pediment surface, in the form pools and ponds (now in the form of patches of black soils around the granite inselbergs) under the prevailing Late Holocene monsoon regimes in the largely rain-shadow region of the mid-Indian or Deccan Peninsula. Clearly without perennial water resources human settlements could not have lasted for long. An explanation to 'why the settlements are located where they are' could not be based on the occurrence of surface fresh water resources alone. Our geoarchaeological investigations in this landscape led to identifying extinct springs on the sides of the hills, that were active during Late Holocene despite the lowered ISM and that the groundwater depletion occurred under anthropogenic pressure during transition from the Iron Age to Early History. Despite numerous proxy records showing the onset of Late Holocene dry phase under decreased monsoon precipitation these settlements continued to be on hilltop during 2300 and 800 BCE.

With reference to the Harappan settlement patterns locating the settlement: (a) 'The natural choice of was the banks and floodplains of rivers and streams. The tool makers of hilly and rocky terrain thus descended on to the flood plains of the river systems of the Saraswati in the East and the Sindhu in the west' (p. 76), in the context of transition from Neolithic to the urban way of life; and (b) 'The decay of the culture seems to be related to environmental stress that

the death of the once benevolent river brought about. This happened in the face of aridity that prevailed over the entire Sindhu-Saraswati land. A resilient culture that not only withstood the stress of aridity but flourished despite dryness over a thousand years... finally crumbled when the life-giving Saraswati itself became lifeless' (p. 99), need to be reconsidered in the light of more recent studies.

According to Dave *et al.*³ the documented linear settlement patterns of settlements along the banks of both palaeochannels and major living river need not necessarily indicate perennial flow of the rivers at the time of the rise of settlements during the mid- to Late Holocene and wonder whether the migrating channels would have sustained the permanency of the settlements, both urban and rural³. They cite the example of Kalibangan which: 'survived and flourished without a perennial water source. It seems reasonable that the large urban centres utilized groundwater, as evident from the presence of wells at Kalibangan, and that people in these settlements practised water harvesting and followed agricultural practices sustainable under a limited and seasonal supply of water' (ref. 3; p. 234). This situation is not unique to Kalibangan, also repeated at Mohenjo Daro, the largest city of the time, sustained on ground water utilization. A ring well in every alternate house has been documented, especially in the lower town during Mature Harappan period. More than 700 wells are known and Mohenjo Daro has been called the city of wells.

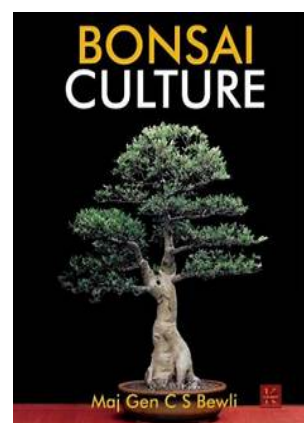
The main conclusions of Valdiya are (a) the Saraswati was not a monsoonal fed river, (b) it did not originate in the Outer Siwaliks and its foothills and (c) the river got lost as a consequence of tectonic upheaval in the foothills of the Himalaya. Obviously, these conclusions are a result of rigorous evaluation of all inferences and surmises 'on the anvil of the principles of geodynamics'. And asserts that the 'Saraswati was not a fantasy. It was a reality'. It is no exaggeration that the theme of the book is as formidable as the reputation of K. S. Valdiya. The book is a masterly synthesis of multidisciplinary data and successfully brings to the fore the potential of the region drained by the Saraswati and its associated rivers for a better understanding of the history

of the river and its relation to the rise and fall of Harappan Civilization.

1. Danino, M., *The Lost River: On the Trail of the Saraswati*, Penguin Books India, New Delhi, 2010.
2. Valdiya, K. S., *Curr. Sci.*, 2013, **104**, 42–54.
3. Dave, A. K. *et al.*, *Quat. Geochron.*, 2019, **49**, 230–235.

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Bonsai Culture. Major Gen C. S. Bewli. Kalamos Literary Services LLP, Delhi. 2018. 240 pages. Price: Rs 595. ISBN-10: 938778018X, ISBN-13: 978-9387780187.

The book under review is a creative articulation that deals with the aesthetic art and science of miniaturizing a tree. For Major Bewli bonsai is not a dwarf species or a young sapling shaped as a tree but an artifact coming out of love and hard work that is put over the years to create a piece of living art, resembling a mature, balanced and an aged tree in nature.

Going back in history the monograph talks about the origin of bonsai in *Yajurveda* (an ancient Indian scripture) and how it travelled through the Buddhists to China and Japan where the art flourished. The fashion of alluring bonsai was soon recognized globally as it not only reduces the stress at work places, but also contributes in making the area oxygenated giving an impressive mini landscape. The monograph reports the

phenomenal rise in the demands of these fascinating miniatures at offices, hotels, and public buildings and industrial complexes, etc. which has opened a commercial market of export in countries like Japan, China and Indonesia.

Bonsai styles discussed in the monograph is the Japanese articulation of viewing a miniaturized nature. Experimenting and creating distinct styles beyond the boundaries is quite innovative. The art of making various Japanese styled bonsai like Chokkan, Moyogi, Shakan, Kengai, Han kangai, Yose-ve, Hokidachi, Sokkan, Kabudachi, Bunjin has been thoroughly explained. The various Japanese styled bonsai depicts the look of plants having undergone natural phenomena of soil erosion, leaning towards for light, facing heavy winds or growing in mountainous terrain, coastal regions, steep cliffs and so on. The mesmerizing photographs of different styled bonsai leave an interminable impression in readers mind.

The monograph deals with every aspect of rearing and nurturing a bonsai right from its inception. It provides every basic information and technique on how to miniaturize a giant tree to a pot giving shape and style as per one's desire. The science behind bonsai culture explained in a simple language makes the monograph easy for a common man. Photographs of plants with their botanical names will avoid ambiguity across the boundaries as often happens with the common names.

Carefully the monograph handles every element in bonsai care starting from pots, tools, soil mix, watering, sunlight, aeration for growth and rehabilitation of a bonsai. The entire plant groups from deciduous to evergreen trees have been covered in the monograph. The significance of various parts of the plant and its shaping has been carefully dealt with. The monograph describes the importance of the relationship between every element of bonsai, thickness of trunk, leaves, blossom, and the container which together brings harmony and gives the artifact an aesthetic value. Beautiful description of the variegated leaves and how it affects the metabolism of the plants has been explained with special attention. Plants grown with multiple secondary trunks creating a canopy gives the feel of dense forests. The interest of author gets well reflected in his bonsai collection which is incredible.

Giving a complete idea of the macro and micro nutrients, the monograph minutely covers the nutrient deficiency symptoms appearing in bonsai giving ways to alleviate it. Listing down the do's and don'ts while fertilizing bonsai makes it even easier to the users.

A whole chapter explores the driftwood to give the bonsai an elegant and aesthetic look. Tutorials on driftwood articulated as an ornament glorifies the bonsai. The dual combination of a deadwood and a living tree appearing as a single entity created by the author is admirable.

Aerial roots found with trees growing in tropical and sub-tropical region have been used to bring a striking difference in the art. Aerial roots of *Ficus* give a classic look to the bonsai. The aerial roots of house plants, viz. *Philodendron*, *Monstera*, *Epipremnum*, *Hedera*, *Euonymus* beautifully harmonized with the thin trunks to enlarge its width are quite impressive. Bonsai created in non-tropical regions normally do not develop aerial roots until facilitated with favourable environment. Techniques have been discussed to stimulate aerial roots and overcome the limitations.

An exclusive style dealt is the root over rock. The style is inspired by the nature in rocky and mountainous terrarian where the roots are exposed. The author shortlists the plant species which go well in this style like *Ficus benjamina*, *F. microcarpa*, *F. retusa*, *F. virens*, *Acer buergerianum*, *Pyracantha coccinea*, *Salix babylonica*, *Schefflera actinophylla*, *Ulmus parviphlorea* and *Juniper* sp.

A chapter on succulents throws light on making, enthralling and unusual additions to bonsai collections. The chapter lists the succulent that can be trained as bonsai like *Adansonia digitata*, *Adenium obesum*, *Moringa ovalifolia*, *Senna meridoinallis*, etc.

Techniques of propagation of bonsai through seeds, cutting, layering, grafting and tissue culture techniques can make even the beginners an expert as it covers every minor detail about the technique making the complex procedure simple and easy to understand.

Bonsai trees vulnerable to insect attack and diseases are a big challenge. Listing all the pests affecting bonsai in great detail, the author guides about the symptoms, treatment for Mealy bugs, Red spider mites, scales, nematodes, aphids, caterpillars, snails and shigs. The mono-

graph also gives eco-friendly approach to replace the synthetic pesticides by homemade natural pesticides made of neem (*Azadirachta indica*). The author's love for bonsai gets reflected as he deals with the care to be taken against high velocity winds and hailstones.

One of the amazing topics of the monographs is the mame or miniaturized bonsai. Mame is a Japanese word meaning bean. Creating a mame is the most challenging assignment, where the size of an aged tree needs to be kept between 7.5 and 15 cm.

Taking the readers into the world of Suiseki – the Japanese art of exhibiting the naturally evolved rocks and stones, the author makes marvelous effort to bring the thoughts of the thousand years and the forces of nature which formed the weathered miniatures resembling mountains, water-falls, animals and the replicates of the landscape or a seascape.

Displaying a bonsai is an art. A chapter on etiquettes and display guides how the elements like container, scroll, figurines and backdrop should be harmonious and give an integrated look overall. Bonsai giving perception of a real tree is important in use of deadwood bonsai technique which gives an aesthetic illusion of age. The techniques to develop deadwood 'Jin' and 'Shari' have been well addressed. Guiding correct choice of display pot that complements the configuration has been explained with suitable photographs.

Penjing is a traditional Chinese art of creating landscape in a tray or a pot exhibiting different natural scenes in a miniature format. Both penjing and bonsai are closely related art forms and go well together to create a masterpiece. The frequently asked questions make the learning an easy process for the readers by addressing all the doubts and difficulties, one may face during bonsai culture like time of watering, direction of light, pruning, and species to easily create bonsai and so on. A elaborate list of plant species, viz. *Acacia modesta*, *Adansonia digitata*, *Adenium obesum*, *Brya ebenus*, *Bursera microphylla*, *Buxus harlandii*, *Carissa carandas*, *Commiphora africana*, *Commiphora madagascariensis*, *Crassula ovata*, *Cyphostemma juttae*, *Euphorbia knuthii*, *Ficus benghalensis*, *Ficus petiolaris*, *Ficus virens*, *Fouquieria splendens*, *Ginkgo biloba*, *Gmelina hystrix*, *Lawsonia inermis*, *Malpighia glabra*, *Manilkara hexandra*, *Murraya*

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paniculata, *Operculicarya decaryi*, *Pachypodium saundersii*, *Petrea volubilis*, *Podocarpus gracilior*, *Portulacaria afra*, *Sesamothamnus lugardii* have been individually described with their common name, native place, cultivation technique, feeding, methods of propagation, repotting time which is of specific help.

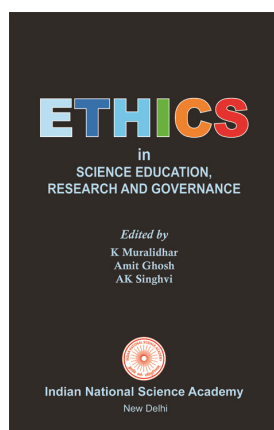
The monograph condemns the misconception and myths against bonsai raised by the Vaastu experts by putting forth a rationale and scientific view. The monograph by Bewli, clearly reflects how spending time with a hobby cultivates skill, knowledge and makes one an expert in that area. The author's exemplary effort in giving a holistic idea on bonsai cultivation is commendable.

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Ethics in Science Education, Research and Governance. K. Muralidhar, Amit Ghosh and A. K. Singhvi (eds). Indian National Science Academy, Bahadurshah Zafar Marg, New Delhi 110 012. 2019. viii + 127 pages. Price: Rs 500.

The book under review is a first step towards development of a comprehensive discourse on the broad theme that would

provide some guidelines for ethical practices in science education, research and governance. The book is a well thought of effort at a time when the country is attempting to address various issues like plagiarism, predatory journals, fabrication of data, ghost authorship, use of money as a surrogate for quality, gender bias, redundant educational practices, examination and evaluation system, etc. The book talks of unethical practices in the arena of science education, research and its governance which have become rooted in the Indian academia as a result of either willful adoption or sheer ignorance, mainly as a result of rising pressure to perform, competition and a desire for quick success. The book is an initiative of the Indian National Science Academy (INSA) with chapters from members of Inter-Academy panel and senior fellows of INSA as a continuing effort of INSA to address issues of contemporary interest to science and societal well-being.

The chapters written by eminent experts and professionals have been edited and reviewed by senior INSA fellows with a detailed introduction to the book by one of them, Prof. K. Muralidhar, who gives the basic concept and philosophy of modern science in relation to the increasing importance of ethical conduct in order to preserve the integrity of the individual, society and environment without compromising on fair practices. It starts with the definition of science and moves on to the description of fundamental and application oriented science, as an apt start to suggested discourse on morals, ethics and laws that govern scientific culture. The introduction also emphasizes on understanding professional ethics, best practices of ethical conduct, mandatory set of norms for scientific temper and resolution of ethical dilemmas. India has aligned its central challenges with the Sustainable Development Goals of the United Nations and emphasized that appropriate science and technology solutions are the only vehicles to ethically resolve them. It stresses on the need for ethical, moral and intellectual component in education to remove ignorance.

In the conceptual premise of ethics in higher education and academic research, the authors have stressed on incorporating ethics and value education in the curriculum to promote awareness, responsibility and compassion and overcoming prejudice, discrimination and

unethical practices. Authors highlight the value of ethics in academic research and talk of issues in research ethics. Postulates for maintaining ethical standards in higher education mentioned in the book are reliability and integrity, objectivity, genuineness, respect for intellectual property, novelty in publication, protection of subjects – both human and animal, agreement for consent, confidentiality and anonymity. The professional obligations of a teacher as listed in Code of Professional Ethics for Teachers have been referred to for defining their personality traits that will ensure ethical conduct while also developing new pedagogies and imbibing 21st century skills to stay globally competitive and be an academic leader. Including moral science in the curriculum is suggested so that the higher education system becomes a wholesome template to nurture mind full of cognitive capabilities accompanied by a balanced view of value system.

Ethical conduct of research while seeking answers to new questions as a part of research practice is a chapter focusing on ethical principles of choice of specific research questions, collaboration, relationship of mentor and mentee, conducting, reporting and publishing of research. Wasteful expenditure of public money and careful choice of research lessons are the first ethical lesson in research. Care is required to not deliberately lean towards hot trends and avoid use of high-end equipment, if not required, with suggestions for a rigorous audit by funding agencies to ensure judicious use of financial resources. It is necessary to encourage young researchers to do independent work, be self-reliant, original and be informed of ethical practices in planning, conduct and reporting of research to avoid any chances of misconduct.

While discussing ethics in measurement practices, the authors start a very well-written chapter with a quote that summarizes the gist of the writing: 'The calamity of the information age is that the toxicity of data increases much faster than its benefits.' The emphasis is on the relevance of maintaining proper lab records and the dangers of improper or hurried communication of research which should be done logically and coherently to enhance the impact of the publication. Authors stress on conciseness to emphasize novelty while stating objectives very clearly and avoiding