

Details of environmental education available have been explained. The last chapter deals with environmental ethics.

While presenting the subject, the author should have used a more practical approach so that there is an easy flow of thought from the ecosystem concept to perturbations and use of modern tools to overcome the problems. Normally, when environment and ecology are introduced, the habitat and ecosystem concept should come first followed by details of abiotic and biotic factors. Nutrient recycling and energy flow should follow this with productivity, production and resources, both biotic and abiotic. This should be followed by various polluting agents, changes in the normal component of the environmental segments followed by human ecology. Biotechnology as a tool to restore the ecological balance and environmental factors with existing environmental laws and ethics should be followed by environmental education. The continuity and linkages of sentences are inappropriate, thus rendering difficulties in understanding the concepts by the reader. Many errors have also crept in throughout the book.

On the whole, it is disappointing to note that such a wonderful subject as environmental science has been presented in this manner. Though all the basic concepts relating to environmental science have been covered, the real flavour and level of description is intermediate and from the users' point of view, it is a bit confusing as the author has tried to introduce many concepts within the framework of environmental science.

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**The Fire Within.** Hari Narain. Association of Exploration Geoscientists, CEG Building, Osmania University, Hyderabad 500 007. 2004. 253 pp. Price: Rs 400.

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This book encapsulates the thoughts and vision of Hari Narain, a doyen among Indian earth scientists, who rightfully belongs to the galaxy of nation builders that began to emerge after independence. His contributions to post-independence

earth sciences laid a solid foundation for indigenous research. An academic scientist himself, he had led a number of successful geophysical explorations for hydrocarbons and minerals that helped the expansion of industries based on such resources. Undoubtedly, he is one of the most influential earth scientists in India, who has shaped up many earth sciences institutions, most importantly, the Research and Training Institute in the Oil and Natural Gas Commission, Dehra Dun (now known as Keshav Dev Malaviya Institute for Petroleum Exploration) and the National Geophysical Research Institute (NGRI), Hyderabad. It was during his long tenure that NGRI developed into a thriving geophysical laboratory, the only one of its kind in the country. He also served as the Surveyor General of India for four years and was also a member of the first National Committee on Science and Technology. His services in the field of education are equally exemplary; he was the Vice-Chancellor of Banaras Hindu University (BHU) during a troubled period. A timely publication, *The Fire Within* celebrates Hari Narain's 81st birthday and 50th anniversary of his marriage; it constitutes a selection, made by his family, from among the general articles and lectures and reflections published over a period of 55 years. Among the themes covered are his vision on education, role of science in nation building, conservation of natural resources and rural development. Some are reminiscences, revealing the pain, pride and romance in building institutions; there are also a few essays on religion and Indian culture. The book wraps up with his thoughts on the status and prospects of earth sciences in India.

In the first part of the book one can trace the background and development of the author's views on education. BHU, with which he had intimate knowledge, is a microcosm of the higher education system, with all its strengths and weaknesses. He uses his experience as a mirror to reflect the problems of university education in the country at large. While taking pride in the age-old Indian tradition in education, he laments at the current falling standards in teaching as well as in learning. He lists several measures to improve the system. These include: restricted admission, open only to those who have the aptitude for higher learning (others should be diverted to vocational training), stringent selection method for

teachers and better monitoring systems of their performances before they are made permanent, developing self-sustaining means of generating funds; selection of Vice-Chancellors based only on merit (not creed, caste, or religion); and better professional tie-up with research organizations and industry. The author's concern for the education sector is not confined to the university system alone; in fact, he presents a broader framework for an enlightened educational pattern. For example, in a letter to the minister for Human Resources Development, he narrates how to restructure the educational structure by giving importance to vocational training at the secondary level, thus making education more need-specific. The consequences of neglecting primary and secondary education in the country, where the drop-out rate is high are pointed out as another serious problem. One suggestion he makes here is that some universities, possibly one in each State, could be asked to take up the additional responsibility and function as a rural-cum-open university. This arrangement will work as a training programme in health, hygiene, land-soil-water management, agriculture, cottage and small-scale industries, etc. for the rural population.

In his scheme on integrated rural development, a major focus of this book, he further elaborates on his plan of action, which was submitted to then Prime Minister, Rajiv Gandhi in 1985. In fact, variations of this village-specific development scheme have been put to practice in some states like Kerala and West Bengal and to some extent in Madhya Pradesh. I doubt whether Hari Narain got the credit that is due to him for initially unravelling this plan, and for his tireless efforts in propagating its virtues (an example is the Karimnagar experiment on integrated rural development initiated by CSIR in 1971, with which Y. Nayudama and Hari Narain were closely involved). Some articles in this book focus on the application of science and technology to address issues like rural poverty and conservation of natural resources. The author realizes that the problems in India with its huge rural population, are vastly different from the Western countries – the reason why he always stresses the social role of science.

In an article entitled 'Science and technology for development', the author elaborates on his criticism of the standard of research in basic sciences in the coun-

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try and says that 'it has hardly resulted in any significant technological innovation'. He quotes Nobel laureate Abdus Salam who observed that not 'a drop' has been added by India and other developing countries to the 'pool of world knowledge'. Hari Narain also makes an important observation on imported technology. Here, he says that it is prudent to 'assimilate, adapt and improve' them to avoid repeat imports. Two examples that we can follow are Japan and South Korea, who have successfully adapted and improved the Western technology and now are in the forefront. This issue should be of serious concern to us, especially with the current open-door policy in place.

Other major points he raises in this book are about the standard of earth sciences research and the need to enhance the status of earth sciences in the country, an area that he is very conversant with. Here the author emphasizes the unique role of earth sciences in unravelling the questions related to the continued evolution of the earth; in addressing problems of sustainable development; and conservation of natural resources, all of which are fundamental to our existence. He wants the teaching in geology and geophysics to be more student-friendly, and emphasizes the urgent need to create fresh employment opportunities for trained geophysicists and geologists. He urges the university geology departments to reinvent themselves by breaking the mould of classical geology and making the courses multidisciplinary, and finding out ingenious methods of interfacing them with other sciences. He suggests that it might be beneficial to introduce unit system courses where students can opt for courses in allied fields, also making the curriculum more dynamic (this reform will also give more freedom for the faculty to formulate new courses). He suggests that a brainstorming session may be convened by UGC, involving research scientists, educationists and industry to deliberate on updating the university curricula for integrated courses in earth sciences and to seek new job opportunities. He is of the opinion that these openings can be created at the school level, provided geosciences is introduced as a professional discipline at the 10 + 2 level, or at the State or town planning levels and in the private sector, if planning processes are made to involve inputs from earth sciences.

Hari Narain is known as a builder of scientific institutes. Among those he has built, NGRI is a standing monument of his vision. This institute had made some pioneering efforts in air-borne geophysical surveys, groundwater investigations, geophysical instrumentation and solid earth geophysics. While recalling his NGRI years, Hari Narain shares not only his success stories, but also the failures and unfulfilled dreams (he rues over the fact that NGRI could not initiate some of his pet themes like water resources management, offshore resource surveys, air-borne surveys and earthquake hazard assessment due to the lack of support from higher levels). Managing any scientific institution is not easy, with its vast human potential and clashes of interests, a task that Hari Narain does well. He observes, 'Organization and management of scientific research is an art, in addition to being a science. One has to take account not only the scientific capabilities and qualities of leadership, but also human aspirations and jealousies, and attitude towards both colleagues and their scientific interest. Creative persons, be it in arts or science, have to be nurtured with care and their sensitivities have to be respected'. No doubt, this sensitivity and humaneness is what made him one of the most successful and highly respected, long-served directors of an Indian scientific institute. It must be mentioned that he left the institute without a blemish. And true to his nature, he comes out as a great mentor (how proudly he mentions the work of some of his junior scientists), and he had unselfishly promoted many of this younger colleagues – a quality that is disappearing rapidly these days. Reading Hari Narain's recollections starkly reminds us that mentoring is a forgotten skill today, a factor that may negatively impact the future of science in India.

Although this book is mostly about weighty issues dealing with education, science and national policies, there is a selection of warm memories – of the author's years in Sydney University, his friends and mentors in Australia, about his marriage, and his attempts while living abroad, to spread the message of Indian philosophy and culture. Browsing through this section, one will find the author's capacity to feel for the richness of human experience. Hari Narain was the first Asian to have been given a permanent position in any university in Australia. It

is remarkable that he got this job when the white Australian policy was prevalent in that country. While he was working, he had most doggedly raised his voice against this discriminatory policy. A firm believer in Hindu philosophy, Narain is a true *Karma Yogi* and his faith is all embracing. A couple of articles in this collection unfold his religious philosophy. What is the law of Karma? He says, 'Man shapes himself moment by moment by his activities; moral and physical. At death he does not disappear into nothing, but enters a new tenement, which he has built for himself by his life activities'. Who would disagree?

The get-up of the book is attractive, and equally captivating is its title. The Association of Exploration Geoscientists has done well in bringing out this book. Although the publishers have done a good job with the layout, I believe the book would have certainly benefitted with a little more editing. The earth's image on the cover outlines the Arabian Peninsula and Africa rather than India – a mismatch with the contents of the book. These quibbles aside, the book is a must read for the scientists, politicians and administrators. The author provides us a roadmap to recovery in our major spheres of activity – education and science, and he emphasizes their respective roles in sustainable development. At the end, one question, however, haunts us, which the author himself implies in one of the articles that chronicle the ten-year saga of piloting his proposal on integrated rural development with different ministries: Is anybody listening? The mind-numbing insensitivity to these issues from those who wield political and administrative power could be extremely discouraging. An incorrigible optimist that he is, I do not think Hari Narain would ever ask us to give up. So, the moral of the book is to keep up the good work that we are doing, so that one day, hopefully, the message falls on receptive ears. Until then, as the saying goes, the stone of Sisyphus has to be rolled up again and again.

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