

of 40+) is an amazing achievement. She learnt the trick of searching the worm-like trails of asteroids in a photograph filled with starry dots, from a student of Gene. She surpassed the record of the senior Caroline (Herschel). She goes on to say, 'Passing Herschel's record was a special goal for me . . . not because there was anything personal . . . it was a landmark and special in a way to find more than any other woman had found so far'.

Gene was a wonderful instructor and teacher – his students remember him with great reverence. Levy has compiled a good number of anecdotes and quotations from the students and astronauts as well.

The book makes very interesting reading with lot of tips on comet discoveries, the description of development of the new science of astrogeology and paleomagnetism. It is rich with emotional narration, like the comet crash episode and the 'fulfilling' of his dream to reach the moon (after his fatal accident), running to full-length chapters. Gene's identity as a scientist, as a man with vision – ever toying with new ideas and as a good friend – have been rendered gracefully. While it leaves newcomers with a sad feeling that they could not meet Gene in person, the future generations would definitely get inspired to venture into unexplored avenues.

That was Gene – who etched his name on 32 comets, 24 craters (on earth) and led five Surveyor missions and six manned landings on the moon. If one ever wondered on the rechristening of the NEAR (Near Earth Asteroid Rendezvous) spacecraft, which landed on the asteroid Eros last February, as NEAR – Shoemaker, the book provides a justification.

Notes, selected bibliography and references for every chapter are apt and useful. The book is recommended for students of science, astronomy, space sciences and geology as well.

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Renewable Energy and Environment – A Policy Analysis for India. N. H. Ravindranath *et al.* Tata McGraw Hill, New Delhi. 2000. 1st edn. 251 pp. Price not mentioned.

This monograph, one of a series on Environment and Development, has been published for Centre for Environment Education, Ahmedabad. It is very welcome as this is a timely and first full length overview of India's Renewable Energy Technology Programme (RETP). It is undertaken by authors, who are not too much away from RETP, but are not too integral a part of it either. As such it gives the review authenticity and independence at the same time. Readers might like to know that India has one of the largest renewable energy programmes in the world, underpinned by a full department/ministry since 1982. This review is divided into 7 chapters. The first two chapters give a fairly succinct account of the interface between RETP and environment and the consumption patterns and their socio-economic context such as sustainability implications in terms of dispersed and low-intensity use in rural areas, consideration of rising energy demand and energy security for urban areas and the impact on climate change factors of burgeoning demand of industry and transportation sectors. Chapters 3 and 4 outline the historical evolution of strategies, their progress and performance. Need for a RET Policy as part of the National Energy Policy is emphasized. The high upfront costs of RET, which can find a niche only via life-cycle economic analysis, including rebates for avoided climatic change and pollution and not just in terms of traditional economic analysis of installed costs per Mw and tariffs for units costs of delivered energy are emphasized. Chapters 5 and 6 on integration of environmental consequences of RETP and the actual impact of RETP in India are central to the concerns of the monograph. They are treated exhaustively and systematically. However, in the reviewer's opinion, the authors fail to highlight unique achievements and glaring defects of RETP in an emphatic manner. For example, outstanding success of solar PV home-lighting systems in Ladakh and Spiti and highly successful cluster of 150 Solar PV pump sets

at Auroville are almost bypassed, even though reasons for success are different from SELCO's.

As regards the role of external funding (it is lending and not funding), it is overtly highlighted (p. 187). It has helped government-controlled programmes, but has skewed voluntary efforts in terms of loss of initiative and cost intensity escalation by a factor of 3 to 4 in terms of already matured technologies. Not a single relevant high-end technology such as manufacture of evacuated tube collectors (ETC), parabolic trough collectors (PTC), etc. has been inducted. Instead of building capacity for manufacture, stress has been on marketing of finished products (including overseas ones). There is hardly any attempt to increase the buying capacity in rural communities, except through people-to-people bilateral NGO funding. Subsidy for industries and clean development mechanism are useful only for funding big projects. But for two other equally important sectors, usefulness of energy supply companies (ESCOs) needs specific mention in light of requirements of trained staff for installation and maintenance of RETs. Success of Barefoot College in training local youth and the participation of local population in decision making, has been crucial to the success of voluntary efforts in backward and far flung areas. Their absence has been the single cause of much advertised failures of target-driven government controlled programmes. This can be easily corrected by proposing that certification and evaluation centres could also act as diagnostic and remedial centres for a small service charge and by manufacturers providing risk insurance policies. Suggestions for NGOs to build community mechanisms for RETPs, rather than highly politicized and overloaded panchayats is a courageous appreciation of ground realities, but is fraught with grave political risks.

Suggestions for green rating and green pricing mechanism for upper income communities and support by incentives for low income sections such as prizes, recognition and media exposure as in the recent case of rainfall harvesting will be helpful in promoting RET realistically and effectively. There is already a widespread awareness on information level throughout the country, but credibility needs to be built up. Scales for manufacture for RETs imply volume and not large

size (the 135 Mw solar thermal plant in Rajasthan is only 20 per cent solar) of single units. The lament of the authors, that hardly any measurable data exist for assessing performance and impact of RETs in India is sadly true. But in a highly emotional atmosphere surrounding energy choices in India (evidenced by nuclear lobby, Dabhol fiasco, Narmada dam height) complete transparency could invoke murder of RETs. Once this fear is removed and national vision is clear, this transparency can lead to success of RETs, better systems' life and performance and reduced energy embodied in the manufacture of RET devices.

This book, on the whole, is an independent and comprehensive overview of renewable energy technologies in India and their positive implications for India's future environment, as also the present status and its evaluation. All energy decision makers should find it profitable to go through the book and all students in various energy courses would find in it a mine of data and information. Through its well-structured boxes of presentation, informed and intelligent public at large can derive much profit.

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Making Water Everybody's Business – Practice and Policy of Water Harvesting.

Anil Agarwal *et al.* (eds). Centre for Science and Environment, 41, Tughlakabad Institutional Area, New Delhi 110 062. 2001. 456 pp. Price not mentioned.

Good quality water is increasingly becoming a rare commodity. People have lost faith in municipal water supply and those who can afford to pay have taken to bottled water, which is available at a price. The average urban dweller, however, has to be satisfied with any type of water, taps remaining dry for most part of the day and life in rural areas has become a daily struggle to fetch water. The scientific community has shown scant interest

in solving this problem of the poor. Rainwater harvesting, recharging of the groundwater reservoir and desalination of brackish water are areas in which no research organization in the country is seriously engaged. A host of engineers are employed in the construction of major dams and in transferring water over long distances, but collection of rainwater where it falls and storing it for local use has not interested them.

Anil Agarwal, well-known environmentalist based at Delhi, has been waging a lone battle against the policies of past and present-day governments. His first report on the state of India's environment was issued in 1981, nearly twenty years ago, and it focused attention on the degradation of India's environment through the unwise policies of the government and people's neglect. Subsequent reports have been issued at five-yearly intervals on aspects like food self-sufficiency, floods and flood plains. The last book, *Dying Wisdom*, released in 1997, draws attention to the water-harvesting systems in practice in ancient and medieval India. These books have made an impact both on the bureaucracy and the people, creating an awareness of what needs to be done for conserving our water resources, preventing their pollution and making water available where it is most needed.

The present volume under review, also issued by the Centre for Science and Environment (CSE), New Delhi, under the direction of Anil Agarwal, summarizes the proceedings of the three-day conference held at Delhi in October 1998, which was inaugurated by K. R. Narayanan, President of India. Water harvesting activists, builders, policy makers and academics from India and abroad are stated to have participated in the conference.

The objective of the conference was to make water harvesting a mass movement and thereby diffuse the water crisis which is building up at an alarming rate in most parts of the country. There is heavy extraction from rivers as well as groundwater reservoirs, resulting in significant lowering of the water table. With too much dependence on the State, which has no money to invest in new projects and is unable to supply water at highly subsidized rates, the only alternative is for the people themselves to take the initiative and revert to and improve the ancient practice of harnessing rainwater by

capturing it where it falls. The book advocates water harvesting in houses and farms by funding small projects in both rural and urban areas and media participation is felt necessary in giving a new fillip to this movement.

The bulk of the book is devoted to demonstrating that rainwater harvesting, widely practised in India in earlier times, is feasible and can be successfully implemented, thereby making people self-sufficient in this most essential of commodities – water. The book, with the most appropriate title, is intended to involve everyone in the process of ensuring water supplies.

Chapters 2 and 3 of the book narrate remarkable success stories of the work turned out by villagers of Ralegan Siddi under the leadership of Anna Hazare, Sukhomarji under P. R. Misra and the numerous villages in Alwar district, Rajasthan by *Tarun Bharat Sangh* under the leadership of Rajendra Singh. Many traditional water-harvesting systems in Rajasthan, Bundelkhand, Madhya Pradesh and other parts of the country are outlined. Their re-emergence as crucial sources to meet the growing water scarcity in many rural parts emphasizes the need to revitalize the numerous tanks by desilting them and restoring them to their original state.

A heartening development in this direction is the mushrooming of voluntary organizations in different parts of the country, whose work and success stories are narrated in a number of papers. Spectacular results obtained in parts of the Thar desert and the Western coastal plains and revival of the river Aravai in Rajasthan are illustrated by many excellent photographs in colour, bearing ample testimony to the success of the programme.

A silent revolution seems to be sweeping across Rajasthan through voluntary organizations like the *Tarun Bharat Sangh*, which has constructed 3000 water-harvesting structures in 760 villages, regenerating 0.65 million hectares of land! *Pani Yatras* organized by CSE have helped to spread the message of rainwater harvesting and its conservation far and wide.

A quite promising development is the promotion of roof-water harvesting, especially in salinity-affected areas (Chapter 4). When once the success of roof-water harvesting spreads, the construction of underground storage reservoirs will be