

BOOK REVIEW

WATER - QUANTITY-QUALITY PERSPECTIVES IN SOUTH ASIA by V Subramaman,
School of Environmental Sciences, Jawaharlal Nehru University, New Delhi Published by
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The book is written by Prof V Subramaman of the school of Environmental Sciences, Jawaharlal Nehru University, New Delhi. The book is divided into ten chapters covering various aspects of the hydrological cycle, water availability, distribution of fresh water, water quality, water demand, water management, policy and environment issues.

Chapters 1 and 2 deal with the hydrological cycle, the total water availability, the rainfall pattern and water withdrawal. There is a figure (fig 11), which gives depth to water with hydrology whereas the title of the figure is 'declining water table depth with hydrology'. Though the source is not given, the figure is from a brochure issued by Central Ground Water Board, New Delhi on rooftop rainwater harvesting which gives the hydrology and depth to water. Central Ground Water Board (CGWB) has brought out a brochure on the National Capital Territory (NCT) of Delhi wherein the fall in the water table in the Delhi region has been discussed. The author could have consulted them.

Chapters 3 and 4 discuss the distribution of fresh water in the country and water quality criteria. The author gives impressive figures and tables on the inland freshwater resources and discharge data of major rivers of India, Pakistan and Bangladesh, the effluent discharge, water quality standards and water quality situations existing in India. While discussing water demand for the next 50 years (Table 5, p 27) the author has furnished the water demand for domestic, irrigation and the total water demand for the years 2000, 2025 & 2050 which is at variance with the figures given by the National Commission for Integrated Water Resources Development Plan of the Ministry of Water Resources, Govt of India, New Delhi (Jan 1999). The author could have collected the information from the ministry before giving the figures in the book.

On the water quality, the author while discussing about water quality standards quotes standards of WHO, USEPA and Central Pollution Control Board standards but does not discuss about the water quality standards and guidelines given by the Indian Council of Medical Research (ICMR) and Bureau of Indian Standards (BIS1991). Certain statements by the author such as that there are no standard limits in India that can be followed (p 46, lines 1&2) are not tenable.

While discussing the subsurface waters (p 49), the

author states that the depth of the water table in Gujarat is beyond 200 m, which is not a fact. He may be referring to the water occurring in depth, which is under pressure or under confining conditions.

The author writes about two major water quality problems encountered in the country - that of fluoride and arsenic. Now, nitrate pollution is also becoming one of the major problems in the country, especially in the urban areas. High fluoride in ground water of more than 1.5 mg/l occurrence is now reported not only from Ajmer in Rajasthan and Anantpur in Andhra Pradesh but also from Nalgonda, Hyderabad, Prakasam and Warangal Districts of Andhra Pradesh, several districts of Karnataka and Tamil Nadu. In discussing about residual time (p 59), the author states that 'a water molecule that enters the ocean is moved around all the oceans' which is surely an exaggeration.

In chapter 5 the author describes various types of subsurface water and gives the ground water resources of India in Table 18 (p 68). The title says 'Ground Water Resources and Irrigation Potential' but the irrigation potential is not given, but gives only the utilizable groundwater resources. The figures are at variance given by CGWB (Ground Water Resources Assessment of India, by Rana Chatterjee, CGWB, New Delhi. Paper presented in the workshop on Ground Water Development & Management, Past Achievements & Future Strategies, organized by Central Ground Water Authority, New Delhi, Jan 2000). This needs to be corrected. The author also states (p 69) that unconfined aquifer is one where the water table is not overlain by impervious soil and not directly exposed to the atmosphere which is a wrong statement. Unconfined aquifers also known as phreatic aquifers are open to atmospheric pressure. Figures 22 & 23 given by the author are from the book 'Ground Water' by D K Todd, which is not listed in the references nor suitably acknowledged.

In Table 20 (p 73) the author gives long-term changes in groundwater levels in various states of India, the India (average) figures given are wrong. It gives only the minimum and maximum of the rise and fall and cannot be taken as average figures. Regarding rainwater harvesting possibilities of metropolitan Delhi area, CGWB has brought out a

brochure and the figures given by the author (p.75 and 76) are again at variance. It is difficult to harvest 65,000 litres of rainwater in Delhi for a roof area of 100 m². He has not considered the losses (evaporation, conveyance) and the normal rainfall of Delhi is only 611.8 mm and it has been estimated that only 55,000 litres of rainwater can be harvested. Again there is a mistake in the estimation (p.76, lines 16 and 17). It is stated that a 100 mm of rainfall over an area of 10 km² yields 10 million litres of water whereas it should be 1000 million litres. Also the figures quoted in p.77 (Groundwater resources of 432 BCM and harvesting of 160 BCM from the monsoon runoff) are from CGWB sources but not acknowledged anywhere.

Discussing about water quality parameters and specific cases of water quality in India, author says the major parameters in water quality is bicarbonate (HCO₃), Calcium (Ca) and Magnesium (Mg) and the bicarbonate holds the key to the levels of a number of other ions. The contaminants can be removed from water when the water becomes alkaline. Hence by the change of Ph, the concentrations of many of the contaminants can be brought down.

The author presents in Table 35a, b the chemical quality of ground water in India, part of which is sufficiently old data (1974), which needs to be updated, and the information will be available either from CGWB or from State Groundwater organizations. In chapter 9 the author discusses about the problem areas for water quality, in particular the incidence of high fluoride in Rajasthan and Andhra Pradesh. The author states that use of phosphatic fertilizers leads to accumulation of fluoride in the soils which eventually gets into groundwater. This needs to be verified with some field data. Nalgonda technique is a old technique. Now, for defluoridation, activated alumina is used. He also discusses a the use of soil as filter of an experiment done in Ajmer district of Rajasthan and presents results of the experiment carried out to remove excess fluoride by using clay and activated charcoal, which is encouraging. However, clay even though it may have the capacity to retain fluoride, will not be useful as its permeability and specific yield are very low and hence cannot be tried in a real life situation. Compared to clay, activated charcoal offers a better scope which needs to be tried on a large scale. High arsenic level is also reported in the ground waters of West Bengal and Bangladesh. Here also the author states (p.211) that arsenic can replace phosphorus by interaction of arsenate ions with phosphate ions and addition of phosphatic fertilizers may lead to movement of arsenic from one area to another and under reducing conditions, sulphides (iron sulphides) can form

arsenic sulphides and efficient bioreactors can scavenge the toxic component like arsenic and immobilize them and suggests bioremediation as a potential solution for the arsenic problem, in the environment. This also needs to be tested with field experiments especially their suitability costwise for the community and individual household levels. However, while discussing the possibilities the author has not mentioned or is not perhaps aware of the existence of the recent developments in membrane technology now available for the community and individual household level (water filter type) for desalination, defluoridation and for nitrate and arsenic removal.

In the last chapter (chapter 10) the author presents the water management policies and environmental law. In his enthusiasm, highlighting the problems related to water the author states (p.236) that at the present stage of usage of water, water may have to be brought from Mars and Moon in the distant future. This is an exaggeration as we have nearly ³Ath of the globe covered with sea water which is saline and desalination may be the solution to meet the water demands in the near future. Already some plants are in existence in the Middle East. Only cheaper methods have to be developed to make it cost effective. The author lists international pollution agreements (pages 242 to 247) but has failed to mention the existence of the Environmental Protection Act 1986 of the Government of India and is being enforced in the country for the protection of land, water, forests and the environment. He has also not mentioned the creation of Central Ground Water Authority (CGWA) under the Environmental Protection Act 1986, in the Ministry of Water Resources, Govt, of India, in January 1997 based on the judgment delivered by Supreme Court in a public litigation case. Central Ground Water Authority has been charged with protecting the country's groundwater resources from overexploitation and pollution.

On the whole, the book presents various aspects of water but is mixed up in presentation about the water quality aspects. The author quotes extensively almost in each chapter from newspaper reports on various issues relating to water. It is not clear whether such information given in a newspaper can be quoted in a reference work. There are many grammatical and typographical mistakes some of which ofcourse are included in the 'errata'. The book though quite informative has not been edited properly. The suggestions given above can be incorporated in the next edition, as and when it is brought out in the future.

No.96, Telecom Colony
New Timberyard Layout
Bangalore - 560 026

D.S.S. MURTHY