

**Monograph on Radioactivity of the Environment.** C. Rangarajan, Sarada Gopalarishnan and S. Sadasivan. Indian Nuclear Society, Project Square, Anushaktinagar, Mumbai 400 094. 2002. 49 pp. Price not stated.

Environmental background radiation has been one of the most widely studied topics by the health and safety community. Not infrequently have such studies produced controversial findings. For instance, a recent publication in the *New Scientist* claims that most cases of the commonest types of childhood thyroid cancer could be caused by low-levels of natural radiation from rocks and cosmic rays. On the other hand, there have also been several publications in the past that have reported that low levels of radiation are indeed beneficial to health, as they stimulate the DNA repair mechanisms and enhance the body's immune response. This phenomenon is referred to as radiation hormesis. The Indian Nuclear Society (INS) should be commended for its laudable efforts to bring out a monograph on such an important topic. The authors, in view of their long and rich experience in the measurements of atmospheric radioactivity, are eminently suited to handle the topic.

The monograph gives an excellent outline about the sources and types of radioactivity in the environment as well as their magnitude and distributions. Both natural and man-made sources are well discussed and their differences are highlighted. The reader will get a good idea of how the radioactive material is transported in the environment, through air, earth and water. Atmospheric diffusion properties have been described in great detail. Dispersions through water and soil are not covered to the same degree of detail. The fact that the exposure received by a member of the public from man-made sources like nuclear reactors is small compared to the natural background radiation, is highlighted. It is worth noting that the internal exposure accounts for 60% of the total exposure. The monograph also points out the fact that the diagnostic medical examinations account for much of man-made sources of radiation. The authors have thoughtfully included sections on basic concepts of nuclear physics and definitions of radiation.

There are a few minor avoidable errors. For example, it is stated that 'the limit for radiation worker is 20 mSv, effective dose'. The ICRP recommendation, in fact, is that the effective dose should not exceed 100 mSv over five years, with the annual limit being 50 mSv. The annual limit prescribed by Atomic Energy Regulatory Board of India for occupational workers is 30 mSv. In figure 5.2 showing the pathways of entry of radioactive elements into man, the important route from animal to man indicating the ingestion of meat and its products has been omitted.

After the collapse of the iron curtain, the world has come to know how the former Soviet Union had dumped indiscriminately, high-level radioactive wastes from its weapons programme into the Karchai Lake in the Chelyabinsk area, resulting in extensive contamination of Techa river and its environs. The exposures received by a large number of members of the public are high compared to even the population exposure in the Chernobyl accident. Extensive studies on the Chelyabinsk population, being carried out by a large number of international groups of scientists, are providing important inputs for the reassessment of radiation risks due to low levels of chronic exposures. It is surprising that the monograph has not made any reference to the Chelyabinsk site, which is arguably the most contaminated region on the earth today.

On the whole, the book is an excellent introduction to the subject under discussion. The level of presentation is such that the reader will not be put off by too many technical details which are typical of books dealing with such topics. INS should bring out more such monographs targeting the students and general public, to bring about an awareness among them regarding the myriad benefits to mankind from the applications of nuclear energy, and also to place the radiation risk in proper perspective.

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**Sustainability and Management of Aquaculture and Fisheries.** H. D. Kumar. Daya Publishing House, 1123/74, Deva Ram Park, Trinagar, Delhi 110 035. 2003. 429 pp. Price: Rs 995.

With reference to animal production, fisheries have some advantages: First, fishes are the cheapest source of animal protein and a health food. Unlike poultry, egg and meat, which are sold at a uniform price in the markets, fisheries constitute a unique sector, offering animal protein to the broad economic cross-section of the society, from a price as low as Rs 10/kg to as high as Rs 700/kg. Yet the low-priced fishes like the sardines are not low in nutritional quality, as their protein and energy contents are equally high, comparable to that of lobsters. Secondly, high fecundity (up to 1 million eggs) and fast growth rate (growth coefficient often  $> 1.0$ ) of fishes have no parallel in other animal protein sources like the livestock, including poultry. The problem of feeding the world's 7-8 billion through agriculture in an environmentally sustainable manner, has prompted scientists to look towards water as a major source of food production. Not surprisingly, Kumar, who has authored books on algae, biodiversity and aquatic environment, has attempted in this book to discuss the present status and future prospects of fisheries and aquaculture, and their sustainability in the face of increasing demand for more and more fishes.

The book is organized in 10 chapters followed by glossary, bibliography and index. The first chapter introduces the subject with a focus on sustainability. This is followed by a detailed chapter on fish farming. Understandably, the achievements, especially the Indian capture fisheries and Chinese aquaculture are described in the fifth chapter. The seventh chapter pays special attention to ecological and biological importance of the declining wetlands and mangroves, and to environment. The last two chapters are devoted to futuristic management models of fisheries and aquaculture. In the remaining chapters, almost all aspects of fisheries and aquaculture are described, but not in the expected format, resulting in some kind of mixing. For instance, coastal aquaculture finds a place in marine fisheries, although there is a separate chapter on coastal aquacul-