with mysterious links to quantum mechanics. He has provided some references for these on p. 255.

I joined the Indian Institute of Science (IISc), Bengaluru as a research student in 1965, when research papers on the KdV equations started coming (including the paper of Zabusky and Krushkal) to the institute library. The subject interested me deeply but there was no question of getting involved in research in this area by an young research student without any research experience and with no one to discuss even the most elementary aspects. I collected about 30 reprints (including the review article of Miura – 1976). When I went to Mehta Research Institute (now renamed as Harish-Chandra Research Institute) at Allahabad, I handed over all the reprints to P. L. Bhatnagar, who was my research advisor at IISc during 1965–67. He took interest in the KdV equation, tried to promote it in India by holding a month long lecture workshop in 1976 (with only two resource persons, he and me) and wrote a book entitled *Nonlinear Waves in One-dimensional Dispersive Systems* (Oxford University Press (OUP), 1979). This book is available (with permission from OUP) at: https://drive.google.com/file/d/1Ffohxed1I1ZAPYR54rebewpENI-n_cIUu/view.

Much later, Zakharov was my guest at IISc and told me that he was surprised to see the first book (a good book – he emphasized) from a country where no contribution to the subject was made. Soon after, he got it translated into Russian.

I have written the above two paragraphs with a feeling of disappointment since mathematical aspects of the subject were not pursued in India – also because I could not have pursued the subject. One of the finest contributions in mathematics and physics in the last century has been completely neglected by Indian mathematicians. There are some physicists in India who have contributed to the subject but their interest has not been in the development of mathematics associated with solitons. Kasman's book is an excellent one to encourage mathematicians to take note of the subject and start training some students at graduate level. The applied mathematics aspect, 'analysis of nonlinear PDE leading to dynamics of waves' is not covered in this book. Apart from Bhatnagar's book above, I mention one more book *Solitons: An Introduction* (Cambridge University Press, 1989) by P. G. Drazin and R. S. Johnson, which can be used as a textbook.

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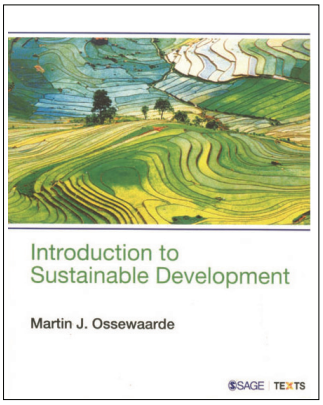

Introduction to Sustainable Development. Martin J. Ossewaarde. SAGE Publications India Pvt. Ltd, B1/I-1 Mohan Cooperative Industrial Area, Mathura Road, New Delhi 110 044. 2018. xxv + 277 pages. Price: Rs 350.

Writing a textbook on 'sustainable development' (SD) especially for the undergraduate students is a formidable challenge. Yet, the author, Martin J. Ossewaarde has made an extremely good beginning and he deserves much appreciation and credit. The challenge lies not only in its multidisciplinary character, but also in intricate interactions among its economic, ecological and social dimensions. With a decade of experience in teaching SD to undergraduate students, Ossewaarde has brought together all the essential elements of SD in this book.

The book is divided into three parts more for convenience of grouping the issues; the fact remains that interrelationships and complex interactions among the three parts and their chapters cannot be treated distinctly from each other. Hence, this review is an overall analysis of the entire contents of the book.

The book starts with the UN Sustainable Development Goals (SDGs) set for the period 2015–2030. Ideally, it should be preceded by reference to the UN Millennium Development Goals (MDGs) for the period 2000–2015. It is important for students to understand that MDGs resulted in varied degrees of success across nations, and the overall impression is that failure to fulfil the target goals was mainly due to much greater emphasis on the economic dimension and much lesser on the ecological and social pillars of SD. Further, even before a reference to MDGs, the book (that is 'introductory in nature') could have ideally begun with a brief narrative of how Earth is at a cross-roads, brought about by anthropogenic activities leading to environmental degradation, biodiversity loss, depletion of finite natural resources, population growth beyond the 'carrying capacity' of the planet and technology-driven economic growth through production of largely inessential consumer goods, etc. Today, the threat of a 'tipping point' related to global warming and climate change is looming large.

The year 1968 is notably significant when M.S. Swaminathan, the architect of India's 'Green Revolution' referred to it as 'exploitative and unsustainable' in the long run. Then in 1972, publication of *Limits to Growth* (Meadows, D. *et al.*, Universe Books, New York, 1972, p. 211) for the Club of Rome, and the UN Conference on 'Human Environment' (Stockholm, Sweden, June 1972) moved the world leaders to realize that development by exploitation of the finite natural sources cannot go on indefinitely and that environmental degradation cannot be effectively tackled without also addressing poverty, especially the rural poverty due to lack of livelihoods. Consequently, the Gro Harlem Brundtland Report *Our Common Future* (Oxford University Press, Oxford, UK, 1987, p. 416) defined SD, and provided the base material for holding the UN Conference on Environment and Development (UNCED) in 1992 in Rio de Janeiro, Brazil. Among its outcomes, the 'Agenda 21' calling upon the Member nations to embark on SD provided major thrust for action.

The author's statement that the policies and actions of the World Bank, World Trade Organization and International Monetary Fund have not been conducive for promoting SD, especially in the developing world is appropriate. He has also pointed out that globalization encourages the spread of Western

consumption patterns to the developing world and threatens its fragile ecosystems. Further, it is obvious that trade under globalization is free but not fair. Spread of violence in several regions of the world accentuates the vicious spiral between poverty and natural resources degradation; peace and contentment are essential for SD.

The students from the developing countries need to know if globalization was a desperate need at all, and whether developing countries could not have chosen to opt for 'gross national happiness' (GNH) as Bhutan did, instead of the Western concept of 'gross domestic product' (GDP) that set them in competition with the industrialized nations. M.S. Swaminathan's book *In search of Biohappiness* (World Scientific Publishing Co, Singapore, 2015, p. 205) shows the pathway to attain GNH. Surely, the developing countries are at a technological disadvantage and not on level playground to compete economically with the developed countries. This only widens the rich–poor gap in their own countries. The author, an economist, could have introduced the concepts of 'ecological economics' and suggested that one way to bridge the widening economic gap is by fixing higher price for the raw materials and natural resources so essential for technologies to convert them into value-added products. Under the colonial era, exactly the opposite was enforced.

This book is a rich source of information on global policies, human attitudes towards SD, case studies, etc. However, an ethical dimension of SD needs greater emphasis. The author elaborates throughout the book the worldviews of 'bio-environmentalists', 'institutionalists', 'market liberals' and 'social greens' on SD. Obviously, the views on SD differ widely. It appears that the author leaves it to the students to decide the best among the four to achieve SD. Instead, the worldviews of market liberals should have been rejected, and those of bio-environmentalists favoured. The view of the market liberals that production and consumption growth create funds and attitudes that will improve environmental conditions is unsubstantiated. The views of the institutionalists that global organizations and local governments would direct economy and society towards sustainability is bureaucratic and top-down. It rules out people's involvement in decision-making.

Part III of the book deals with key areas of transition. Its four chapters, viz. 'Energy', 'Sustainable agriculture', 'Sustainable cities' and 'Green economy' form the core issues addressed by SDGs. The chapter on 'energy' lucidly presents the critical issues such as development of clean and renewable energy, the need to cut down dependence on energy from fossil fuel, adverse impacts of perverse subsidies (e.g. free electricity to farmers), etc. The students need to appreciate that solar and wind energy also pose environmental problems in the disposal of solar panels after use, and in the allocation of land (a shrinking resource) for windmills respectively. Energy issues have an ethical dimension too; about 1.3 billion people in the world have no access to modern energy services, and about 2.8 billion people lack access to cooking facilities. So, the trees are cut for fuel wood. In this background, the need is that homes and offices should use sunlight radiating through the windows, instead of blocking it with curtains and illuminating with electricity. These issues pertain to social inequality as well as ethics and social responsibility.

The most important of all is the chapter on 'sustainable agriculture' and a 'Zero Hunger' world. This is SDG 2 and is closely linked with SDG 1, which refers to the eradication of extreme poverty that denies 'access' to food and nutrition. That the Green Revolution requiring huge inputs of chemical fertilizers and pesticides is 'exploitative' and hence unsustainable was pointed out as early as January 1968 by Swaminathan (who is indeed the Father of India's Green Revolution). The need is for a technology that would ensure productivity in perpetuity without causing environmental and social harm. Hence Swaminathan developed a systems approach-based 'evergreen revolution' to achieve this objective. The evergreen revolution includes a variety of eco-friendly agricultural practices to produce food. Further, it opens up avenues for creating on-farm and non-farm eco-enterprises to fight the famine of rural livelihoods by harnessing eco-technologies (resultant of judicious blending of the best of frontier technologies and traditional knowledge and ecological prudence of the rural and tribal people). The evergreen revolution is widely recognized and has been cited by E. O. Wilson (Harvard University, USA) in his book *The Future of Life* (The Vintage Books, London, 2002) as the best option available to feed burgeoning billions of new mouths over the next few decades, and at the same time save the rest of life as well without entering into a 'Faustian' bargain that threatens freedom and security. In order to break the vicious spiral between environmental degradation and accentuating poverty (especially the 'feminization' of rural poverty), the M.S. Swaminathan Research Foundation (MSSRF), Chennai has set up 'Biovillages' (i.e. human-centred sustainable rural development) in order to empower the largely illiterate and unskilled women and men to conserve natural resources and make sustainable use of them to create 'on-farm and non-farm' livelihoods with market linkages. Today, knowledge is power in the globalized world. Resource-poor small and marginal farming, fishing and landless families need training, capacity and awareness as well as basic resources to create livelihoods in rural areas. So MSSRF, way back in the late 1980s set up Village Knowledge Centres (VKCs) with internet connectivity. These facilitate lab-to-lab, lab-to-land, land-to-lab and land-to-land communication linkages to provide time- and locale-specific information on a variety of issues, such as management of crop and animal husbandry, markets, education, health, etc. In the coastal areas, VKCs provide information on sea wave height for the safety of fishers, occurrence of fish shoals, etc. The VKCs of MSSRF are globally applauded for promoting SD. Bruce Alberts (former editor of *Science*) has visited these VKCs and written about them. Biovillages and VKCs with their 'pro-nature, pro-poor, pro-women and pro-livelihood' eco-technologies are accelerating the pace of sustainable rural development. This reviewer believes that inclusion of these innovative approaches would help in making the chapter more practicable. In a nutshell, the value of the book to introduce undergraduate students to SD would be greatly enhanced by the inclusion of practical approaches.

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