

Sustainable Management of Wetlands – Biodiversity and Beyond. Jyoti Parikh and Hemant Datye (eds). Sage Publications India Pvt Ltd, B-42 Panchsheel Enclave, New Delhi 110 017. 2003. 444 pp. Price: Rs 650.

The book under review gives a comprehensive account of different wetlands, ecology, biodiversity, socio-economic aspects, conservation and management strategies for sustainable utility of the ecosystem in India. These are presented in 12 chapters.

The first chapter by Y. N. Rao and Hemant Datye gives an appraisal of wetlands of India. It describes the definition, classification, distribution, economics and policies. 'Wetland mapping: a remote sensing perspective' is presented in the second chapter by P. S. Roy and Mukunda Dev Behra. It highlights the results of mapping some of the major wetlands using remote sensing techniques. The third chapter by M. V. M. Wafar and Sayeeda Wafar discusses the coral-reef ecosystem, its biodiversity, economic contribution, threats and conservation. The fourth chapter, 'Mangrove ecosystem of India: status, management and policy' by Sanjay Deshmukh and T. A. Rao, describes the ecosystem and its importance in the marine environment and conservation aspects. Man-made wetlands are described in chapter five. 'Wetlands and river systems: some experiments in their ecodevelopment planning and integration' by Prakash Gole. Man-made wetlands are more than the natural wetlands. Several approaches have been suggested to improve the quality of the rivers. The sixth chapter, 'An approach to indicators for wetland planning and monitoring and policy' by Hemant Datye and Jyoti Parikh, describes the indicators for the proper management of this system. The seventh chapter, 'Economic assessment and wetland management' by Jyoti Parikh and Hemant Datye, describes the economic contribution of wetlands. The salient features of the ecosystem of the Keoladeo National Park (KNP) over 10 years is presented in the eighth chapter by V. S. Vijayan and Lalitha Vijayan. The ninth chapter, 'People's participation in wetland conservation through conservation education: a case study of Keoladeo National Park, Bharatpur' by Prashant V. Mahajan, discusses ecological, economic and management perspectives of this

park. In the tenth chapter, 'The valuation of biodiversity within protected area: alternative approaches and a case study' by Kanchan Chopra outlines the critical issues about valuation and explores two specific approaches for valuation of KNP. The need and approach for a wetland protected-area network in India is described in chapter 11 by B. C. Choudhury and T. L. Raghu Ram. In the twelfth chapter, Jyoti Parikh, Hemant Datye and T. L. Raghu Ram have discussed the national wetland strategies and action plans.

Wetlands form one of the major basic, useful ecosystems on earth and are now under threat. The book under review may be useful to maintain sustainable utility of this ecosystem. I would recommend it to students, academicians, scientists, environmentalists, policy makers, legal advisors, social workers, etc.

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Methods of Risk Assessment of Transgenic Plants. IV. Biodiversity and Biotechnology. Klaus Ammann, Yolande Jacot and Richard Braun (eds) Birkhauser Verlag, P.O. Box 133, CH-4010, Basel, Switzerland. 2003. 177 pp. Price not mentioned.

During the last 50 years or so, the global population has more than doubled from about 2.5 billion in 1950 to about 6 billion today. Population projections of the United Nations estimate that the numbers would increase to about 10 billion by 2050. And what is most alarming is that: 95% of this increase will be in the developing world. It has been argued strongly that despite the undesirable impact of the Green Revolution, such as reliance on unsustainable inputs (fertilizers, irrigation, pesticides and non-renewable energy resources), and consequences such as salinization, soil degradation, etc., it saved the world from mass starvation, social upheaval and environmental disaster of immense magnitude. If we had to feed

this burgeoning population through increase of farm land alone, we would have witnessed a far serious impact on global biodiversity, primarily due to habitat loss through expansion of agriculture. The challenges ahead are formidable. The Green Revolution is slowing down. Annual growth increases in cereals have come down from about 3% in the seventies and eighties to only about 1%. For the developing countries, this decline in yield growth rate means that in all probability, productivity may not meet the demand of the growing population.

Recent advances in modern biology offer possibilities of genetic enhancement that are either difficult or cannot be accomplished through the conventional methods of crop improvement. These new tools of biotechnology can help provide the much needed technical advance to provide fresh impetus to the Green Revolution and extend benefits of modern science to rain-fed regions of this country. They have been largely bypassed by the resource-intensive technologies of the Green Revolution. The seed-embedded technology of genetic enhancement has the potential to offer immense benefits to millions of malnourished and poverty-stricken farmers of the rain-fed regions. Transgenic crops with improved resistance/tolerance to biotic and abiotic stresses, and nutritional upgradation of the staple food crops, will benefit the subsistence farmers substantially. However, as Conway, Rockefeller Foundation points out, this technological advance can make significant impact to the developing world provided other important components such as improved economic environment, micro-credits, and education and training, particularly to the rural women are also made available.

Perhaps the most contentious issue in relation to deployment of transgenic crops is the one that relates to impact on biodiversity. In many cases, developing countries happen to be centres of diversity for some of the main food crops. This genetic diversity of land races, adapted to local ecological conditions and farming practices, is of crucial importance to the sustainable crop-improvement programmes.

The book under review is an edited account of an international workshop in Bern on the effect of transgenic plants on biodiversity. The topics covered have been grouped under four sessions: (i) Impact of agricultural biotechnology on

ecosystem; (ii) Social, ethical and legal issues; (iii) Impact of biotechnology on conservation; and (iv) Conclusion. The last group has a single chapter entitled 'Discussion – the way ahead'. In their introductory chapter on 'Biodiversity – The impact of biotechnology', Braun and Ammann have done a comprehensive assessment of the importance of biodiversity, loss of biodiversity mainly due to habitat loss, and various issues related to agricultural biodiversity and biotechnology, including the economic considerations. The authors are quite clear in their belief that agricultural biotechnology is likely to contribute towards conserving biodiversity by reducing appropriation of biodiversity-rich native lands for farming. To allay fears in respect of threats to native land races and cultivars by transgenic crops, the authors cite an interesting case of Monsanto's RR soybean:

... hundreds of different varieties have been derived from it ... to suit different geographic regions. This shows that at least with this dominant transgenic crop, biotechnology has not led to a loss of agricultural biodiversity.' This may be the case in the US, but the situation is different in most other countries. Braun Johnson in his chapter on 'Problems of plant conservation in agriculture landscapes: Can biotechnology help or hinder', draws attention to the fact that the issues may be of '... less concern in large countries as the US, where intensively farmed land occupies a small proportion of the total area, and where large tracts of naturally and extensively grazed wilderness act as refuges for many native species'. Unlike the case in the US, in most developing countries, farm lands have far greater contact with wild crop relatives and natural ecosystems. Another chapter co-authored by Klaus Ammann deals exclusively with the crucial issue of vertical gene flow. The authors point out that 'adaptive traits acquired under domestication usually have no selective value in natural habitats, and sustainable genetic introgression from domestic plants to wild relatives are rare'; very well said. But we need to un-

derstand and appreciate the fact that in most cases the transgenes which we are considering for deployment are no ordinary genes, but specifically crafted for maximizing effect and powered by a package of regulatory elements for heightened expression. Indeed, the value addition they offer provides a huge advantage of survival to the host. Therefore, the new levels of fitness they would provide to the compatible wild relatives, would lift their competitive ability several notches up. In the same chapter, the authors have provided a detailed description of gene-flow indices proposed for adoption as a European classification system. Authors observe that the codes can serve as a first rough estimate, before going into more for a risk assessment. The framework provided is well considered and can be useful for adoption as a regulatory oversight in India as well.

Among the other informative reviews of crucial importance to transgenics deployment, is the one by Hans Herren, International Centre of Insect Physiology and Ecology (ICIPE). Herren draws attention to the FAO statement, 'Biotechnology, together with other technologies, could provide new solutions ... achievement of food security' and points out that not enough attention is being paid to the words 'together with other technologies'. He describes in some detail the work at ICIPE that involves 'a novel utilization of biodiversity to control stemborers and an intractable weed in Africa'. Wild grasses are used to either attract or repel stemborers from the maize field, while a legume plant is used to repel borers, attract natural enemies, and control the witchweed (striga). 'All this for less than US\$ 5 million for some 14 countries of East and southern Africa, and at practically no recurrent cost for the farmers.' Herren hastens to clarify that he is not 'against the science or principles behind biotechnology, or genetic engineering for that matter'. He mentions, 'The question I would like to pose is: How much and when, for what purpose and under what conditions, and at what costs to other

agricultural/biological/ecological disciplines ...'. Taking the African example, where the vast majority of farmers are poor, lack access to credit and often good land, and have difficulties accessing inputs and then markets, 'Who wants to drive a Formula-one race car on a road full of potholes?' Harren warns that 'the "quick fix" mentality has resurfaced and needs to be dealt with in a timely and appropriate manner.'

Last but not least, the last chapter 'Discussion: The way ahead' is perhaps the most interesting. Some well-considered suggestions have emerged from the five small sub-groups into which the specialists at the workshop were grouped. Be it the recommendations of Vernon Heyward's group for learning lessons from the past, the importance of baseline data on biodiversity, undertaking research in centres of crop diversification, or Brian Johnson's proposed study on GM herbicide-tolerant rice that would 'enable competent authorities and governments to make informed choices between growing GM herbicide-tolerant rice and conventional wetland varieties', or the advocacy by Sandy Thomas' group for enhancing public-private partnership 'which would enable us to negotiate ... lead to better access to technology for the developing world', the suggested solutions to some of the major problems are worthy of serious attention. All in all, the book is a crisp compilation of a wide spectrum of views expressed by some of the best specialists in this area. I would strongly recommend it to all researchers, policy planners, regulators and such other personnel involved directly or indirectly with development and deployment of GM technology for crop improvement.

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