The New Energy Economy. G. M. Pillai (ed.). World Institute of Sustainable Energy, 'Surya Suman', 49 Hindustan Estates, Road No. 2, Kalyani Nagar, Pune 411 006. 2005. 254 pp. Price: Rs 600.

The book under review is an updated version of the proceedings of a seminar titled 'Future energy' organized by Maharashtra Energy Development Agency in 2002, when G. M. Pillai, the editor of the book was at its helm. All the speakers were invited according to a plan, so that their inputs could weave into a state-of-the-art report on 'green electricity' in the country. This publication is timed with the unbundling of generation, transmission and distribution aspects of power, as also the setting up of Regulatory Commissions and Bureau of Energy Efficiency under the auspices of the Ministry of Power. As such, it is a timely and relevant initiative.

Apart from the first three chapters dealing with energy needed in the new millennium and the role of 'renewable for electrification' – how much and why', the book covers decentralized sources such as power from wind, water at macro/mini/small scale (e.g. few kW/3 MW/25 MW), biomass and biowastes. Solar concentrating systems, hydrogen and off-grid hybrid systems, hitherto neglected and yet of considerable importance, have been considered in such a compilation for the first time. The only earlier comprehensive reviews at state-of-the-art level having been in 1991, published for KSCST, Bangalore with specific stress on economic aspects[1] and in 1998 by Auroville Foundation, Auroville with emphasis on technology[2], this update is both timely and relevant. It also has other notable and relevant features: coverage of recent steps in energy management via regulation, innovative financing, funding through CDM in terms of the Kyoto Protocol and policy initiatives, such as village electrification of non-grid villages (18000 numbers) through renewable sources. Energy conservation aspects for infrastructure in areas of buildings and transportation which consume one-third of the commercial energy, and role of energy efficiency in primary and service/industry sectors are also touched upon. Recent moves on energy labelling of consumer goods, training of energy managers, auditors and entrepreneurs are also brought out. The integration of all these initiatives into a vision and a plan for sustainable energy economy in the next 15 years, when 10% of the national supplies are targetted to come from renewables has also been highlighted. One notable omission is a chapter on monitoring for performance in terms of design and costs, the weakest link in the Indian renewable energy scene.

There are too many cross-currents in the Indian energy thinking. With the government promoting nuclear energy as the main workhorse of its capacity addition and of financial outlays and extolling of renewables at the same time albeit in a lower key need to be integrated in a national energy plan, something long overdue and urgently awaited. In view of the oil prices and import quantum touching ridiculous levels, there is no escape except to build up the renewable ladder competently and speedily. It does not interfere with any other source.

The cover is subtly suggestive. The production is well got up and quite a few articles have representative graphs, figures and reproductions for more understanding. Few pertinent policy recommendations for sustainable energy economy are given on p. 244. The book is a significant and useful compendium for all energy professionals and could be a profitable guide. The book is well printed and bound, and singularly free from misprints. Its price is high, probably because of being brought out by an NGO. It would be good to have a cheaper paperback for wider readership.

1. Pai, B. R. and Ram Prasad, M. S. (eds), In *Power Generation through Renewable Sources of Energy*, Tata McGraw Hill, New Delhi, 1991.
2. Gupta, C. L. (Compiler), In *Renewable Energy: Basics and Technology*, RETWS lectures, Auroville Foundation, Auroville, 1998.

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Agricultural Sustainability: Strategies for Assessment. Gary W. van Loon, S. G. Patil and L. B. Hugar, SAGE Publications India Pvt Ltd, B-42 Panchsheel Enclave, New Delhi 110 017. 2005. 281 pp. Price: Rs 650.

Ever since the World Commission on Environment and Development produced the now famous, document 'Our Common Future' (1987) there has been increasing recognition that goals of poverty alleviation and enhancing livelihoods must be achieved in ways which do not adversely impact our ability to meet the future needs. The follow-up 'UN Conference on Environment and Development' (1992) held in Rio de Janeiro was considered a launching pad for establishing policies and actions directed towards sustainable development (Agenda 21) and in which the nations around the world would participate. The action plan was supposed to be a major step in initiating a process which would contribute to achieving goals of sustainability. Yet little progress was made over the next decade by way of doing things differently and which will contribute to sustainable development. There appears a major hurdle in translating universally sound concepts into actions and activities, which take place locally. Ten years after the Rio Conference 'World Summit on Sustainable Development' (2002) was held in Johannesburg to take an assessment of the progress. The conference emphasized a clear and vital role for science to be more policy-relevant to address issues of sustainable development. Some of the new-generation tools which will address the policy relevance of science for sustainable development include (ICSU):

Conceptual frameworks which provide powerful insight and organizing qualities for sustainability analysis.
Indicators and indices of development status and environmental change.
Specific forms of analysis relying on indicators that are best selected through the use of sound conceptual frameworks.
Assessments that are carefully constructed and produced to provide policy inputs.

The present volume is a significant contribution to our understanding of what constitutes agricultural sustainability (i.e. a conceptual framework), how to go about assessing agricultural sustainability within

the framework (i.e. development of indicators and indices) and how specific forms of analysis and assessments can provide an input for determining agricultural policy in the region of study. With more than seventy per cent of developing country populations engaged in agriculture, sustainability is clearly an issue of concern for all. Although globally, food production may be nearly sufficient to meet the needs of every person, however, when one looks at a continent, a country or region-wise distribution of food, it is far from even. Thus, while for the country as a whole, India has achieved goals of self-sufficiency, availability of adequate nutritious food for a large fraction of the population is still a dream. At the same time, there are clear evidences that the past strategies (e.g. of the Green Revolution era) are a cause of concern as we look into the future. Degradation of land and water resources, excessive reliance on chemicals and non-renewable inputs in the long term could have a negative impact on food security and rural life in general. Problems of sustainability can be viewed across a range of levels. These could be regions, watersheds or at the lower end of the spectrum, viz. farm and individual fields and the different levels are interconnected. This book is concerned basically with methodologies for evaluating and assessing the sustainability of agricultural systems in a micro region. It provides a comprehensive and lucid account of concepts of sustainability as they relate to agriculture and provides practical 'how to' guidelines and details of methodologies to carry out appropriate assessments, focusing on the central issue of whether productivity can be maintained. The book divided into four chapters, begins with a discussion of the meaning of sustainability and sustainable development and reviews issues related to agricultural sustainability to bring out an overall picture of what sustainability is about. The authors maintain that while the term 'sustainable development' has been used fairly loosely, there are important universal and fundamental underlying concepts and these fundamentals form a basis for the framework for any definitions; yet each situation has its unique features and it is essential to apply universal concepts to specific cases to define what constitutes sustainable development. There is a broad consensus that for any comprehensive view of what is sustainable will involve three key elements: economic, environmental and social and that the components of the sustainability tripod are interconnected and it is only when they are considered together that we can assess sustainability in comprehensive terms. If a system does not make economic sense, i.e. if farming is not profitable, the system is clearly unsustainable. Agricultural sustainability demands that farmers continue to make a good living and that population as a whole is supplied with quality food at a reasonable cost. Past experience has shown that agriculture-related activities can cause a wide variety of environmental problems – loss of biodiversity and natural habitats, overconsumption of surface and groundwater, contamination of soil and water by organic biocides, nutrient-induced eutrophication of water bodies, release of excessive quantities of greenhouse gases, etc. For a vast majority of the population (up to 70% or more) in many developing countries, agriculture is a way of life. It is therefore essential that successful farming does not preclude opportunities in the social sphere, e.g. education, access to medical facilities, recreation, etc. Thus agricultural sustainability must consider and bring together sound practices in the economic, social and environmental sphere, the legs of the sustainability tripod.

The chapter on 'Sustainability indicators' examines the theory and practice of indicators in considerable detail with emphasis on desirable properties of indicators, methods for quantification and aggregation. Broadly, three types of indicators are recognized – pressure (potential or actual stress) indicators, indicators of the state (conditions within the system) and indicators of response, which describe measures being used to alleviate or counteract the pressure on the system. For any assessment, it is important to conceptualize a comprehensive framework which permits sustainability analysis. As a basis for this framework, authors consider sustainable agriculture as an 'activity of growing food and fibre in a productive and economically efficient manner, using practices that maintain or enhance the quality of local and surrounding environment – soil, water, air and all living beings. It is also sustainable in supporting the health and quality of life of individual farmers, their families and community as a whole'. With this conceptual statement as a guiding principle, the authors identify categories of indicators which reflect various dimensions of sustainability. The six broad categories of indicators identified are: productivity, stability, efficiency, durability, compatibility and equity. Building on this framework, the authors then set out to develop individual indicators that can point to the state of sustainability with respect to each of the categories.

A point stressed repeatedly is the need to ensure that at all stages of developing indicators, the expert and local populations (involving both men and women) work together. Such assessments enhance the possibility of any recommendations being used in a positive way. The authors provide details of standard methods and specific examples on processing primary data to arrive at indicators or values that integrate all information.

Chapter 3, on 'Indicators for assessing agricultural sustainability' is the core of the book. Having set out six categories within the conceptual definition of agricultural sustainability, the authors explore possible indicators under each of the categories, which could be used in different situations. It is clear, that there is no definite set or category of indicators, which can be applied to all situations. Each agroecosystem with its own geographic, social and economic uniqueness, would require a unique approach to assessment. Yet the broad principles outlined could be applied to a variety of situations and as these are applied widely, a consensus will emerge.

While productivity must always be considered an intrinsic component of sustainability and is a primary goal of any agricultural enterprise, a singular emphasis on productivity in the past is what has brought to the fore the need for more integrated approaches to sustain high productivity. The issue of stability brings us to the basis of evolving strategies, which enhance productivity in ways that do not cause degradation of basic natural resources. Keeping watch on their resources calls for periodic assessment and taking steps for reversal of degradation. Many of the issues of resource degradation are closely linked to how efficiently the resources for agriculture are used. Monitoring the efficiency of input use, e.g. water, nutrients, energy and devising ways to use them more efficiently are the routes to sustainability. An important feature discussed in detail is the role of secondary biomass and whether or not and how this should be accounted for in production and efficiency estimates. The principal options for use of residual plant materials, as animal fodder, soil amendment to build up organic matter and a source of nutrients and fuel would need serious consideration as to the best

ways to use this resource to establish a sustainable agricultural system.

Durability or resilience relates to how a system will respond in periods of stress, say in a drought year or in a year of unusual pest attack. Indicators of system durability will be important in environments which are more prone to stress situations. Recognition that agricultural systems are a part of overall human, social and natural environments, sustainability considerations demand that they contribute to maintaining and enhancing the health of these environments. The authors present examples of indicators relating to human health (e.g. nitrate concentration in drinking water, persistence and mobility of pesticides migrating to groundwater, etc.) and biodiversity issues to emphasize how agricultural activities were related to compatibility issues. Biological diversity and complexity contribute to sustainability and promote habitats where there is reduced need for chemically based interventions to control pests. Promotion of diversity at both landscape and cropped area contributes to resilience. Several diversity-related indicators are included. Equity signifies a balanced distribution of benefits to all members of the community and measuring equity is a means of assessing the state of human and social capital of an ecoregion. An equitable system should provide opportunities and benefits in a manner that is fair to females and males, and one that contributes to essential services like education and health. The authors provide several examples of indicators in the area of educational opportunities, income and employment, gender fairness, etc. Having accumulated a set of indicators covering different categories, the authors describe how to use these individually or in combination to provide a measure of sustainability, which serves a variety of useful purposes – follow trends over time, evaluate progress of a project, assess different management practices in a given region – all with a view to make improvements towards the goal of sustainable agriculture.

The last section (Chapter 4) comprises several case studies carried over different parts of the world with a view to evaluating sustainability of agricultural practices. These studies carried out in relation to a variety of contexts and using different methodologies provide valuable information as to approaches used in selecting categories and specific issues, assigning values and ways of aggregation. One of the studies 'Sustainability of Tungbhadra project area of South India', is where the authors were associated and where they largely developed ideas, which are the focus of the book. The studies clearly bring out the need for enlarged efforts, which consider the specifics and unique details of situations. In a country like India where spatial variations in language, culture and biogeographical features are so distinct, micro sustainability measures will be an important way to understand sustainability issues within a small region as well as for building up a broader picture of sustainability at the macro level.

All in all, the book is timely and a valuable contribution to our understanding of complex sustainability concepts and how to go about translating these into implementable strategies and methods of assessment. These have important implications for the ways agricultural problems are conceived and efforts made to find solutions. The volume will be beneficial to scientists (both social and biophysical) and those striving to give new directions to agricultural research for sustainable development.

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