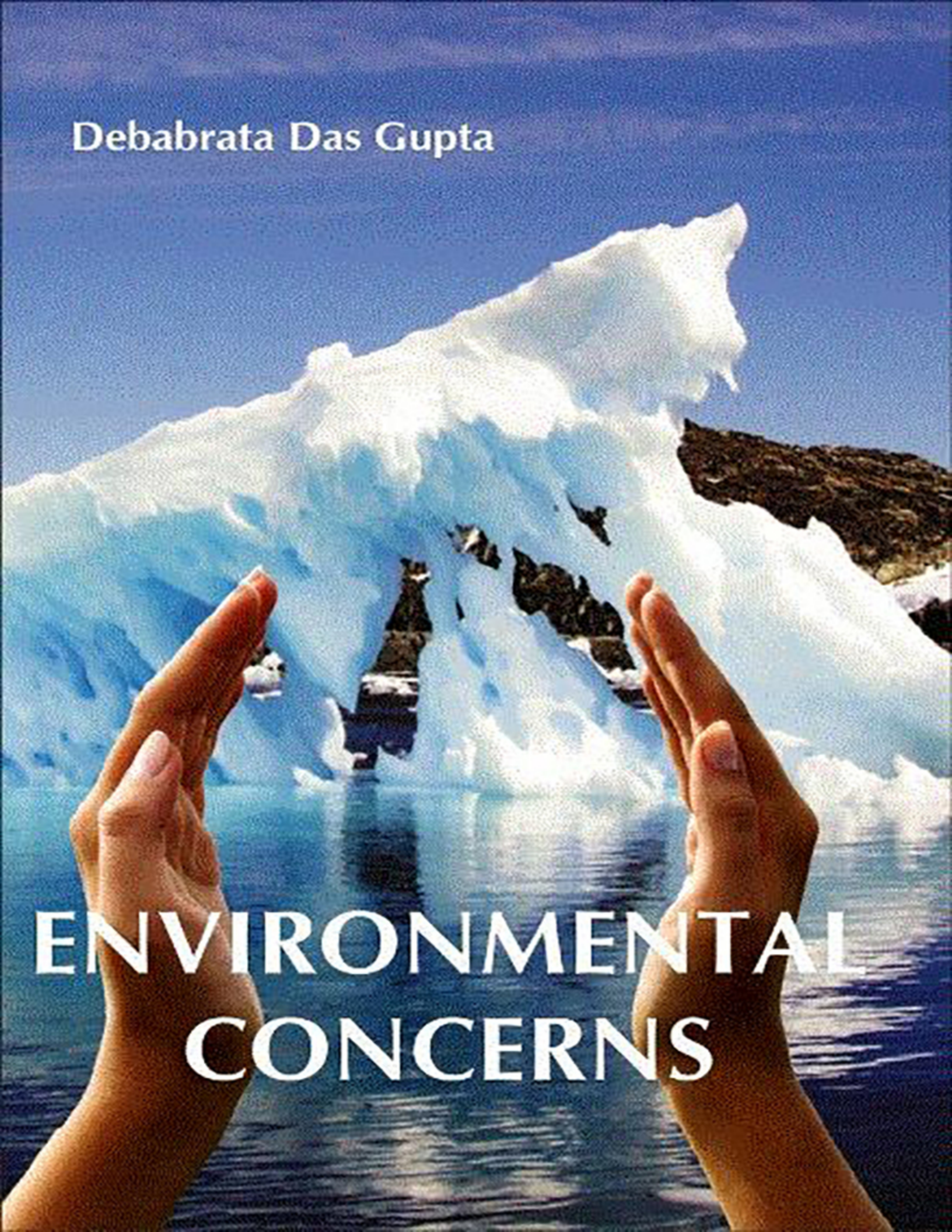
Debabrata Das Gupta
ENVIRONMENTAL
CONCERNS

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PREFACE

The surroundings of any individual or thing include categories like: (i) the combination of physical conditions affecting and influencing the growth and development of an individual or community; (ii) the social and cultural conditions affecting the nature of an individual or community; and (iii) the surroundings of an inanimate object of intrinsic social value. The comprehensive definition of 'environment' as stated by European Commission, the Governing Body of European Community is the combination of elements whose complex inter-relationships make up the setting, the surroundings and the conditions of life of the individual and of society, as they are felt. The place of humanity at the centre stage is beyond any question.

The environment of human being includes the abiotic (devoid of life) factors of land, water atmosphere, climate, sound, odours and tastes; and biotic factors of human being, fauna, flora, bacteria and viruses; and all those social factors which make up the 'quality of life'. Ingredients of the word 'environment as reflected in most national legislation are: (1) all aspects of the surroundings of human being, whether affecting human being as individual or in social groupings; (2) natural resources including air, land and water; (3) ecosystems and biological diversity; (4) fauna and flora; (5) social, economic and cultural circumstances; (6) infrastructures and associated equipment; (7) any solid, liquid, gas, odour, heat, noise, vibration, or radiation; (8) unidentified natural assets like natural beauty, outlooks and scenic routes; (9) unidentified historical and heritage assets; (10) unidentified cultural and religious assets; (11) aesthetic assets; (12) public health features; and (13) unidentified environmental planning, environmental protection, environmental management, pollution control, nature conservation and other mitigation measures.

Human are increasingly anxious about their life-support systems and about the quality of their environment. The very relationship between humans and their environment now attracts greater attention. The side effects of resource use are now far more widely acknowledged and use of environmental resources have become political issues at local, national and even at international levels.

"Impact" is the effect of one thing upon another. The major dimensions of Environmental Impact Statement are: (a) pollution and ecological – effect of air, water, noise, radiation levels, fauna and flora, ecology, bio-diversity, contamination levels, visual environment aesthetics, soil erosion and land degradation, drainage and sewerage, waste generation and climate; (b) natural effects on agricultural land, forest resource, water supplies, minerals and marine resource, energy resource, wetlands, coral, mangroves, rainforest etc.; (c) social effects on settlement patterns, employment, land use, housing, social life, accessibility, safety, residential amenity, minority group, aged, unemployed, disabled, women and the socio-economic profile of the effected community; and (d) economic effects of employment opportunities, accessibility to facilities, services, urban infrastructure, choice and affordability of goods and services, real income, land prices and the likely multiplier effect. All these dimensions may also be conceived into two categories: (1) micro-environmental impact/effects/ problems which are affecting the lives of citizens; and (2) micro-environmental impact/effects/ problems which are problems of a regional, national and international character.

Admittedly, last few decades has witnessed a fundamental change in the manner government and development agencies think about the environment and development. Truly, development strategies and related programmes which do not take adequate care of the state of critical resources –forests, soils, grasslands, freshwater, coastal areas and fisheries may degrade the resource base upon which future growth is dependent.

Since the last few decades we have started to recognize 'global warming' as critical to our overall welfare. **Professor Jayanta Kumar Datta** has narrated this phenomenon from its basics point of view and suggested the key mitigation issues in the first chapter on **"Global Warming and its Mitigation Strategies"**. **Professor Anil Kumar De** in chapter on **"Some Environmental Issues: Global Worming and Agrarian Crisis"** has emphasized that scientists, technologists and policy markers all over the world are seriously obsessed with the burning environmental issues of the day as a matter of human survival on planet earth. The key issues viz., global warming and agrarian crisis have also been put forth. Farming is intimately linked with climatic parameters. Climate change has gained momentum due to inadequate anthropogenic disturbances. In chapter **"Climate Change and Agriculture in Orissa" Professor D. P. Ray** has narrated some potential effects of climate change on overall agriculture in Orissa state. A range of adaptive and mitigation measures have also been forwarded to address the climate change. Groundwater resources and their long-term replenishment are controlled to a great extent by the long-term climate conditions. Admittedly, climate change will, therefore, have a great impact on groundwater resources. The variation in groundwater storage will invariably lead to variety of geo-morphological and geo-engineering effects. Groundwater plays a major role to prevent drought. Unfortunately, inspite of such paramount importance the issue of "climate change and sustainability" which has remained a neglected subject so far has been addressed by **Dr. S. Chakrabarti** and **Dr. S. Ghosh** in chapter on **"Climate Change and Groundwater Sustainability: A Scientific Critique".**

Ability to cope with the problems of reducing the human impact on 'Global Commons' is the key to the sustainable development. However, the world opinion is still divided over the ways of reducing this impact, as such steps would affect their self–interests. With the exception of European Union and certain specific policy regimes, international environmental governance is still weak. In this context **Professor Sibaji Chakraborti** in chapter on **"Understanding the Facets of Sustainable Development – An Exploration"** has emphasized that a consensual approach to bring about the fundamental transformation of production and consumption behavior seems to be the only way for achieving this sustainable development. Emergence of the concept of 'Civil Society' seems to be the only ray of hope in this direction.

The chapter on "**Role of Environment Degradation on Conversation a Plant and Pollinator Resources" Professor Sudhendu Mondal and Dr. Ashoke Bhattacharya** have explained the recent problems in the context of environmental degradation and global warming for biodiversity conservation

Admittedly, at this juncture of modernization, it is really difficult to stop our pollution; but it may be reduced by judicious use of resources and taking needed care, especially in factories/industries/production unit etc. The development of tolerant crop genotypes is the urgent need to augment crop productivity. Air pollution increases the GHGs in the atmosphere, subsequently it increases the global temperature causing climate change. **Dr. Bidhan Roy** and **Professor Asit Kumar Basu**, in such background, have discussed the different causes and sources of air pollution and their ill effects on crops and tolerance mechanisms and productivity of crop plant in chapter **"Atmospheric Pollution and its Consequences on Agriculture"**. Plants respond differently to irradiation with low or high dose of UV-B, either by stimulating protection mechanisms or activating repair mechanisms to cope with the UV-B radiation. The protection mechanisms include development or activating repair mechanisms to cope with the UV-B

radiation. The protection mechanisms include development of anthocyanine, wax deposition on leaves, shielded meristem and DNA repair at molecular level. **Dr. Bidhan Roy** in chapter **"Radiation Stress in Crop Plant"** has dealt at length the injurious and tolerance mechanisms of ill effect of UV radiation. This chapter also includes the genetic variability of few crops on the basis of the importance of breeding in development of UV-B tolerance/resistance crop genotypes.

In chapter on **"Biodiversity vis-a vis Environment" Dr. Buddhadev Duary** has placed the recent updated and modern treatise on biodiversity. A detailed overviews highlighting the importance of biodiversity especially on agriculture, medicine, industrial materials, ecological services, leisure, cultural and aesthetic value of biodiversity has been made. Special emphasis has been given on the importance of biodiversity with respect to environment. This has been made more informative and updated including bio-indicators of various aspects. Loss of biodiversity and its reasons, types of conservation, conservation strategies, conservation efforts in India including National Biodiversity Strategy and Action Plan (NBSAP) project and future strategies of biodiversity conservation have also been narrated in this chapter.

Dr. Anindita Saha in chapter 10 has emphasized the imperatives of research on natural resource management as a highly effective means based on identified principles. She also explained how this will establish a culture among the stakeholders and build the social capital.

In chapter on **"Biodiversity: The Inconvenient Truth" Professor P. K. Das** has righty pointed out the very fact that for understanding and analyzing the complexity related with bio-diversity in terms of its survivality and breakdown it is of utmost need to have a close look for different aspects of this important aspect including its present status and future consequences. He has pinpointed that conservation and wise management of biological diversity must receive topmost priority in the planning process and economic development ought to be based on ecological consideration. Every effort must be directed towards sustainable use of species and the ecosystems.

Professor Ranen Sen and Sri Debmalya Dasgupta in their write-up (chapter 12) on **"Stress Ecology and Environment"** have made attempts to define the response to stress of different ecosystems function from realistic field conditions to changes arising out of the human interventions in natural ecosystems. In such context ecosystem stability, ecological stress, sustainability and environmental chain vis-à-vis operational chain (considering the environmental stress management as a supply–chain management) have been narrated.

Dr. Apurba Ratan Ghosh has dealt in depth the basic elements /fundamentals of toxicology which are the interaction of the agents with biological body, exposure period and the possible responses in his chapter **"Toxicology: Some Fundamental Aspects"**.

The concept of Integrated Pest Management (IPM) has been recently revitalized in response to increasing technological failure of chemical pest control technology and human health. **Professor Sarthak Chowdhury and Dr. Prabuddha Ray** in chapter on **"Integrated Pest Management Panacea to Contain Pesticide Abuse"** have narrated that this IPM is akin to new technology and its widespread adoption is likely to be constrained by a number of socio – economic and policy related factors. A lack of understanding at any level would render any IPM programme unsuccessful. The central objective of any IPM programme should be empowerment of extension workers and farmers in the use of tools and methods of IPM. The conventional disease triangle constituting host-pathogen environment module has undergone a paradigm shift.

Fungitoxic materials have to be regulated strictly so that they are ecologically benign. In such background **Professor A. Chowdhury and Dr. S. Saha** in chapter 15 have harped on conducting defined toxicology tests and investigating environmental fate. They have suggested for concerted effort of the research institutions, corporate organizations and farmers for paving the way for a healthy pollution less environment as well. In chapter on **"Application of Fuzzy Logic for Pest Management in Agriculture" Dr. Somdatta Chakrabarty** has focussed on developing

an 'expert system' based on Fuzzy Logic for decision making in pest management. She has explained the application of fuzzy logic in uncertainty management during pest activity level. Its aim is to develop and use information and software technology in solving problems posed in plant protection domain.

Developing nations are paying increased attention to food safety because of growing recognition of its potential impact on public health, food security and trade competitiveness. In this backdrop **Dr. Md. Wasim Aktar** and **Professor Anjan Bhattacharyya** in chapter on **"Food Safety in India: Challenges and Opportunities"** have discussed in depth the food safety concerns in India which will obviously require adoption of appropriate legislation, strengthening capacity to enforce rules, promoting adoption of agricultural manufacturing and hygienic practices, greater collective action and targeted investments.

Energy becomes a global concern because of its multidimensional effect on the security of food, nutrition and environment. **Professor P. K. Das** in chapter on **"Energy, Food and Environment: The Biomass Impact"** has stressed the overall need of policy on the long run and short range potential of biomass in order to give it due recognition and place in the planning process. Efforts will have to be continuously made to renew and conserve our energy resources for sustainable development.

Dr. S. S. Gadge and **Dr. B. P. Bhatt** have narrated a success story on watershed development in a Nagaland region (chapter 19) which has actually infused a new philosophy of work culture among the rural people. Sick culture and immoral practices were eliminated to a large extent. A sense of hope and aspiration has been implanted in the farming community after successful implementation of the project. **Smt. Arpita Ghose** and **Professor Malay Mukhopadhyay** in chapter on **"Impact of Mayurakshi Canal Irrigation on Changing Geo-economic Environment of its Command Area"** have narrated the effects of canal irrigation to determine the cropping pattern, land use and geo-environment of the Mayurakshi Canal irrigation command area. In chapter 21, **Dr. Sutapa Mukhopadhyay** and **Sri Swadesh Pal** by an empirical field study have attempted to examine the land use change over time and to find out crucial impact on wetland environment of Kandi Block of Murshidabad, West Bengal. Likewise in chapter 22, **Dr. Manisha Deb Sarkar** and **Smt. Sriparna Sengupta** through their study on mining and quarrying related development activities have tried to confirm that environmental degradation is a serious and continuing problem.

Debate on 'transgenic crops' or GM crops is on in different parts of the world. There are proponents and opponents of this technology on its very advantages and disadvantages. In chapter 23, **Dr. Md. Nasim Ali** has tried to trigger these aspects in general along with its concomitant bio-safety issues and government regulations on GM crops.

Professor Manjur Hossain has suggested some general measures for minimizing pollution in chapter on **"Minimizing Environmental Pollution"**.

Admittedly, the inherent silent nature of the dynamic environment causes immense difficulties to the ecologists/environmentalists for its proper assessment due to dearth of sufficient information. In chapter 25 **Dr. Phani Bhusan Ghosh**, **Dr Subhasis Sarkar** and **Dr Tapan Saha** have explained that by making combination of some of the physio-chemical components of water, lot of information could be gathered which would be immensely beneficial to the ecologists for the assessment of the environmental health. The future challenges of Ganga river pollution have been summarized in chapter on **"Ganga Water Pollution –Challenges Ahead"** by **Dr. Surendra Nath Chatterjee**.

Professor Bernard Fleet and **Professor Shibani Chaudhary** in their chapter on **"The Electric Highway – India's Future for Green Transportation?"** have argued that the conclusion from most climate change scientists is that in order to avoid the most serious impact of

global warming. It will be needed by 2050 to reduce GHG emission level by 80% from 2005 level. Such goal can only be attained by abandoning oil and shifting to an industry zero –emission electric vehicles powered by renewable energy.

The revisited concepts and thoughts on property rights of environmental resources have been explained by **Dr. Debasis Sarkar** in chapter 28.

As regards environmental education and extension education there should not be any theoretical incongruence as both has similar objectives as far as the change in the clients' behavior is concerned. The very philosophy of environmental education and ecological knowledge system itself asks for a participatory and experiential learning. This will provide environmental extension an excellent scope for achieving emancipatory vision, a much empowering and sustainable goal than persuasive extension can do. **Dr. Rupak Goswami** has attempted to establish the theoretical base and agenda for action in chapter on **"Extension for Environmentally Sound Agriculture: Basic Theories and Agenda for Action"**.

Scientists from G8 countries and five biggest emerging nations have urged to ratchet up action against global warming, warning that climate change threatened food and water supplies. In this context, **Professor Debabrata Das Gupta** in chapter on **"Kick the Carbon Dioxide Habits"** has highlighted the National Action Plan on Climate Change in depth. He has also suggested measures towards a low carbon economy at individual level, at organizational level. For this a mindset change is needed to usher in more thought out responsible actions.

In chapter on **"Environmental Audit" Professor Debabrata Das Gupta** has emphasized the need for environmental audit as a sound precaution and a proactive measures in today's regulated environment. His discussion has included in details the process of conducting an environmental audit.

The chapter on **"Environmental Laws in India: A Review"** of **Professor Manik Chakraborty** has focused mainly on the various anti-pollution laws which are presently in force in India. The author has examined India's constitutional mandates and approach of the judiciary for the recognition of environmental rights of the individual. The inadequacies of the legal regime in India have been highlighted as well.

As the Editor I do sincerely wish to thank all the contributors of chapters on "Environmental Concerns". All of them deserve praise and special mention. The secretarial assistance rendered by Sri. Hara Prasad Chatterjee is acknowledged with much thanks. I am also indebted to my wife Sandhya for her co-operation, encouragement, understanding and tolerance during the entire period of this exercise. Lastly, I owe to my publisher, M/S Agrobios (India) for publishing this edited volume.

Views expressed in this publication are those of the contributors. Constructive criticism and academic feedback from users of this book would be highly appreciated.

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