

along with wave energy resource assessment and the fundamentals of waves based on linear wave theory and the relations between various wave parameters.

The energy from currents, salinity gradient and ocean thermal energy conversion is discussed in chapter 6 along with technology types and environmental impacts. Commercial progress in various ocean energy plants is also discussed. Ocean energy resource assessment is a significant challenge faced by wave energy plant developers. The book covers in detail the various methods of wave and tidal energy resource assessment along with the details of instruments used to obtain *in situ* data and information through satellite and airborne remote-sensing technologies, including X-band and high-frequency radar. Although tools for observing the oceans have recently been revolutionized due to technological developments, such as remote sensing by sensors carried by satellites and *in situ* measurements using autonomous vehicles and instrumented moorings, the role of research vessel still continues to be most important in ocean sciences. The different measurements from the research vessel are also covered in the book.

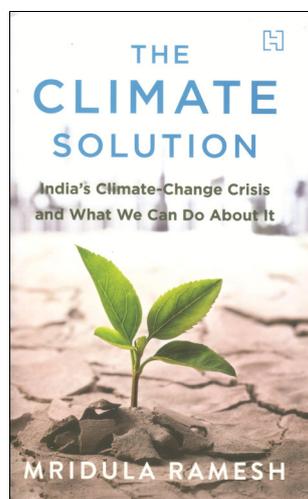
Direct observations from buoys remain the most reliable sources data, but *in situ* measurements are costly, time-consuming and difficult to cover the entire oceans. Ocean modelling is a commonly used tool which is also economical and plays a vital role in the generation of oceanographic data and resource assessment. Accordingly, chapter 8 is exclusively devoted to ocean modelling for resource characterization. General features of ocean models, numerical methods, input parameters, boundary conditions along with the tools for model pre-processing and post-processing are discussed in detail. For minimizing the environmental impacts and maximizing electricity generation, optimization needs to be done. Chapter 9 introduces the optimization theory, intra-array and inter-array optimization, and the various optimization tools. Resource variability influences electricity generation, and how the resources vary intra-annually, inter-annually and due to climate change is also discussed in the book.

Technology readiness level used to estimate technology maturity should have been provided in the book for all the major technologies developed for ex-

tracting electricity from the ocean. A number of ocean energy converters have been developed since the 1940s and a few of them have been commercially demonstrated in actual sea conditions. More than 200 wave energy converters were under development in 2017, with varying degrees of maturity. Even though several concepts have been tested, due to the harsh ocean environment, at present some of the concepts are not commercially viable and some of them have failed. It would have been better had the authors introduced another chapter on lessons learned from the development of various ocean energy converters.

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The Climate Solution: India's Climate-Change Crisis and What We Can Do About It. Mridula Ramesh, Hachette Book Publishing India Pvt Ltd, 4th/5th Floors, Corporate Centre, Sector 44, Gurugram 122 003. 2018. x + 325 pages. Price: Rs 550.

During the past 20 years, many books have been written that deal with global warming or on its impact on society. Most of these books are by foreign

authors from developed countries – mainly journalists or scientists. Some of these books try to convince the reader that climate change is a natural phenomenon and that the society can learn to adapt to it. The books written by scientists tend to convince the reader that human beings are responsible for the rapid warming of the earth during the past 50 years. The books written by journalists tend to focus on the politics surrounding the attribution of climate change to human actions. Most of these books do not discuss, in great detail, what we can do to arrest global warming.

There are very few books written by authors from India that discuss the challenges faced by Indians in dealing with climate change. Hence this book is unusual since its major focus is on India and is written by an Indian author (founder of Sundaram Climate Institute, Madurai, Tamil Nadu). The book will benefit those who want to know about climate change and what they can do about it. The author begins by stating that 'we are playing Russian roulette with our collective future'. The first part of the book explains climate and environmental changes in eight chapters, while the second part discusses what we can do to deal with them in 11 chapters. The first chapter highlights the fact that although India contributes about 6% to global emission of carbon dioxide, the adverse impact of global warming on the country will be much higher than on developed countries. At this point the author expresses her concern about climate change and environmental change together, and this can confuse the reader. Most of the environmental change in India is not on account of global warming. The author mentions that the global vertebrate population has halved in the past 40 years, but this is not directly related to the increase in carbon dioxide in the atmosphere but more directly related to the rapid increase in human population. The author highlights that the rate of global warming in the 20th century is unprecedented. During the past 100 years the global mean temperature has increased by 1°C, while when we came out of the Last Ice Age 15,000 years ago, the global mean temperature increased by 1°C in 1000 years. In the second chapter the author has highlighted the challenge all nations will face if they want to limit global warming to within 1.5–2°C above the value in 1850. In the third chapter the

author shows that the impact of global warming is not uniformly same on all countries. Hence political leaders of different countries have not found it easy to agree on a way to limit the emission of fossil fuels in the next 30 years. The fourth chapter looks at the impact of global warming on heat waves, floods, droughts and vector-borne diseases. At this point it would have been useful if the author had pointed out that most of the increase in floods and vector-borne diseases in India in recent years is mainly on account of rapid urbanization. We cannot attribute all increase in floods and diseases to global warming. This is because we know that even a moderate rainfall event with an intensity of 50 mm/day leads to flooding in many urban areas in India on account of poor urban planning and governance. In chapter 5, the author highlights the tendency in many states of India to grow sugar cane and rice in areas that are prone to drought. She has discussed the problems faced by small farmers and has argued that global warming will aggravate these further. Chapter 6 provides a good discussion on problems related to poor

transport infrastructure, waste disposal and water availability in the Indian cities. In chapter 7, the author argues that many global conflicts are related to climate change and water shortage, while in chapter 8 the vulnerability of women to climate change is underlined.

The second part of the book deals with the solutions to issues raised in the first part of the book. The author proposes innovative solutions to the rapidly declining water resources in India and the value of precision farming. She suggests that buses may be a better solution to the urban gridlock than metro-rail. She also mentions how some Indians have been able to turn urban waste to a resource. In chapter 14, there is a strong case made for solar and wind power. Chapter 15 deals with saving water and treatment of sewage. The impact of our diet on climate is discussed in chapter 16. In chapter 17, the author outlines her vision of India in 2025. Chapter 18 identifies 'climate heroes' who have protected the environment, while the last chapter provides a check list of what we can do.

This book is very different from the others on climate change, since the major

focus is not on the devastation that can be caused by climate change but on what we can do to tackle it. The focus of the book is on the environmental crisis facing India and hence the subtitle 'climate crisis' is misleading. Many of the environmental issues like air and water pollution and waste disposal are local in nature and demand local solutions. They are not caused by the global increase in carbon dioxide. The global warming problem demands a solution at a global level, while most of the environmental problems we face in India are related to poor local governance. Those who read this book may not be able to discern the subtle difference between a climate crisis and an environmental crisis. The writing style of the author is fluid, and hence will be a good introduction to environmental problems in India and their link to climate change.

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