Preface

The sustainable building design lays a new emphasis on passive design strategies. Over the last decade, much progress has been made in our understanding of the climate and thermal behaviour of buildings with the more sophisticated analytical techniques available and relying on the assistance offered by computers, many factors can be quantified which were previously handled in qualitative terms only. However, as research is becoming more and more sophisticated, its results are becoming more and more remote from the everyday practice of architecture as these enhancements are not available in any book for ready reference.

The aim of this publication is to bridge the gap with the objectives:

- to define parameters of passive design: climate, comfort and sun
- to present state-of-the-art design strategies; and
- to illustrate design case studies for each of the five climatic zones of India
- to present climatic data and sun path diagrams in a readily usable format for application in passive design;

The manuscript is organized into five distinct chapters as follows:

- Chapter 1 Introduction
- Chapter 2 Climate, Comfort and Sun
- Chapter 3 Design Strategies
- Chapter 4 Design Case Studies
- Chapter 5 Climatic Data and Sun-Path Diagrams

Chapter 1 presents a brief literature review of sustainable development, climate responsive design and its significance in the present day practice. Chapter 2 presents classification of climate, elements of climate, parameters of thermal comfort and solar geometry. The heart of the book is Chap. 3 that discusses passive design strategies and application of climatic data at different design stages: briefing, pre-conceptual, conceptual, preliminary and detailed. The qualitative assessment of climate, the pre-conceptual analysis, the bioclimatic analysis (climate and comfort zone) and passive design concepts are presented for early design stages. The steady-state analysis of cooling and heating load of a given design using the

monthly average data of the hottest and coldest months and solar control design are discussed for design development and energy conservation. Chapter 4 presents design case studies for each of the climatic zones of India. Each exemplar study includes an overview of the design intentions, climate and site responses, thermal strategies, energy systems, lessons for the future generation of sustainable design thinking and practice, and a profile summarizing design strategies. These exemplar studies may be useful in inspiring a broader understanding of the potential of the climate responsive design to shape the future generation of sustainable architecture. The pioneering architects and projects featured in the exemplar studies reveal the promise of a new climate responsive architecture that responds deeply to the environmental challenges of our day, while recognizing that when our buildings delight our senses, architecture can help inspire us to dwell more lightly on our beautiful earth. Chapter 5 is a compilation of climatic data for 62 cities in India. Temperature, humidity, sunshine hours, solar radiation, wind and rainfall data are given both numerically and in graphic form; the latter for quick, visual appreciation and the former for more detailed climate analysis. Some single-figure indices are included, such as an indication of temperature variability; outdoor design conditions recommended as a basis for calculating the required heating or cooling capacity; and rainfall intensity, which would be the basis for drainage and rain harvesting system design. Wind roses show the direction and frequency of winds, while average speeds are given in numerical form. The latter must be the basis of structural design. Sun-path diagrams are provided for solar control design.

The book is a first of its kind and the state-of-the-art book to be used as a practical tool or manual for senior undergraduate and postgraduate students of architecture and related disciplines, as well as for researchers and practicing architects and other designers. This book will provide them an understanding of the physical phenomena to be dealt with and means for appropriate implementation and application of climate responsive design principles for sustainable future in India.

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