Mukunda Mishra
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Climate Change and Regional Socio-Economic Systems in the Global South

Resilience Strategies for Sustainable Development

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This book is dedicated to the late Prof. R. B. Singh, who was the legendary Professor of Geography at the Delhi School of Economics, the University of Delhi, and the Former Secretary General of the prestigious International Geographical Union (IGU). It is a token of our deep admiration for that great man who, in his multiple conversations on this book idea, guided us to build the central theme of discussion.

Foreword

It can be said that there is an agreement among scientists that climate change is due to global warming caused by human activities. We have observed that the negative impacts of climate change are accelerating in terms of coverage and magnitude in the third decade of the present millennium. The scholarly world has well identified the scientific mechanism possibly behind climate change, and most of the numerical and computer-based models have successfully validated the facts of climate change. However, the recording of micro-spatial observations for assessing the diverse threats of this global phenomenon to the local societies, economies, livelihoods, mobility, and culture is not yet fully utilized by the policymakers who are responsible for the mitigation of climate change impacts. It is effective to link the local observations to the global models in order to culminate scientific and socio-economic planning initiatives, build capacities within vulnerable groups and places, optimally utilize energy resources, and manage livelihoods and human resources. It is an ideal way to 'think globally, act locally.'

This volume is an effort to identify different corners of the Global South that are vulnerable to climate change through various channels—high-intensity rainfall, flooding, forest fires, forced migration, and so on. Contributors of different chapters bring forth appropriate data, vivid descriptions, and well-analysed discussions that suggest a real-time scenario of climate change adaptation and sustainable development in the Global South. Societal betterment is pursued by reducing the risk to economies and livelihoods through the implementation of adaptive strategies so that resilient communities are realized by mediating adverse climate phenomena. To quickly increase the resilience of vulnerable areas and groups by reducing climate change risk should be an early initiative to ensure local stability and peacefulness and ensure sustainable development at large. In this sense, the role of the proposed volume is crucial and novel.

The book, with its wide coverage, promises to be of great usefulness to serious students, teachers, and researchers who are interested in the 'social' dimension of climate change impacts, and searching for pathways for human society for a safe departure from this threat.

June 2023

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Yoshiro Higano has been awarded a Ph.D. in Environmental Science, and he is now an Emeritus Professor, University of Tsukuba, Japan. His research is chiefly focused on the Comprehensive Evaluation of Resources for Decision Science and Engineering. He, in his research and writings, focuses on the simulation model for control of environmental quality; evaluation of environmental remediation technologies; comprehensive watershed management; synthesized environmental policy. In general, his research interests include economic theory and policy, social systems engineering/safety systems, and regional science. He served as President of RSAI (2011–2012). Professor Higano also serves as the Editor-in-Chief of the prestigious journal, Asia-Pacific Journal of Regional Sciences (Springer), and the Springer Book Series, New Frontiers in Regional Science: Asian Perspectives. He has received more than 10 honours and awards concerning scientific performance in regional and environmental issues. He has published more than 50 articles concerning environmental policy analysis, economics, energy, water management, bio-fuels, technology systems and industry impacts, evaluation of sustainability, and regional development, as well as more than 25 books and contributions.

Preface

The editors of this book guess that they should be first answerable to the readers why, amidst ample discussions on climate change in current literature, another title on 'climate change' becomes necessary. This is distinctly perceivable in almost all corners of the human-inhabited world, how the rising climate change phenomena (CCP) have been culminating into multifaceted threats to humankind, and how more frequent extreme events are manifesting the social, economic, and human development worldwide. There is also spatial concern hidden in this whole scenario. The effects of CCP and related disasters have been adversely impacting more, unfortunately, the states in the Global South, which house the majority of the human population, and, moreover, most of those depend directly on land and natural resources for their lives and livelihoods, and, interestingly, the predecessors of whom didn't burn the fossil fuels in the industrial furnaces that caused the level of atmospheric CO_2 to rise to such an alarming level. It opens up the space for political dialogue between the states that had ensured their growth by combusting fossil fuels and the states that find themselves in a crisis when they need energy for their economy to take off. A transition towards green and renewable energy is a many-times costlier alternative, which is, however, the challenge for the economically impoverished states to fetch the growth opportunities. This volume is all about the social, economic, and political ground realities of the world in a changing climate.

The world spent more than a century to reach the current scientific consensus on climate change, which, in a precise form, states that the earth's climate has warmed significantly since the late 1800s due to human activities taking the primary role in adding a significant amount of greenhouse gases to the atmosphere, and, also, these continuing emissions of such gases will likely increase the likelihood of manifesting global consequences with varied forms at different scales—local to global. The 'science' behind climate change is well understood, and many numerical and computer-based models have successfully come up to predict the possible future scenarios of atmospheric temperature and sea level and their consequences. The international datasets are widely used for building physical models to predict the CCP and the anticipated threats on human habitat land and, consequently, the society and the economy on it, though mostly at the national or regional scale. While all these predictions indicate that the impact of CCP is enormous and diverse, this is the time to look into how are the unorganized marginal agricultural labourers, tribal communities, coastal fishermen, alpine grassland cattle-rearing communities, tea garden labourers, forest fringe dwellers, slum dwellers, migrating urban-industrial labourers, and also folk artists and rural handicraft artisans cope with the climate adversities.

The climate adversities, their causes and consequences, and the solutions have positioned themselves on different ranges of the scale of research and analysis. The cross-nationality of the climate change problem has appeared as a critical issue while resilience and adaptation are concerned. The consequences are shaped and reshaped by the local actors, making it a challenging task for the policymakers to address the resolution through a common global framework and, on the other hand, the criticalities in the cross-national political dialogue for the cooperation and partnership, making the adaptation far-reaching than expected. Like many other hazards human faces globally, the cost and capabilities do matter, which forms another background reality in the climate adaptation process. Climate change has been gradually linking itself with lives and livelihoods prominently since the last few decades; however, it puts them at higher risk who possess lesser capabilities to pay for climate adaptation. Macro to micro observations and analysis of the social and economic parameters of CCP are vital for finding adapting strategies. At the same time, institutional climate adaptation policies need to work in full swing for economically weaker countries. Global South, the home of a large portion of the world's extremely poor, has a higher likelihood of the risk reaching its vast population, emphasizing the need to implement a better response mechanism than what exists today.

Climate change and the associated extreme events, through multiple channels in distinct and many more lying hidden, raise alerts to sustainable human development. They threaten the timely achievement of the Sustainable Development Goals (SDGs). How the local and regional versions of the CCP actively challenge the economies and livelihoods, question social security and good governance, and ultimately become a constraint in achieving sustainable development forms a basic curiosity, the answer to which this volume finds to seek.

This volume is constituted of twenty-one chapters, which are divided into four sections. Part I, entitled 'Changing Climate and Uncertain Sustainability in the Global South,' addresses the relevance of the discussion of the book centralizing the Global South, while the later sections are area specific: Part II accommodates six chapters on Latin America, Part III consists of four chapters dealing with the issues in the African Continent, and Part IV envisages the South Asian scenario with seven chapters within it. The editors of the book have chosen some curated chapters for this volume which are the deep introspection for different regions in the Global South regarding the social and economic consequences of climate issues and finding out adaptation strategies, prevailing political dialogues, regional cooperation efforts, and forms of partnership to tackle the climate adversities, particularly safeguarding the poor and ensuring sustainability.

Itahar, West Bengal, India — Mukunda Mishra
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June 2023

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Expository reviews, thoughtful remarks, and valuable shreds of advice on the manuscripts of so many scholarly minds remain unparalleled in selecting manuscripts for the volume and substantially upholding the quality of the content within its folds. The editors are thankful to all the reviewers of the chapters.

The role of the contributing authors is precious in an edited volume. We convey our sincere thanks to all contributors for offering us the opportunity to include their valuable works in this volume. Their prompt response and active cooperation have made this volume successful on time.

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Abbreviations

ADB	Asian Development Bank
ALADI	Latin American Integration Association
APERC	Asia Pacific Energy Research Centre
AQI	Air Quality Index
ARDL	Autoregressive Distributive Lag Model
ARIO	Adaptive Regional Input-Output Model
BNDES	Banco Nacional de Desenvolvimento Econômico e Social
CCKP	Climate Change Knowledge Portal
CCP	Climate Change Phenomena
CDM	Clean Development Mechanism
CGE	Computable General Equilibrium (models)
CHC	Climate Hazards Center
CSE	Centre for Science and Environment
CVI	Climate Vulnerability Index
DEWS	Drought Early Warning System (India)
EAP	East Asia and Pacific
EBA	Ecosystem-Based Asset
ECOSS	Eco-tourism and Conservation Society of Sikkim (India)
ECS	Equilibrium Climate Sensitivity
EPI	Environmental Performance Index
ESI	Energy Security Index
EVI	Enhanced Vegetation Index
FAO	Food and Agriculture Organization
FCH	Fisherman and Crab Hunter
FGD	Focused Group Discussion
FTA	Foreign Tourist Arrival
FUND	Framework for Uncertainty, Negotiation and Distribution
FWI	Fire Weather Index
GADM	Database of Global Administrative Areas
GCCA	Global Climate Change Alliance
GDP	Gross Domestic Products

GLOF	Glacial Lake Outburst Floods
GNI	Gross National Income
GVA	Gross Value Added
IAM	Integrated Assessment Models
IASC	Inter-Agency Standing Committee
ICAR	Indian Council of Agricultural Research
IDMC	Internal Displacement Monitoring Centre
IEA	International Energy Agency
IFM	Integrated Fire Management
IIED	International Institute of Environment and Development
ILO	International Labour Organization
IMF	International Monetary Fund
IMR	Infant Mortality Rates
INC	Intergovernmental Negotiating Committee
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Intertropical Convergence Zone
KII	Key Informant Interviews
LAC	Latin America and the Caribbean
LE	Life Expectancy
LST	Land Surface Temperature
LVI	Livelihood Vulnerability Index
MATOPIBA	[States of] Maranhão, Tocantins, Piauí and Bahia
MCS	Mesoscale Convective Systems
MECCT	Ministry of Environment, Climate Change and Technology
MENA	Middle East North America
MERCOSUR	The Southern Common Market
MMRF	Monash Multi-Regional Forecasting (model)
MNRE	Ministry of New and Renewable Energy
NAFTA	North American Free Trade Agreement
NAP	National Adaptation Plans
NAPCC	National Action Plan on Climate Change (India)
NCCV	Natural Calamities and Climate Variability
NCRMP	National Cyclone Risk Mitigation Project (India)
NEP	National Environment Policy
NITI	National Institution for Transforming India
NTPC	National Thermal Power Corporation (India)
OECD	Organisation for Economic Co-operation and Development
PATA	Pacific Asia Travel Association
PCA	Principal Component Analysis
PMCCC	Prime Minister's Committee on Climate Change (India)
PPA	Power Purchase Agreement
PREC	Accumulated Precipitation
PROINFA	Programa de Incentivo às Fontes Alternativas de Energia Elétrica
RCP	Representative Concentration Pathways

SAARC	South Asian Association for Regional Cooperation
SACZ	South Atlantic Convergence Zone
SAMS	South American Monsoon System
SAP	Strategic Action Plan
SAPTA	SAARC Preferential Trading Arrangement
SASE	Snow and Avalanche Study Establishment (India)
SASEC	South Asia Subregional Economic Cooperation
SDG	Sustainable Development Goals
SDH	Social Determinants of Health
SFDRR	Sendai Framework for Disaster Risk Reduction
SIDS	Small Island Developing States
SLSEA	Sri Lanka Sustainable Energy Authority
SPI	Standard Precipitation Index
SREP	Scaling-up Renewable Energy Program (Maldives)
SSA	Sub-Saharan Africa
SSF	Small-Scale Fishers
UHI	Urban Heat Island
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
UNWTO	United Nations World Tourism Organization
USAID	United States Agency for International Development
USGS	United States Geological Survey
UTCI	Universal Thermal Climate Index
WCC	World Climate Conference
WCED	World Commission on Environment and Development
WMO	World Meteorological Organization
WRI	World Resource Institute
WTO	World Trade Organization

List of Figures