Advances in Geographical and Environmental Sciences

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R. B. Singh *Editors*

Sustainable Development Goals in Northeast India

Challenges and Achievements

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Foreword

I deem it a matter of real pleasure for me to write the foreword of a book on a theme looking as appealing as the distinguished academician Prof. Narendra Nath Bhattacharyya, in honour and felicitation to whom the book project is dedicated by a group of his enchanted scholars, colleagues and admirers. Professor Bhattacharyya is well known for his academic brilliance, notable scholarship and passionate commitment to the cause of teaching and research. As this book carries an extended narrative on different facets of his academic, professional, social and family life and achievements in a subsequent chapter, I would like to restrict myself here to mention few of the salient aspects of his persona that impressed me most and liven up our relationship over the years bringing feelings of mutual bonhomie. Being colleagues in the faculty of the Geography Department of Gauhati University during my tenure in the Department from 1971 to 1998, we had numerous occasions of intimate interaction and close association on diverse matters of academic and personal interests. A man of amiable nature, pleasant disposition and marked simplicity, Prof. Bhattacharyya was a devoted teacher and an assiduous researcher who had contributed immensely towards the growth and development of the subject in Gauhati University as well as its popularization in the NE region. Among the most noticeable traits observed in his words and deeds are his strong sense of integrity, modesty and diligence in all academic works related to teaching, research and publication. Offering my heartfelt felicitations to Prof. Bhattacharyya for his remarkable academic achievements and significant contributions to the cause of higher education, especially in the field of Human Geography and as my valued long-time friend and well-wisher, I wish him a long and healthy life with his near and dear ones in the family. Having discussed so far, the raison de'tre of the book project, I would like to briefly talk about some of salient features of the book and its potential and prospect for academic research and practical utilization.

The overarching central theme that binds the organizational framework of the book is the Sustainable Development Goals (SDGs) vis-a-vis their pattern of achievement on a wide range of topics in different states of the Northeast region. It is a pioneering corpus of study in the shape of a compendium extending over a panoramic landscape of diverse physical, socio-economic, cultural, ecological–environmental

setting marked by immense potentialities and ridden with disturbing levels poverty, insecurity and underdevelopment. The book is divided into three parts (Part I: Introduction, Part II: SDG and North-East India and Part III: Case studies). These three parts, in turn, carry between them a total of 30 chapters authored by 62 scholars. The opening chapter is the flagship of the study that sets the tone of the book through lucid and relevant presentations highlighting the areas related to methodological framework for the NE region District SDG Index, performance on SDG in different states of NE India, SDG goal-wise good performance of different districts and composite scores of SDG performance of top-10 and bottom-10 districts.

In the wake of the phenomenal break through made in the area of SDG methodology and their application potentials, the concept of sustainable development which has been a popular catchphrase in the last several decades, presently equipped itself with spectacularly more effective methodological tools and techniques making it, in its new *Avatar*, more focused, effective and operational with improved clarity, authenticity and applicability. The SDGs were adopted by the United Nation in 2015 as a universal call for action and a blueprint to achieve a better and more sustainable future for all, ending poverty, protecting the planet and ensuring that by 2030 all people would enjoy peace and prosperity.

While poring over the foreword of the book, I am reminded of a project way back in mid-1990s on Sustainable Development, covering Hamren subdivision of Karbi Anglong district and the Puthimari river basin of Kamrup district of Assam in which I was involved as a Project Scientist and Head (Honorary) of the Assam Remote Sensing Centre at Guwahati. It was a part of a national-level project called Integrated Mission for Sustainable Development (IMSD) that covered more than 170 districts in the country and sponsored by the Planning Commission through the Department of Space, Government of India, in collaboration with the State Remote Sensing Centres. With this memory in the back of the mind, when I browse over the draft contents of this book which is based on the completely new and distinctly more focused, meaningful and operational strategy based on the SDGs, I am delighted to find that the current strategy has been able to rid itself of most of the earlier shortcomings and challenges ushering in newer and brighter horizons for success and fulfilment. Especially, the 'Means of Implementation targets' (finance, trade, capacity building and/or science and technology and innovation, etc) and 'Outcome targets' lately introduced under Goal 17 to support member states of UN seem to be of great relevance for us in the NE region. Similarly, the innovation and effectiveness observed in the construction of Index and Dashboard to track the achievement and rank the states' performance in achieving goals looks quite enthralling.

It is expected that the book will open up new avenues in many more promising fields for further exploration and research. Over and above their intellectual and academic excellence in different domains of knowledge, the authors seem to have abiding interest and affinity for the region and understanding of its people and their habitat, culture, livelihood, economy and welfare which are reflected in the large

number of case studies included the book. To me the authors have been able to do full justice to the fascinating subject they have chosen to study. If the study could arouse academic, scientific and technological interests on the subject and the region, the authors should feel amply rewarded.

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Acknowledgements

Professor Ram Babu Singh (1955–2021) ***Source*** **The Editors**

The vision and the conceptual idea of this volume emerged from late Professor Ram Babu Singh, who is the fourth editor of this volume under the series *Advances in Geographical and Environmental Sciences*. Professor Ram Babu Singh was the first Indian Geographer to have accomplished the dual distinction of becoming International Geographical Union (IGU) Secretary General & Treasurer and ICSU Scientific Committee Member. Professor Singh was also the first Indian and second Asian Secretary General and Treasurer of the IGU from 2018 to 2022. Unfortunately, Prof. Ram Babu Singh left for heavenly abode before the execution of this dream project on 22 July 2021. This book volume is his brain child on North-East India, while

offering our humble obeisance, we dedicate this project to his memory. We wish you were here to see this volume being published!

Chapter 2 of this project is in honour of the academic contribution of Prof. Narendra Nath Bhattacharyya. We thank Mr. Pranjal Bhattacharyya, Mr. Prantar Bhattacharyya and Mrs. Pallavi Chakravarty for providing us with the personal and academic information about Prof. Narendra Nath Bhattacharyya.

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Finally, we thank our families and close-knit relatives for their continued support and, of course, our parents for their unconditional blessings.

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Madhushree Das
Rituparna Bhattacharyya
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About This Book

The responsible series editor of this book is Dr. Ram Babu Singh.

Contents

Chapter 1
Sustainable Development Goals in Northeast India—Challenges and Achievements

Rituparna Bhattacharyya, Subhash Anand, and Madhushree Das

Abstract This project is a festschrift honoring the academic contributions of Professor Narendra Nath Bhattacharyya to North East India. This chapter overviews the region's accomplishments and challenges of the Sustainable Development Goals. Alongside, this chapter attempts to pull all the chapters included in this book by dividing it into three parts—Part I: Introduction; Part II: SDG and North East India and Part III: Case studies.

Keywords Sustainable development goals · SDG index · Challenges · Achievements · North East India

1.1 Introduction

This book project is a festschrift to celebrate the academic contributions of Professor Narendra Nath Bhattacharyya. Professor Bhattacharyya took to the challenges of very scant educational resources of the time of developing and sustaining geographical scholarship (both human and physical geography) of North East India. It is needless to mention that North East India is one of India's resource-limited and under-developed regions.

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Comprising of eight states—Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim,[1] (Fig. 1.1), the border states share approximately 99% of its boundaries with five neighbouring countries—Nepal in the west (97 km or 60 miles), Bhutan in the north-west (455 km or 283 miles), Bangladesh in the south-west (1596 km or 992 miles), Myanmar in the east (1640 km or 1020 miles) and Tibet Autonomous Region, of China in the north (1395 km or 867 miles) constituting about 8% of the geographical area of India, which is 262,230 km^2 or 101,250 mi^2. The seven states of the region (excluding Sikkim), known as the land of seven sisters, is connected to mainstream India by a narrow corridor, which is 33 km (20.5052 miles) on the eastern side and the 21 km (13.0488 miles) on the western side which are often subjected to segregation because of heavy rainfall and floods (Bhattacharyya 2005). Arguably, the region's strategic terrestrial location linked to its national security can be referred to as "sensitive space" (Cons 2016).[2] Because of this strategic sensitivity, which is home to 46 million (357 constitutional communities—32 scheduled castes and 182 scheduled tribes) (Census of India 2011), the region has remained more or less isolated from the mainstream since independence leading to alienation of the population, under-development coupled with socio-political unrest—insurgency and ethnic conflicts (Bhattacharyya 2005; Bhattacharyya 2018, 2019a, b; Goswami 2015).

However, despite being under-developed, the region's people are more or less straightforward, welcoming and highly hospitable; therefore, the region can be labelled as the land of Namaste (N = Nagaland, A = Arunachal Pradesh, M = Manipur, Meghalaya and Mizoram, A = Assam, S = Sikkim, T = Tripura and E = East). The first of its kind, this interdisciplinary project aims to foreground the region's challenges and achievements of Sustainable Development Goals (SDGs), which hitherto can be claimed as highly under-researched.

1.2 Sustainable Development

According to the 1987 Report of the World Commission on Environment and Development: Our Common Future, known popularly as the Brundtland Report, after Gro Harlem Brundtland, the Commission's chairwoman, "[s]ustainable development is

[1] There remains a confusion as to when Sikkim became a part of North East India. In Goswami's (2015) edited book, *Troubled Diversity: The Political Process in North East India*, it mentions that Sikkim was added to North East India in 1992, while in other literature, it is mentioned that Sikkim became a part of North East India in 2002 (Bhattacharyya, 2018; 2019a, b) following an amendment to the North Eastern Council Act, 1971 (Evaluation of NEC Funded Projects in Sikkim, 2010).

[2] Of course, Cons (2016) applied it in the case of the enclaves along the Indo-Bangladesh border following the partition in 1947—there were 111 Indian enclaves in Bangladesh covering 17,160.63 acres and 51 Bangladesh enclaves in India covering 7,110.02 acres (for details, please read, Ferdoush 2019; also Das et al. 2022). On 31 July 2015, the historic Land Boundary Agreement was ratified and signed between the two countries through which the exchanges of enclaves between the two countries were facilated offering the residents to choose nationality according to their choice(for details, please read: India & Bangladesh: Land Boundary Agreement).

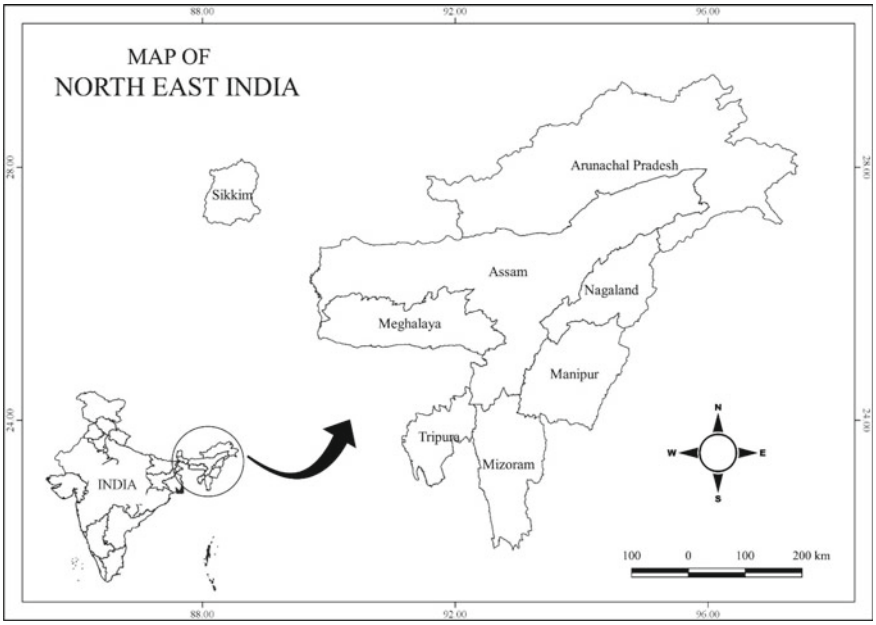

Fig. 1.1 Location map of North East India. *Source* Prepare by Authors

[the] development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Report 1987). This report which was published more than three decades ago is one of the most proficient reports that put to the fore the incongruities of the ramifications of economic development and economic growth on climate change and the environment, and at the same time, the necessity for such development and growth remains paramount to tackle current and future poverty as well as other indicators of SDGs. As the (Brundtland Report, 1987) put:

Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits—not absolute limits but limitations imposed by the present state of technology and social organisation on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organisation can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.

It is common knowledge to state that sustainable development became an established notion in the two weeks summit—3–14 June 1992, at the United Nations

Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil. Commonly known as the Earth Summit, it produced a 600-page *Agenda 21* charting encyclopedic action plans among the stakeholders—global, national and local organisations of the United Nations System, Governments and other significant groups, which was consequently adopted by more than 178 countries. Simultaneously, the Earth Summit also launched an international environmental treaty, the United Nations Framework Convention on Climate Change, wherein Article 2 (p. 9) of the treaty aims to tackle "dangerous anthropogenic interference with the climate system" to reduce concentrations of greenhouse gas in the atmosphere (United Nations Framework Convention on Climate Change 1992). One hundred fifty-four states signed this treaty and ratified it by 50 states; it became effective on 21 March 1994.

In parallel, the Earth Summit also floated the idea and started drafting on 9 May 1992 for a multilateral environmental treaty—Convention on Biological Diversity (or Biodiversity Convention), thereby opening for signatures, which was ratified by 30 states and became effective on 29 December 1993. This convention further went for two supplementary agreements—The Cartagena Protocol on Biosafety to the Convention on Biological Diversity adopted on 29 January 2000 and came into force on 11 September 2003 and The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity adopted on 29 October 2010, which became effective on 12 October 2014.

In the wake of the Millennium Summit of the United Nations in 2000, followed by the adoption of the United Nations Millennium Declaration, all 191 United Nations member states and about 22 international organisations pledged to accomplish the eight Millennium Development Goals (MDGs) by 2015, which was obviously highly ambitious appearing hollow. However, at the end of the 2015 MDG era, the United Nations General Assembly on 25 September 2015 adopted a resolution to transform the world via the adoption of 17 interconnected global goals of sustainable development by 2030 (Transforming our world: the 2030 Agenda for Sustainable Development 2015), which looked highly ambitious even at the pre-pandemic level. For example, baseline projections showed that 6% population of the world would be living on the brink of extreme poverty by 2030.[3] The ongoing COVID-19 pandemic has worsened the situation in a generation, suggesting that it has pushed an additional 119–124 million people to the edge of extreme poverty.[4] Obviously, North East India is no exception. In the following section, we discuss SDGs and North East India.

[3] Goal 1: End poverty in all its forms everywhere. *UN Sustainable Development Goals*. https://www.un.org/sustainabledevelopment/poverty/.

[4] Goals 1: End poverty in all its forms everywhere. United Nations: Department of Economic and Social Affairs Sustainable Development. https://sdgs.un.org/goals/goal1.

1.3 SDGs and North East India

Like other countries of the world, in India, the NITI Aayog, in collaboration with the Union Ministries and States/Union Territories, launched the SDG Vertical, the nodal agency meant for coordinating and monitoring the SDGs of the respective states and union territories. Following this, for the first time, the NITI Aayog developed the NER District SDG Index (Fig. 1.2) to track the progress and failure of the SDGs at the district level of the eight states of the region deploying 84 indicators enveloping 15 of the global goals transversing 50 targets. The central objectives of the NER District SDG Index were fivefold: to strengthen the level of monitoring for all the districts of the eight states of the region; establishment of NER District SDG Index, which would serve as a comprehensive monitoring tool to examine the performance of each SDG at the micro-level, that is the district level; to help the districts and the states identify critical gaps in the SDG sectors; to build and stimulate healthy competition among the stakeholders of the districts and states; and to promote and smoothen mutual learning via good practices and challenges. This NER District SDG Index was developed after the North Eastern Region SDG Conclave 2020 organised by NITI Aayog in Guwahati in February 2020. NITI Aayog drafted the North Eastern Region District Indicator Framework (NEDIF) and shared the same with all the eight states for inputs and feedback. This NEDIF draft also included inputs from the District Infrastructure Index prepared by the Ministry of DoNER in 2009. Taking all the pieces of feedback into account, the NER SDG Index computed SDG-wise scores for each district on 15 SDGs (SDG 14—life below water and SDG 17—partnerships for the goals were omitted as they bear the least relevance to the region). Following this, the NER SDG Index generated composite district scores taking the goal-wise scores to calculate the aggregate performance of the district on the basis of its performance across the 15 SDGs. The scale of the scores ranges from 0 to 100. A 100 score signals that the district has accomplished the set targets for 2030, while a score of 0 indicates that the district has failed to achieve the target, thereby occupies the bottom of the index. Based on the NER District SDG Index score, the districts have been classified under categories—Aspirant (0–49), Performer (50–64), Front Runner (65–99), Achiever (100).

Table 1.1 presents the breakdown of the SDG performance of the eight states of North East India, 2018–2021, indicating that Sikkim's overall SDG performance is better than the all-India average followed by Mizoram and Tripura.

A pedantic analysis of the NER District SDG Index unveils that the East Sikkim district of Sikkim occupied the first position in the region while the districts Gomati and North Tripura, both located in Tripura, occupied the second position. SDG goal-wise good performing districts of NER are illustrated in Table 1.2, while in Table 1.3, the names of the Top-10 and Bottom-10 districts of the region based on their composite scores of SDG performance are shown. Interestingly, the top-10 districts are located in Sikkim, Tripura and Mizoram, whereas in the bottom 10, six districts are located in Nagaland, followed by Arunachal Pradesh and Meghalaya (Table 1.3). Arguably, the poor levels of SDG performance in the districts of Nagaland (Longleng,

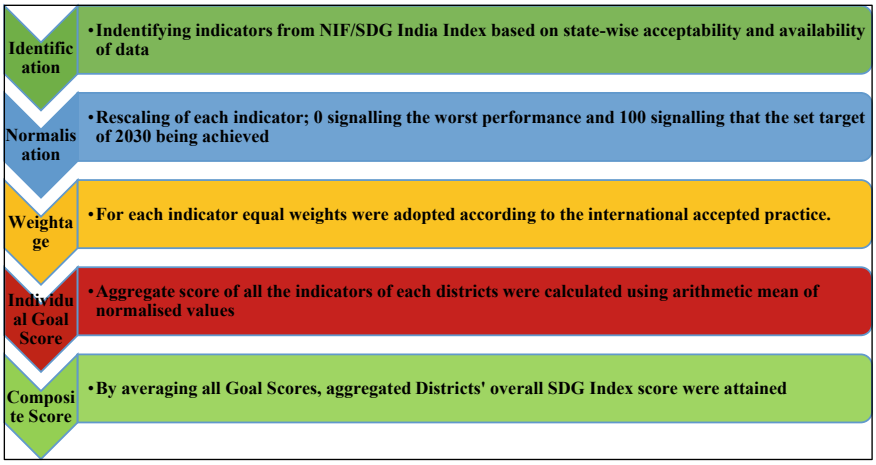

Fig. 1.2 Methodology of the North Eastern Region District SDG Index. *Source* Created from NER District SDG Index and Dashboard 2021–22: An Introduction to the Baseline Report

Phek, Mon, Tuensang, Zunheboto and Kiphire), Arunachal Pradesh (Shi Yomi, East Kameng, Kamle and Kra Daadi) and Meghalaya (North Garo Hills) *inter alia* can perhaps be attributed to remote location coupled with hilly terrain and inaccessibility. But the question is that even Sikkim's geographical location is hilly, and the landscape is highly susceptible to weathering and erosion. Moreover, even Tripura and Mizoram share a substantial amount of hilly/mountainous terrain. However, Sikkim is more or less a conflict-free state. Even in Tripura, Armed Forces Special (Powers) Act was revoked in 2015 following gradual normalisation of law and order situation and reduced incidents linked to militancy (Bhattacharyya 2018; Lal 2015). Except for sporadic violence since October 2020 in connection to the border dispute between Assam and Mizoram,[5] the state of Mizoram has remained in peace post the signing of the Mizo Peace Accord on 30 June 1986 (Sharma 2016).[6]

The socio-political unrest (insurgency and ethnic conflicts) plays a significant role in poor SDG performance. Therefore, the leaders of the Naga National movement and other similar stakeholders of the entire region (including the political leaders) should realise as to what have they contributed towards the performance of SDG in the name of leading various forms of political movements (Bhattacharyya 2018; 2019a; Bhattacharyya and Pulla 2020a, b; Goswami 2015; Sarma and Bhattacharyya 2021).

[5] The Hindu Net Desk (2021, 28 July). Watch | What is Assam-Mizoram border conflict?. The Hindu. https://www.thehindu.com/news/national/other-states/watch-what-is-assam-mizoram-border-conflict/article35576378.ece.

[6] Memorandum of Settlement (Mizoram Accord). New Delhi, 30 June 1986.https://peacemaker.un.org/sites/peacemaker.un.org/files/IN_860630_Mizoram%20Accord.pdf.

Table 1.1 Performance of the North Eastern states on SDGs (2018, 2019–20 and 2020–21)

States	SDG 1	SDG 2	SDG 3	SDG 4	SDG 5	SDG 6	SDG 7	SDG 8	SDG 9	SDG 10	SDG 11	SDG 12	SDG 13	SDG 15	SDG 16	Composite SDG
Arunachal Pradesh	**52**	**58**	**38**	**44**	**32**	**64**	**44**	**72**	**16**	**47**	**44**	**n/a**	**n/a**	**73**	**77**	**51**
	34	*66*	*50*	*58*	*33*	*88*	*74*	*52*	*31*	*38*	*43*	*67*	*31*	*71*	*62*	*53*
	54	***66***	***64***	***41***	***37***	***67***	***85***	***50***	***31***	***69***	***39***	***77***	***58***	***93***	***64***	***60***
Assam	**53**	**53**	**30**	**54**	**36**	**42**	**18**	**61**	**35**	**75**	**32**	**n/a**	**n/a**	**100**	**53**	**49**
	48	*39*	*44*	*44*	*33*	*78*	*70*	*62*	*46*	*67*	*40*	*68*	*47*	*90*	*52*	*55*
	51	***41***	***59***	***43***	***25***	***64***	***98***	***50***	***39***	***65***	***55***	***66***	***53***	***78***	***62***	***57***
Manipur	**44**	**74**	**67**	**65**	**25**	**44**	**39**	**33**	**72**	**98**	**31**	**n/a**	**n/a**	**100**	**70**	**59**
	42	*69*	*62*	*70*	*34*	*87*	*72*	*27*	*43*	*81*	*28*	*85*	*37*	*100*	*70*	*60*
	60	***64***	***68***	***63***	***41***	***87***	***96***	***36***	***35***	***70***	***65***	***89***	***57***	***60***	***69***	***64***
Meghalaya	**68**	**43**	**52**	**38**	**36**	**40**	**11**	**62**	**42**	**100**	**39**	**n/a**	**n/a**	**94**	**53**	**52**
	68	*35*	*53*	*55*	*34*	*70*	*52*	*65*	*22*	*76*	*22*	*60*	*36*	*99*	*59*	*54*
	77	***37***	***70***	***48***	***51***	***75***	***50***	***63***	***25***	***88***	***51***	***73***	***62***	***64***	***72***	***60***
Mizoram	**71**	**69**	**53**	**54**	**43**	**67**	**78**	**65**	**0**	**100**	**32**	**n/a**	**n/a**	**69**	**71**	**59**
	67	*75*	*52*	*61*	*37*	*81*	*81*	*42*	*8*	*66*	*33*	*50*	*45*	*75*	*63*	*56*
	80	***72***	***79***	***60***	***54***	***85***	***100***	***51***	***32***	***64***	***61***	***87***	***66***	***48***	***81***	***68***
Nagaland	**59**	**69**	**34**	**45**	**42**	**58**	**45**	**40**	**0**	**80**	**32**	**n/a**	**n/a**	**75**	**87**	**51**
	56	*70*	*29*	*47*	*42*	*75*	*70*	*28*	*23*	*61*	*23*	*100*	*51*	*94*	*84*	*57*
	73	***64***	***61***	***39***	***48***	***87***	***69***	***48***	***30***	***46***	***48***	***91***	***69***	***63***	***79***	***61***
Sikkim	**64**	**67**	**52**	**47**	**50**	**78**	**47**	**57**	**1**	**67**	**56**	**n/a**	**n/a**	**98**	**66**	**58**
	65	*66*	*59*	*58*	*49*	*79*	*97*	*68*	*27*	*64*	*74*	*60*	*38*	*100*	*69*	*65*
	80	***69***	***62***	***58***	***58***	***89***	***100***	***71***	***52***	***61***	***85***	***76***	***65***	***73***	***72***	***71***

(continued)

Table 1.1 (continued)

States	SDG 1	SDG 2	SDG 3	SDG 4	SDG 5	SDG 6	SDG 7	SDG 8	SDG 9	SDG 10	SDG 11	SDG 12	SDG 13	SDG 15	SDG 16	Composite SDG
Tripura	**71**	**58**	**53**	**56**	**38**	**38**	**32**	**52**	**38**	**89**	**38**	**n/a**	**n/a**	**86**	**71**	**55**
	70	*49*	*61*	*55*	*32*	*69*	*56*	*63*	*48*	*45*	*31*	*92*	*37*	*88*	*73*	*58*
	82	***52***	***67***	***42***	***39***	***82***	***83***	***57***	***35***	***85***	***67***	***99***	***41***	***69***	***80***	***65***
India	**54**	**48**	**52**	**58**	**36**	**63**	**51**	**65**	**44**	**71**	**39**	**n/a**	**n/a**	**90**	**71**	**57**
	50	*35*	*61*	*58*	*42*	*88*	*70*	*64*	*65*	*64*	*53*	*55*	*60*	*66*	*72*	*60*
	60	***47***	***74***	***57***	***48***	***83***	***92***	***61***	***55***	***67***	***79***	***74***	***54***	***66***	***74***	***66***
Target	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Sources SDG India Index-Baseline Report 2018/2019–20/2020–21

Note Aspirant: 0–49, Performer: 50–64, Front Runner: 65–99, Achiever: 100 SDGs 14 and 17 not included, n/a: not available (denoted by: Bold), (denoted by: Italic), (denoted by: Bold Italic)

Table 1.2 SDG goal-wise good performers of the districts of North Eastern Region are

Goals	Districts (States)
Goal 1: no poverty	East Sikkim (Sikkim), Serchhip (Mizoram), South Sikkim (Sikkim), Kamrup Metropolitan (Assam), Champhai (Mizoram)
Goal 2: zero Hunger	Phek (Nagaland), Bishnupur (Manipur), Peren (Nagaland), Champhai (Mizoram), Imphal West (Manipur), Kohima (Nagaland)
Goal 3: good health and well being	Champhal (Mizoram), East Sikkim (Sikkim), North Sikkim (Sikkim), Upper Siang (Arunachal Pradesh), East Siang (Arunachal Pradesh), Saiha (Mizoram)
Goal 4: quality education	Aizawl (Mizoram), Kolasib (Mizoram),East Sikkim (Sikkim), Champhai (Mizoram), Serchhip (Mizoram) and West Sikkim (Sikkim)
Goal 5: gender equality	Anjaw (Arunachal Pradesh), Pakke Kessang (Arunachal Pradesh), Shi Yomi (Arunachal Pradesh), Tirap (Arunachal Pradesh), East Kameng (Arunachal Pradesh), Longding (Arunachal Pradesh), Siang (Arunachal Pradesh)
Goal 6: clean water and sanitation	Kolasib (Mizoram), Lower Dibang Valley (Arunachal Pradesh), Kohima (Nagaland), Mamit (Mizoram), North Sikkim (Sikkim)
Goal 7: affordable and clean energy	Aizawl (Mizoram), Imphal West (Manipur), East Sikkim (Sikkim), Kolasib (Mizoram), Kamrup Metropolitan (Assam)
Goal 8: decent work and economic growth	Papum Pare (Arunachal Pradesh), West Siang (Arunachal Pradesh), East Sikkim (Sikkim), West Kameng (Arunachal Pradesh), West Tripura (Tripura)
Goal 9: industry, innovation and infrastructure	Kamrup Metropolitan (Assam), Morigaon (Assam), Hailakandi (Assam), Jorhat (Assam), Nagaon (Assam), Nalbari (Assam), Sepahijala (Tripura)
Goal 10: reduced inequalities	South West Khasi Hills (Meghalaya), Bishnupur (Manipur), East Garo Hills (Meghalaya), South West Garo Hills (Meghalaya) and West Khasi Hills (Meghalaya)
Goal 11: sustainable cities and communities	North Tripura (Tripura), Dhalal (Tripura), Sepahijala (Tripura)
Goal 12: responsible consumption and	Udalguri (Assam), Karbi Anglong (Assam), Unakoti (Tripura), Gomati (Tripura), South Tripura (Tripura)

(continued)

Table 1.2 (continued)

Goals	Districts (States)
Goal 13: climate action	West Jaintia Hills (Meghalaya), South Garo Hills (Meghalaya), East Garo Hills (Meghalaya), West Garo Hills (Meghalaya), Darrang (Assam), Sivasagar (Assam), Mokokchung (Nagaland)
Goal 14: life below water	Not Applicable to North East region
Goal 15: life on land	12 districts from Arunachal Pradesh, Assam and Sikkim share the first rank
Goal 16: peace, justice and strong institutions	Leparada (Arunachal Pradesh), Serchhip (Mizoram), Mamit (Mizoram), Champhai (Mizoram), Churachandpur (Manipur) and Aizawl (Mizoram)

Sources NITI Aayog Releases North Eastern Region District SDGIndex and Dashboard 2021–22, Ministry of Development of North-East Region. https://pib.gov.in/PressReleasePage.aspx?PRID=1749292; NER District SDG Index and Dashboard 2021–22: An Introduction to the Baseline Report. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/aug/doc202182601.pdf; North Eastern Region: District SDG Index. India's First Regional District-Level SDG Index. NITI Aayog, Ministry of Development of North Eastern Region and UNDP. https://sdgindiaindex.niti.gov.in/NER/dashboard/#/

1.4 Chapters on SDGs

Notwithstanding, both environment and development are facets of the same coin and, therefore, inseparable. Indeed, sustainable development is a process of continuous transformation via which resources need to be exploited, and investments need to be directed, alongside the induction of technological development and institutional change, which ought to be congruent with future and present requirements (Brundtland Report 1987). Considering these backdrops, we present 29 chapters on SDGs contributed by social science, humanities and pure science scholars in this book project.

We have arranged the chapters according to the sequence of the SDGs, but some chapters of this multidisciplinary book project overlap the SDGs; therefore, they have been divided into three parts: **Part I-Introduction**, **Part II-SDG and North East India** and **Part III-Case studies**, which are outlined below:

1.4.1 Part I: Introduction

In Chap. 2, as stated above, Bimal Kumar Kar writes this historical article titled Professor Narendra Nath Bhattacharyya: Professional Career and Contributions to memorialise the geographical and other academic contributions of Professor Bhattacharyya in North East India. Professor Bhattacharyya's writings and publications

Table 1.3 Composite scores of SDG performance of Top-10 and Bottom-10 districts of the North East India

Top 10 districts	Composite score	Districts/States
	75.87	East Sikkim (Sikkim)
	75.73	Gomati, North Tripura (Tripura)
	75.67	West Tripura (Tripura)
	74.87	Serchhip (Mizoram)
	74.80	South Sikkim (Sikkim)
	73.47	Unakoti (Tripura)
	72.87	Lunglei (Mizoram)
	72.60	Dhalai (Tripura), Sepahijala (Tripura)
	72.40	South Tripura (Tripura)
	72.27	Kolasib (Mizoram)
Bottom-10 districts	59.07	Longleng (Nagaland)
	58.60	Shi Yomi (Arunachal Pradesh)
	58.27	East Kameng (Arunachal Pradesh), Phek (Nagaland)
	57.40	Kamle (Arunachal Pradesh)
	56.87	North Garo Hills (Meghalaya)
	55.93	Mon (Nagaland)
	55.87	Tuensang (Nagaland)
	55.60	Kra Daadi (Arunachal Pradesh)
	54.53	Zunheboto (Nagaland)
	53.00	Kiphire (Nagaland)

Source NER District SDG Index and Dashboard 2021–22: An Introduction to the Baseline Report. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/aug/doc202182601.pdf

span from the regional geography of North East India through to Population and Biogeography. Through his teachings, research, publications and mentoring, he shaped the lives of hundreds of students, researchers and colleagues.

Syeda Fahima Shahnaz Sultana, Payel Saha, Chandan Bhuyan, Madhushree Das, Rituparna Bhattacharyya and Subhash Anand in their chapter, Just Transition via (Re) Vision 2020: The Story Hitherto, placed in Chap. 3, revisit the vision document—North Eastern Region Vision 2020, an important document for all the region's eight states to accomplish inclusive growth and development so that the region can emerge as an architect—the lead arrowhead in the country's Act East Policy. The document, however, unveils the complexities and challenges of the region while drawing a roadmap for new development strategies. However, NER District SDG Index suggests that despite some SDG goals' positive and incredible performance in many districts of the region (Tables 1.2 and 1.3), much still needs to be done to achieve development in a true sense. Moreover, 2020 is already gone. So, applying the notion of Just Transition, the authors urge to revise the vision document to set an

achievable target of at least 2070 (the same year when India pledges to attain carbon neutrality at COP 26 in Glasgow, 31 October to 12 November)[7] to accomplish the SDG targets via acceleration and inclusive growth and governance.

1.4.2 Part II: SDG and North East India

In their Chap. 4, An Analysis of the Performance of Sustainable Development Goals (SDGS) in the North East Region of India: An Economics Perspective by Pawan Kumar and Paramjit employ an economic perspective to analyse the performance of the SDGs in the entire NER.

India ranks 101 on Global Hunger Index (GHI). In 2000, GHI for India stood at 38.8, which has reduced gradually to 37.4 in 2006 through to 28.8 in 2012 to 27.5 in 2021 (Global Hunger Index 2021). SDG Goal 2 aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture by 2030. Article 47 of the Constitution of India enshrines that the State must raise the level of nutrition and the standard of living to improve public health. Food and Agriculture Organization of the United Nations (1998, p. 43) publication titled *The Right to Food: In theory and practice*, state that:

The State shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties, and, in particular, the State shall endeavour to bring about prohibition of the consumption except for medicinal purpose of intoxicating drinks and of drugs which are injurious to health.

Intending to provide food at subsidised rates to its citizens in need, India has passed The National Food Security Act in 2013 (Bezbaruah 2013).[8] The act aims to provide food via schemes like Midday Meal, Integrated Child Development Services scheme and the Public Distribution System. Reinforcing the importance of food security and agriculture, even the Journal Space and Culture India, a ten-year-old journal, has published a few case studies on India's food security (Nandi & Mistri 2019; Siddique & Mukherjee 2017; Sankar 2020).

In 2006, the Government of India had passed the Mahatma Gandhi Rural Employment Guarantee Act (MGREGA), a flagship programme, a form of food security scheme providing 100 days of guaranteed employment to its beneficiaries. Amid its failures, corruption and success, the MGREGA proved as a rural lifeline (Bhattacharyya and Vauquline 2013; Bhattacharyya 2016; Ramya 2018). In the wake of the migrant crisis that surfaced on the first phase of lockdown in March 2020, there is ample evidence to suggest that MGREGA served to salvage the lives of the labourers

[7] Special Correspondent (2021, 02 November). CoP26 summit | India will achieve net zero emissions by 2070, says PM Modi. *The Hindu.* https://www.thehindu.com/sci-tech/energy-and-environment/prime-minister-narendra-modi-addresses-cop26-un-climate-summit-in-glasgow/article37292550.ece.

[8] The National Food Security Act, 2013 (No. 20 of 2013). Ministry of Law and Justice. The Gazette of India. https://www.egazette.nic.in/WriteReadData/2013/E_29_2013_429.pdf.

who were hit hard during the pandemic (Bhattacharyya et al. 2020). In this project on SDGs, SDG 2 performance by the North Eastern states and the district-level performance have been presented in Tables 1.2 and 1.3. Taking diverse perspectives and its challenges on food (in)security, the authors—Raju Mandal Binoy Goswami Munmi Sarma and Hiranya Nath; Navneet Hazarika Joyeeta Deka, Praditya Kumar Das and Kandarpa Kumar Saikia; Dibyajyoti Dutta and Akhil Ranjan Dutta; and Vimla Singh and Nivedita Chaudhary, respectively, present their research in Chaps. 5, 6, 7 and 8:

Chapter 5: Extreme Weather Events and Food Insecurity in Northeast India
Chapter 6: Food Security in North East India: the Role of Agriculture, Challenges and the Road Ahead
Chapter 7: Juxtaposing Food Security and Sustainable Development Goals (SDGs) in Northeast India: Evidence and Explanations
Chapter 8: Land Degradation, Desertification and Food Security in North East India: Present and Future Scenarios

The common thread of analysis of these chapters is food security and livelihood. Chapter 9 by Priyanka Puri critically examines and analyses the geographical and temporal evolution of the Enhanced Vegetation Index (EVI) and Land Use for the seven North East India sister states excluding Sikkim. K. V. Chamar & Rekha Dhanak, in Chap. 10, using the district-wise Census of India (2011) data and applying z-score, examines the quality level of living space among rural households in the NER. In Chap. 11, Eeshankur Saikia & Parvej Reja Saleh argue for the deployment of artificial intelligence tools coupled with computer vision and machine learning (ML), demonstrating how such techniques would advance further the growth of agriculture and other allied activities.

Health remains a critical indicator of the everyday life of an individual. Without the sound health of its population, it remains a daunting task for a state to attain development (Bhattacharyya 2016a; Sarma and Bhattacharyya 2015). As already stated, Tables 1.1 and 1.2 demonstrate state-level and district-level performances of all the SDGs, including SDG3. Mridul Kumar Sarma in Chap. 12 Sustainable Development Goals (SDG 3) "health and wellbeing": What's ailing north eastern states? critically reviews the region's health challenges while in Chap. 13, Sahana Bhattacharjee, applying data-based assessment probes as to what extent the states of NER in comparison with India as a whole have been able to accomplish the set target of SDG3.

It is generally reckoned that in North East India women enjoy a higher status and mobility when compared to their counterparts of the rest of India (Bhattacharyya 2009; 2021; Behel 2002). While this is true to a great extent primarily because of the matrilineal influence of the societies of Khasis, Jaintias and Garos[9] and have remained a dowry-free and sati-free region. However, this does not mean that the region is free from gender-related discrimination (Bhattacharyya 2016b; Bora and Das 2019; Vauquline 2015). Applying the theories of socialisation, double-burden,

[9] It is also believed that the Chutiya kingdom of thirteenth century followed a system which was not solely patrilineal but had elements matrilineality as well.

sticky floor and schema, Lovleen Gupta, Shubham Singhania and Rohit Kumar Shrivastav investigate the status of gender equality in the states of NER in Chap. 14; Ashu Rani and K. V. Chamar in Chap. 15 have used village-level census data of 2001 and 2011 to examine dominant and deficient functions of rural female workers of NER (excluding Sikkim).

Using varied examples from NER about cyber-attacks and cyber-frauds stemming from increased digitisation, in Chap. 16, Subimal Bhattacharjee examines the evolving paradigm of cybersecurity in the region.

1.4.3 Part III: Case Studies

This section is devoted to presenting SDG case studies from different states of NER.

In Chap. 17, Payel Saha, Syeda Fahima Shahnaz Sultana, Ankabehari Saha and Madhushree Das critically analyse the impact of the performance of SDGs in the state of Assam; similarly, Barnali Gogoi and Swapnali Saikia, in their Chap. 18, critically identify the causes and measure the gaps to achieve the SDG 1 in Assam.

Applying an interdisciplinary approach alongside a questionnaire survey, Rituparna Bhattacharyya, Bowen Tan and Diganta Bhusan Das, in Chap. 19, examine the complex problem of drinking water during times of an emergency (floods, ethnic riots, etc.) in the state of Assam. In doing so, the authors discuss the factors of drinking water treatment practices in Assam. The study's findings intend to develop a decentralised water treatment system (DWTS) that could be useful during emergencies and everyday living. In a similar but slightly different context, connecting to SDG 5 and SDG10, Bikash Chetry in Chap. 20 presents the treacherous geographies of erosion and floods of Majuli, one of the largest riverine islands of the world. In doing so, Bikram Chetry meticulously illustrates how the lack of good governance and the Community-Based Disasters Risk Reduction (CBDRR) strategies or programmes of Majuli are non-inclusive and continue to create gendered inequalities. Similarly, in Chap. 22, Nazifa Ahmed presents a meticulous analysis of the perilous geographies of precarity and vulnerability of the ecosystem of *char* (shifting sandbars) dwellers or *charuas* in Assam during floods and how the dwellers are fighting the annual natural hazard of the state.

In Chap. 23, Chandrama Goswami and Manisha Bhattacharyya probe how "work" definition has transformed over time. Using a time use survey of 100 women in Guwahati, the authors explain why and how unpaid work has been subsumed in the Sustainable Development Goals (SDGs); how unpaid work invisibly control and impact the entry of women into livelihoods and labour markets vis-à-vis the performance of women on the same.

There are two chapters on two famous wildlife sanctuaries of Assam—Manas National Park (MNP) and Pabitora Wildlife Sanctuary. MNP, located in Chirang and Baksa District, Bodoland Territorial Region was recognised as a UNESCO World Heritage site in 1985. However, it was significantly affected by socio-political unrest of the Bodos resulting in the loss of its glory as a World Heritage site in 2003. In

Chap. 21, the authors, Pranjit Kumar Sarma, Rituparna Bhattacharyya, Sanatan Deka, Amal Sarma and Sanjay Prasad, demonstrate how the success stories of biodiversity and bioresource conservation through the participation of the people of the fringe villages of MNP helped in regaining not only its lost heritage status in 2011 but developed sustainable livelihood among the inhabitants of the surrounding region. Similarly, Pranjit Kumar Sarma, Bibhab Kumar Talukdar, Pradipta Baruah and Mukul Tamuli in Chap. 24 revisit Pabitora Wildlife Sanctuary to assess wildlife habitat dynamics. To evaluate the sanctuary's habitat dynamics (including habitat characterisation data), they used Dji Phantom drone. The study aimed at redeveloping a habitat classification scheme for sustainable development of the sanctuary focussing primarily on how the current developmental activities in and around the sanctuary are (in)directly impacting its unicorns. The collected data was analysed using Arc GIS 10.3 and ERDAS Imagine 9.3 software.

Unlike the mainstream, tourism in North East India is unique because it is naturally wedded to its paradisiacal beauty linked to the Himalayan landscape and culture. Therefore, the next two chapters, Chaps. 25 and 26, are devoted to the region's sustainable tourism. Shikha Yadav, Gautam Kakaty and Usha Rani, in Chap. 25, studied 200 samples through a questionnaire survey, taking 100 each from Kaziranga National Park and Majuli to assess the prospects of tourism in Assam. Then, in Chap. 26, Parijat Borgohain and Barnali Patowary develop the concept of ethnic tourism in the state of Arunachal Pradesh, which is home to 26 major tribes and over 110 sub-tribes, who bear intimate relationships with its surrounding natural environment embedded in cultural beliefs and traditional knowledge of conservation and management. To set the notion of sustainable ethnic tourism, the authors studied Apatani and Monpa tribal communities reckoned as essential tourist circles of the state circumambient—Tezpur-Bhalukpong-Bomdila-Tawang and Itanagar-Ziro–Daporizo-Along-Pasighat circuits.

The final four chapters of this volume are devoted to the state of Manipur.

Reviewing National Family Health Survey (NFHS-5) and connecting it to SDG3, Esther Ngaihte and Anushruti in Chap. 27 unfold the retrogression of the overall healthcare services of Manipur and urge for its redressal.

With the application of GIS and secondary statistics alongside the notion of sustainability, which is composed of three pillars—the economy, society and environment, Irom Luckychand Meitei and Gurumayum Jadumani Sharma in Chap. 28 examine the interconnection between food, population, arable land and economy in Manipur.

In the penultimate chapter, in Chap. 29, Lunghim Rongmei, Irom Luckychand Meitei and Ekta Raman apply Remote Sensing and GIS techniques to assess landslide hazard zonation in Tamenglong District of Manipur and thereby demonstrate how such natural hazard can be reduced in a mountainous landscape of Manipur.

Finally, in Chap. 30, applying secondary data, Himani Tiwari and Harshita Tiwari critically analyse the development-induced trade-offs of the Loktak Multipurpose Project located in the Loktak lake, which was built with an aim to increase the economy of Manipur. Hence, present book volume contributes critically for achieving the sustainable future of the North East region of India.