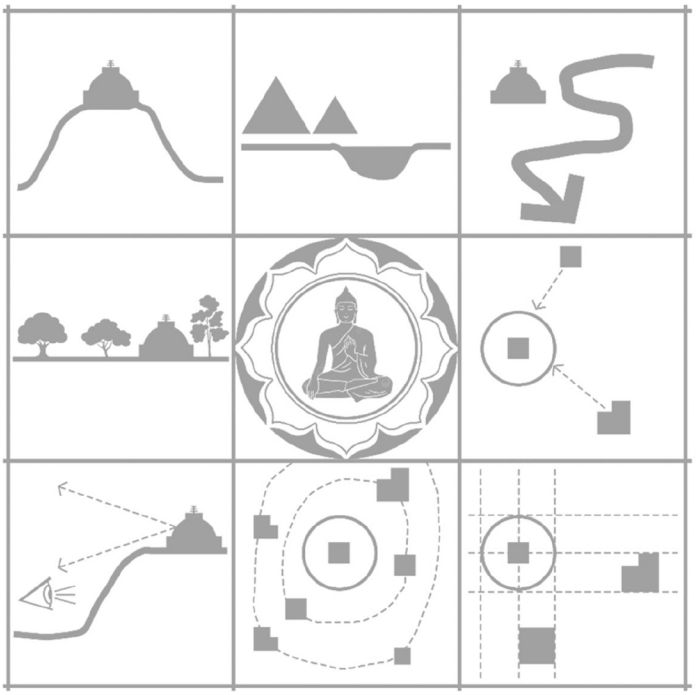
Inquiries into the Cultural Landscapes and Environmental Concepts of Buddhist monastic sites in India



Thesis submitted by

AMIT BHATTACHARYA

Doctor of Philosophy (Engineering)

Department of Architecture,

Faculty Council of Engineering & Technology

Jadavpur University

Kolkata, India

2023

SUCHANDRA BARDHAN
Professor
Department of Architecture
Jadavpur University
Kolkata-700032

17.11.2023

Amit Bhattacharya

17.11.2023

JADAVPUR UNIVERSITY

KOLKATA- 700 032, INDIA

INDEX NO. **48/16/E of 2016-17**

Title of the thesis:	Inquiries into the Cultural Landscapes and Environmental Concepts of Buddhist monastic sites in India
Name, Designation & Institution of the Supervisor/ s:	Dr. SUCHANDRA BARDHAN Professor Department of Architecture, Faculty of Engineering and Technology Jadavpur University
List of Publication:	
Journal publication	Bhattacharya, A. and Bardhan, S., Investigating the Landscape Layers of hilltop Buddhist monastic site at Sanchi, Madhya Pradesh, **Solovyov Studies ISPU (SCOPUS indexed journal), ISSN: 2076-9210, Volume 71, issue 10**, October 2023, pp. 1-30, DOI: 10.37896/ispu71.10/001
Journal publication	Bhattacharya, A. and Bardhan, S., Spatio-temporal Patterns of Buddhist Monastic Settlements in the Cultural Landscape of West Bengal, **Journal of Xi'an university of architecture & technology (SCOPUS indexed journal), Science Press, ISSN: 1006-7930, Volume XIV, issue XII**, December 2022, pp.94-104, https://app.box.com/s/rv66b9xvhqlxtkcylmh6wca6gzgsf1wl, https://doi.org/10.37896/JXAT14.12/316508
Book chapter of conference proceedings	Bhattacharya, A. and Bardhan, S., Historic landscape reinterpretation as a driver for cultural tourism, **4th Congress on Architecture and Cultural Heritage in Tourism, Karabuk University Safranbolu Faculty of Tourism, Çanakkale Onsekiz Mart University and Izmir Kavram Vocational School, Safranbolu, Turkey**, 12-14 October, 2023, Book of Abstract published, pp. 25, ISBN: 978-605-9554-87-9

Book chapter of conference proceedings	Bhattacharya, A. and Bardhan, S., Understanding site planning approach through interpretive study of ancient Indian Buddhist sites, **International Conference on future is Urban Livability, Resilience & Resource Conservation, Nirma University, Ahmedabad, Gujarat**. 16-18 December 2021. Routledge, Ch. 40, pp. 383-395, ISBN: 978-1-032-37892-3, DOI: 10.4324/9781003342441
List of Patents:	N.A.
List of Presentations in National/ International/ Conferences/ Workshops:	
National Conference(s):	Bhattacharya, A. and Bardhan, S., Understanding site planning approach through interpretive study of ancient Indian Buddhist sites, **International Conference on future is Urban Livability, Resilience & Resource Conservation, Nirma University, Ahmedabad, Gujarat**. 16-18 December 2021.
International Conference(s):	Bhattacharya, A. and Bardhan, S., Historic landscape reinterpretation as a driver for cultural tourism, **4th Congress on Architecture and Cultural Heritage in Tourism, Karabuk University Safranbolu Faculty of Tourism, Çanakkale Onsekiz Mart University and Izmir Kavram Vocational School, Safranbolu, Turkey,** 12-14, 2023.
International Doctoral colloquium(s):	Bhattacharya, A. and Bardhan, S., Cultural Landscapes and Environmental Concepts of India: a study of Buddhist sites; Interpretation for roots and identity; **Doctoral Colloquium, ECLAS Conference 2021 Stop and Think, Department of Urban and Rural development, Division of Landscape Architecture, Uppsala, Sweden, Swedish University of Agricultural Sciences**, 13-15 September 2021.

Statement of Originality

I AMIT BHATTACHARYA registered on 18.11.2016 do hereby declare that this thesis entitled "**Inquiries into Cultural Landscapes and Environmental Concepts of the Buddhist monastic sites in India**" contains literature survey and original research work done by the undersigned candidate as part of Doctoral studies.

All information in this thesis have been obtained and presented in accordance with existing academic rules and ethical conduct. I declare that, as required by these rules and conduct, I have fully cited and referred all materials and results that are not original to this work.

I also declare that I have checked this thesis as per the "Policy on Anti Plagiarism, Jadavpur University, 2019", and the level of similarity as checked by iThenticate software is 5 %.

Signature of Candidate:

Amit Bhattacharya

Date: 17. 11. 2023

Certified by Supervisor(s):

(Signature with date, seal)

Suchandra Bardhan

SUCHANDRA BARDHAN

Professor
Department of Architecture
Jadavpur University
Kolkata-700032

17.11.2023

Certificate from the supervisor/ s

This is to certify that the thesis entitled "**Inquiries into Cultural Landscapes and Environmental Concepts of the Buddhist monastic sites in India**" submitted by Shri **AMIT BHATTACHARYA**, who got his name registered on 18.11.2016 for the award of Ph. D. (Engineering.) degree of Jadavpur University is absolutely based upon his own work under the supervision of **Dr. SUCHANDRA BARDHAN** and that neither his thesis nor any part of the thesis has been submitted for any degree/ diploma or any other academic award anywhere before.

17.11.2023

_____

Signature of the Supervisor
and date with Office Seal

Dedicated to my teachers and *gurus*

Who guided me throughout the journey…

Acknowledgements

The current research is the outcome of work carried out on the field, archives and the drawing studio. The analysis of such material was carried out in 2016, 2021, 2022 and 2023 in places of Madhya Pradesh, West Bengal and Uttar Pradesh respectively. These places are dotted with the research interest, historical accounts, archaeological evidence and unique landscape features evolved due to geo-climatic diversities. It is Prof. Dr. Suchandra Bardhan, Faculty of Department of Architecture of Jadavpur University, who supervised and guided my study with her valuable insights. In her I found a great mentor who made me read historical, cultural and archaeological heritage with a renewed approach associated with landscape principles. This approach looked beyond the conventional art-historical perspective. I am most privileged to be associated with and guided by Prof. Suchandra Bardhan, who is an esteemed innovative researcher on landscape design. Her body of work on cultural and heritage landscapes was a great inspiration for me. Prof. Bardhan devoted much of her valuable time to discussing my study, reading and reviewing the text and drawings meticulously and providing critical constructive remarks to improve the quality of research work. It has been a pleasure to carry out research work under her expert guidance, and I respectfully record my deepest gratitude to this teacher, philosopher and guide.

I also take this opportunity to pay tribute to Dr. Priyaleen Singh, the former Head of the department of conservation in School of planning and architecture, New Delhi. I had the privilege of developing an appreciation in historical landscape conservation, for persuading me and providing valuable assistance during initial stages of study to carry out this doctoral research spread across various geographical locations in India. I am also indebted to Dr. Somreeta Majumdar, with whom I had the opportunity to discuss Bharatpur monastic site, and to be inspired by her exceptional knowledge of, and scholarly research on the site and providing me all the study materials to carry out the study.

I am also grateful to Mr. Pandey, Assistant Archaeologist, Archaeological Survey of India, Lucknow Circle, Uttar Pradesh for his valuable comments and relevant information on Jetavana monastic site at Sravasti and encouragement provided from his end.

Finally, I wish to extend my deep sense of gratitude to my mother, Ms. Sumita Bhattacharya, who is a graduate in ancient Indian history, and a plentiful source of inspiration, who undoubtedly appreciate my work. My friends and colleagues Mr. Ritam Mitra, Mr. Shobhan Mohanty and Mr. Pravat Singh who extended their assistance enriching the quality of representation as and when required despite having their own work throughout this study.

Amit Bhattacharya

Kolkata,

November 2023

Contents

1. Introduction 1
1.1. Context of the study 3
1.2. Background and Relevance 3
1.3. Buddhist monastic settlement practices in ancient India 5
1.4. India's historical built and cultural landscape of Buddhist Archaeological monastic sites: a schematic overview 8
1.4.1. Sites associated with Historic Buddha (5th c. BCE) 8
1.4.2. Post historic Buddha prominent sites (post 5th c. BCE after mahaparinirvana) 19
1.5. The key issue and principal objective 22
1.6. The secondary objectives 24
1.6.1. Locating Buddhist monastic sites in the cultural landscape regime 24
1.6.2. Conservation, Preservation and Management with the perspective of landscape-environmental interpretation 25
1.7. The approach of study, scope of work and limitations 25
1.8. The structure of the study 26
2. Literature review and Previous work 28
2.1. General Context: Global Cultural Landscape overview 29
2.2. Natural and Environmental Profile of India 29
2.3. Cultural landscapes in global and Indian context 38
2.3.1. Relevance of global charters and operational guidelines in current study 41
2.3.2. Learning values of Indian Cultural Landscapes 45
2.4. Archaeology of religion and Early Buddhism in India 45
2.5. Previous studies and interpretation on Buddhist monastic practices 47
2.6. Finding and establishing research gap 68
2.7. Points of departure: recent developments in the study of Buddhist monastic sites 69
2.7.1. Archaeological and art history point of view 70
2.7.2. Textual account point of view 71
2.7.3. Landscape and environment point of view 71
3. Research design, Hypothesis and Methodology 73
3.1. Conceptual framework 73
3.2. Hypothesis 74
3.3. Research questions and objectives 74
3.4. Analysis of Existing Methodologies 76
3.4.1. Methodology for site suitability interpretation by Ian Mcharg 77

3.4.2. Methodology of the Research of European Garden study by Delft 78
3.4.3. Methodology of the INTACH historical garden conservation 80
3.5. Architectonic forms of Buddhist monastic sites 80
3.5.1. Elementary form or landscape form 80
3.5.2. Spatial form or organisational form 81
3.5.3. Philosophical form 82
3.5.4. Environmental form 82
3.6. Methodological framework for the present study 82
4. Environmental analysis of forest site- Jetavana monastery, Sravasti, Uttar Pradesh 85
4.1. General outline of the site 85
4.2. Chronology of archaeological explorations and study 86
4.3. Characteristics of natural and wider archaeological landscape 89
4.3.1. A paleochannel 89
4.3.2. Natural topographic configurations 90
4.3.3. Hydrological regime and its elements 93
4.3.4. Vegetation and plant characteristics 96
4.3.5. Aspect and Exposure – visual layering and functional siting of built elements 99
4.4. Scientific tools and micro-methodology for analysis 102
4.5. Composite analysis 104
4.6. Functional relationship of spaces in spatio-environmental regime 106
5. Environmental analysis of hilltop site – Sanchi monastery, Raisen, Madhya Pradesh 107
5.1. General outline of the site 107
5.2. Chronology of archaeological explorations and study 107
5.3. Characteristics of natural and wider archaeological landscape 109
5.3.1. Concise view of the wider archaeological landscape of Sanchi 111
5.3.2. A cluster of waterbodies 112
5.3.3. A paleochannel 113
5.3.4. The monasteries and cluster of votive stupas 114
5.4. Characteristics of natural and wider landscape settings 114
5.4.1. Natural topographic configurations 114
5.4.2. Hydrological regime and its elements 117
5.4.3. Vegetation and plant characteristic 120
5.4.4. Aspect and Exposure – visual layering and functional siting of built elements 122
5.5. Scientific tools and micro-methodology for analysis 124
5.6. Composite analysis 126
5.7. Functional relationship of spaces in spatio-environmental regime 130

6. Environmental analysis of riverine floodplain site – Bharatpur monastery, Bardhaman, West Bengal 131
6.1. General outline of the site 131
6.2. Chronology of archaeological explorations and study 131
6.3. Characteristics of natural and wider archaeological landscape 132
6.3.1. Natural topographic configurations 134
6.3.2. Hydrological regime and its elements 136
6.3.3. Vegetation and plant characteristics 138
6.3.4. Visual structure – Aspect and Exposure – visual layering and functional siting of built elements 140
6.4. Scientific tools and micro-methodology for analysis 142
6.5. Composite analysis 143
6.5.1. Nucleated 145
6.5.2. Semi-compact 146
6.5.3. Isolated 146
6.5.4. Linear and dispersed 147
6.6. Functional relationship of spaces in spatio-environmental regime 149
7. Comprehensive understanding and Buddhist environmental ethics 150
7.1. Comparative analysis of the three study sites 150
7.1.1. Philosophical form 150
7.1.2. Spatial form 150
7.1.3. Environmental form 150
7.2. Environment and ecology in Buddhist philosophy 152
7.2.1. Place of Nature in early Buddhist monasticism and their impacts in spatial planning 152
7.2.2. Interpretation of five-fold eco-ethics in Buddhism 158
7.3. Plant association and ethnobotanic contribution 164
7.3.1. Forests directly associated with historic Buddha 164
7.3.2. Plants directly associated with historic Buddha 166
7.3.3. Plants used in Buddhist literatures and art works 174
7.3.4. Ethnobotanic activities in Buddhist monastic practices 184
8. Theorisation and Interpretation of Buddhist Landscape Principles 192
8.1. The essence of the Indian Buddhist monastic landscape tradition 192
8.2. Interpretive landscape characteristics of Buddhist monastic sites 192
8.2.1. The symbolic approach and its influence on site planning 192
8.2.2. Attitude to land and topography 194
8.2.3. Attitude to water resources 196

8.2.4. Attitude to plant resources 198
8.2.5. Sense of Anchor 200
8.2.6. Attitude toward visual composition 202
8.2.7. Spatial inter-relationship among elements 204
8.2.8. Statement of landscape integration: narrative of sacred dimensional order 206
9. Conjectural reconstruction of study sites 213
9.1. Analytical observations on spatial forms influenced by landscape setting 213
9.2. Landscape architectonic principles to re-construct the conjectural forms 213
9.2.1. Background studies of previous attempts/ interpretations 213
9.2.2. Lines of formal layout – axial arrangement 213
9.2.3. Siting and orientation of built structures 214
9.2.4. Geometry of the scheme 214
9.2.5. Symmetry and asymmetry 215
9.2.6. Activities and functional elements and their programming 215
9.2.7. Spatial depth and visual limits – impact on site composition 215
9.2.8. Attitude to symbolism and expression in spatio-environmental form 216
9.3. Interpretive re-conjectural reconstructions of three prototype study sites 217
9.3.1. Forest grove site – Jetavana, Uttar Pradesh 217
9.3.2. Hilltop site – Sanchi, Madhya Pradesh 220
9.3.3. Riverine flood plain – Bharatpur, West Bengal 224
10. Conclusion 226
10.1. Analytical observations on spatial forms landscape design characteristics of Buddhist monastic sites in India 226
10.1.1. The elementary form or landscape form 226
10.1.2. The spatial form or organisational form 227
10.1.3. The philosophical form 228
10.1.4. The environmental form 228
10.2. Assessment of research questions and objectives 230
10.2.1. Buddhist monastic landscape as architectonic conformation and common compositional characteristics 230
10.2.2. Influence of natural forces and ethnobotanic contribution of Buddhist monastic practices 232
10.2.3. Synthesis of ancient Indian cultural and environmental values in spatial planning of Buddhist monastic sites 235
10.2.4. Identification traits of Buddhist monastic landscapes from ancient India 235
10.2.5. Values embedded in Buddhist symbolic art and landscape design expressions 236
10.2.6. Learnings from Buddhist environmental systems for contemporary practices 237

10.3. Further scope of study 237

10.3.1. Typological taxonomic classification of Indian Buddhist monastic sites 237

10.3.2. Conservation, preservation and management perspectives with a deeper understanding of landscape environmental principles 238

10.3.3. Contemporary significance and evaluation of traditional landscape wisdom and knowledge system in global context 239

Bibliography and Reference 240

List of figures

Figure 1-1: Buddhist Archaeological and pilgrimage sites in India (Source: Author prepared from Maps published in Buddhsit Monuments by Mitra, Debala; 1971 and Buddhist Monks and Monasteries of India by Dutt, Sukumar; 1962)..... 2
Figure 1-2: Evolution of Lena from primitive Sangha (Source: Author) 6
Figure 1-3: Lumbini site and surrounding (Source: Archaeological survey of India) 9
Figure 1-4: Bodhgaya site and current scenario at surrounding (Source: The Mythic Landscape of Buddhist Places of Pilgrimages in India by Singh, Rana P. B.)..... 11
Figure 1-5: Sarnath and the religious landscape setting (source: Archaeological survey of India)..... 13
Figure 1-6: Rajgir and the archaeological landscape within natural setting (Source: Archaeological survey of India)..... 15
Figure 1-7: Shravasti and its wider archaeological landscape (Source: Archaeological survey of India) 16
Figure 1-8: Kushinagar archaeological site after excavation by Alexander Cunningham in 1871 (Source: Archaeological survey of India) 18
Figure 1-9: Sankisa archaeological site after excavation by Alexander Cunningham (Source: Archaeological survey of India report 1872)..... 20
Figure 1-10: Sanchi main stupa and other archaeological monuments (Source: Archaeological Survey of India)..... 22
Figure 1-11:Antiquarian value of Buddhist landscape in relation to other global-historical landscape traditions (Source: Author, prepared from Sigiriya Royal Gardens, Cooray Nilan; 2012)..... 24
Figure 2-1: Botanical Provinces of India (source: Hookers proposed from the Flora W640) 29
Figure 2-2: Physiographic Map of India (source: Survey of India, 1991) 30
Figure 2-3: Riverine network of India (source: Singh, R.L. 1971, India, A regional Geography)..... 32
Figure 2-4: Geological Map of India (source: Singh, R.L. 1971, India, A regional Geography)..... 33
Figure 2-5: Soil profile of India (source: Singh, R.L. 1971, India, A regional Geography)..... 34
Figure 2-6: Annual Temperature of air in degree Celsius (source: Agroclimatic Atlas of India, Meteorological Department, 1986)..... 35
Figure 2-7: Southwest Monsoon pattern of India (source: Agroclimatic Atlas of India, Meteorological Department, 1986) 36
Figure 2-8: Phytogeographic regions of India (source: Botanical Survey of India) 37
Figure 2-9: Benchmark events toward global cultural landscape recognition. 41
Figure 3-1: Conceptual framework of the study (Source: Author) 74
Figure 3-2: Methodological framework of the study 84
Figure 4-1: Site of Jetavana monastery in Sravasti city 86
Figure 4-2: Archaeological site of Jetavana Monastery, best preserved (source: Archaeological Survey of India, Lucknow Circle)..... 88
Figure 4-3:A regional view of Jetavana and environs showing the river Rapti and the paleochannel. (Source: Author) 89
Figure 4-4: Undulating land profile at site (Source: site documentation by author)..... 90
Figure 4-5: the change of elevation towards lowest point of site (Source: site documentation by author)..... 90
Figure 4-6: Elevation map of Jetavana archaeological site and surrounding. (Source: Author)..... 91
Figure 4-7: Slope analysis map of Jetavana archaeological site and surrounding. (Source: Author)... 92
Figure 4-8: Surface hydrology, drainage channel at site (Source: site documentation by author) 93
Figure 4-9: Surface run off as an outcome of undulating topography at site (Source: site documentation by author) 93

Figure 4-10: Drainage map of Jetavana archaeological site and surrounding. (Source: Author) 94
Figure 4-11: Watershed map of Jetavana archaeological site and surrounding. (Source: Author) 95
Figure 4-12: Dense forested area along buffer area of the site (Source: site documentation by author) 96
Figure 4-13: Seasonal scrub vegetation along moist drainage corridors at site (Source: site documentation by author) 96
Figure 4-14: Existing vegetation map of Jetavana archaeological site and surrounding. (Source: Author) 97
Figure 4-15:Existing sensitive vegetation (on valley areas) map of Jetavana archaeological site and surrounding. (Source: Author) 98
Figure 4-16: Solar exposure recorded on a sunny day at site along southern and northern part (Source: site documentation by author) 99
Figure 4-17: Visual connection map of Jetavana archaeological site and surrounding area (Source: Author) 100
Figure 4-18:Solar aspect map of Jetavana archaeological site and surrounding. (Source: Author) 101
Figure 4-19: Micro-methodology diagram (Source: Author) 103
Figure 4-20: Composite analysis map of Jetavana archaeological site and surrounding for interpretation of site suitability. (Source: Author) 105
Figure 5-1: Sanchi and its landscape setting (Source: Author; prepared from Archaeological Survey of India maps and maps published in The Monuments in Sanchi by John Marshall, Alfred Foucher) .. 108
Figure 5-2: Excavation plan of Sanchi archaeological site showing the great stupa and other extant ruins. (Source: Archaeological survey of India Site Museum collection at Sanchi) 109
Figure 5-3: Excavated monuments of Sanchi (Source: Author; prepared from the maps published in The Monuments in Sanchi by John Marshall, Alfred Foucher) 110
Figure 5-4: Satellite Image of Sanchi Monastic site (Google Earth Pro image dated September 01, 2022) showing the large monument remnants within the ASI boundary (Source: Prepared by author from Google Earth data) 111
Figure 5-5: Waterbodies/ tanks around Sanchi monuments and area (Source: Prepared by author from Google Earth data) 113
Figure 5-6: A regional view of Sanchi and environs showing the river Betwa and the paleochannel. (Source: Author) 114
Figure 5-7: Elevation map of Sanchi archaeological site and surrounding. (Source: Author) 115
Figure 5-8: Slope analysis map of Sanchi archaeological site and surrounding. (Source: Author) 116
Figure 5-9: Rocky terrain at Sanchi monastic landscape setting (Source: Site documentation by author) 116
Figure 5-10: Drainage map of Sanchi archaeological site and surrounding. (Source: Author) 117
Figure 5-11: Watershed map of Sanchi archaeological site and surrounding. (Source: Author) 118
Figure 5-12: Regional Landscape drainage pattern at Sanchi (Source: Site documentation by author) 118
Figure 5-13: Surface drainage direction towards localised low points (Source: Site documentation by author) 119
Figure 5-14: Man made tanks from ancient time at Sanchi surrounding (Source: Site documentation by author) 119
Figure 5-15: Terraced flow of surface runoff to manmade rainwater collection tanks (Source: Site documentation by author) 119
Figure 5-16: Existing vegetation map of Sanchi archaeological site and surrounding. (Source: Author) 120

Figure 5-17: Existing sensitive vegetation (on valley areas) map of Sanchi archaeological site and surrounding. (Source: Author) 121
Figure 5-18: Vegetation pattern of seasonal and scrub forest at hilly terrain of Sanchi (Source: Site documentation by author) 121
Figure 5-19: Visual connection map of Sanchi archaeological site and surrounding area (Source: Author) 122
Figure 5-20: Solar aspect map of Sanchi archaeological site and surrounding. (Source: Author) 123
Figure 5-21: Treatment of panorama and visual frames (Source: Site documentation by author) 123
Figure 5-22: Micro-methodology diagram (Source: Author) 125
Figure 5-23: Composite analysis map of Sanchi archaeological site and surrounding for interpretation of site suitability. (Source: Author) 127
Figure 6-1: Bharatpur monastic site location on Physiographic divisions of West Bengal. (Prepared by author from Survey of India and Shuttle radar data; Bandyopadhyay, 2014) 133
Figure 6-2: Interpreted tentative location of the monastery along West East cross profile of Bengal Radha region (Source: Prepared by author based on ASTER DEM 2011 data; Majumdar, 2019) 134
Figure 6-3: The wider landscape hydrological connect (Source: Author) 134
Figure 6-4: Interpretive regional topographic response to monastic site planning (Source: Site documentation by author) 135
Figure 6-5: Elevation map of Bharatpur archaeological site and surrounding. (Source: Author) 135
Figure 6-6: Slope analysis map of Bharatpur archaeological site and surrounding. (Source: Author) 136
Figure 6-7: Surface drainage pattern at flat fluvial plain of Bharatpur (Source: Site documentation by author) 137
Figure 6-8: Drainage map of Sanchi archaeological site and surrounding. (Source: Author) 137
Figure 6-9: Watershed map of Sanchi archaeological site and surrounding. (Source: Author) 138
Figure 6-10: Evergreen vegetation pattern with fluvial influence around the site (Source: Site documentation by author 139
Figure 6-11: Existing vegetation map of Sanchi archaeological site and surrounding. (Source: Author) 139
Figure 6-12: Existing sensitive vegetation (on valley areas) map of Sanchi archaeological site and surrounding. (Source: Author) 140
Figure 6-13: Leveraging the flat horizon to create visual contrast; inward versus outward views (Source: Site documentation by author 141
Figure 6-14: Visual connection map of Sanchi archaeological site and surrounding area (Source: Author) 141
Figure 6-15: Solar aspect map of Sanchi archaeological site and surrounding. (Source: Author) 142
Figure 6-16: Methodology of investigation (Source: Author) 143
Figure 6-17: Composite analysis map of Bharatpur archaeological site and surrounding for interpretation of site suitability. (Source: Author) 144
Figure 6-18: Relationship between monastic sites and settlement (Source: Author) 146
Figure 7-1: Environmental ethic interpretation on the study sites (source: author) 164
Figure 7-2: Trees associated with historic Buddha and their mention in Buddhist art works (Source: Author) 169
Figure 7-3: Albizzia lebbeck: legend: worship of Bodhi tree, location: Bharhut, 2nd c. BCE, Madhyapradesh (source: Indian Museum, Kolkata) 174
Figure 7-4: Alocasia species; legend: a scene from Romataka Jataka, (source: Mathura Museum) 175
Figure 7-5: Alstonia scholaris; legend Caitya vriksha; Source: Auwa (Pali, Rajasthan) 176

Figure 7-6: Anhocephalus cadamba, legend: vrikshaka, A woman standing cross legged holding the branch of Kadamba tree and worship of the tree with garlands (source: Sanchi Monument, Madhya Pradesh) 176
Figure 7-7: Artocarpus heterophyllus, legend: Jataka stories, six deer revering the tree bearing large fruits (source: Bharhut stupa, Madhya Pradesh) 177
Figure 7-8: Bambusa species, legend: Venuvana (source: Sanchi monument, Madhya Pradesh) 178
Figure 7-9: Bauhinia variegate, legend: Venuvana worship of Bodhi tree (source: Bharhut stupa, Madhya Pradesh) 179
Figure 7-10: Bombax ceiba, legend: Hariti and Panchika; and Mayadevi holding a branch of the tree (source: Chandigarh Museum and Gandhara) 179
Figure 7-11: Borassus flabellifer, legend: two men looking out of the window, lower panel sculpted with two Tala trees (source: Bharhut stupa, Madhya Pradesh) 180
Figure 7-12: Cocos nucifera (source: Bharhut stupa, Madhya Pradesh) 181
Figure 7-13: Euphorbia and other plants, legend: Miracle of Sravashti, (source: Sanchi stupa, Madhya Pradesh) 181
Figure 7-14: Fern leaves; legend: decorative slab (source: Sanchi stupa, Madhya Pradesh, Lucknow Museum) 182
Figure 7-15: Ficus benghalensis, legend: Bodhi Tree (source: Sanchi stupa, Madhya Pradesh) 183
Figure 7-16: Ficus elastica, legend: a male yaksha standing under the tree (source: Mathura 3rd c. CE) 183
Figure 7-17: Ficus glomerata, legend: Bodhi tree worship (source: Bharhut Stupa, Madhya Pradesh) 184
Figure 8-1: Illustration on principle 01: Influence of symbolism in Buddhist monastic site planning (source: author) 193
Figure 8-2: Reflection of "dassana" principle as per Schopen, Gregory on siting the Relic stupa in monasteries for Jetavana, Sanchi and Bharatpur (source: author) 194
Figure 8-3: Illustration of principle 02: Attitude to topography (source: author) 195
Figure 8-4: Illustration of principle 03: Attitude to water resources (source: author) 197
Figure 8-5: Illustration of principle 04: Attitude to plant resources (source: author) 199
Figure 8-6: Illustration of principle 05: Sense of anchor (source: author) 201
Figure 8-7: Illustration of principle 06: Attitude to visual composition (source: author) 203
Figure 8-8: Illustration of principle 07: Spatial interrelationship between elements (source: author) 205
Figure 8-9: Illustration of principle 08: Narrative of sacred dimensional order (source: author) 207
Figure 8-10: Jetavana monastic site; an interpretation of underlying dimensional order (source: author) 208
Figure 8-11: Sanchi monastic site; an interpretation of underlying dimensional order (source: author) 210
Figure 8-12:Bharatpur monastic site; an interpretation of underlying dimensional order (source: author) 211
Figure 9.1-1: Bird's eye view of Jetavana monastery showing landscape context (source: author) ... 217
Figure 9.1-2: Aerial view of the monasteries mingled within forest cover (source: author) 217
Figure 9.1-3: North-south and East-west axes passing through open space within Jetavana site (source: author) 218
Figure 9.1-4: Interpretation of dimensional order and inter-relationship among built elements (source: author) 218
Figure 9.1-5: Conjectural reconstruction of open space and pathway connections within site (source: author) 219
Figure 9.1-6: Monastic activities within open spaces of precinct 219

Figure 9.1-7: Bird's eye view of Sanchi monastic site showing hillock landscape context (source: author) 220
Figure 9.1-8: Hillock and water impounding areas in wider landscape context (source: author) 220
Figure 9.1-9: North-south and East-west axes passing through open space within Sanchi site (source: author) 221
Figure 9.1-10: Axial connection passing through Stupa 1 in Sanchi site (source: author) 221
Figure 9.1-11: Architectural conjecture of Sanchi monastic site (source: Brown, P., Indian Architecture (Buddhist And Hindu Period), 4th edition, 1959, Treasure House of Books, Mumbai) 222
Figure 9.1-12: Landscape reconstruction of Sanchi monastic site (source: author) 222
Figure 9.1-13: Dimensional order and inter-relationship among elements of Sanchi monastic site (source: author) 223
Figure 9.1-14: Monastic activity in open spaces inside Sanchi precinct (source: author) 223
Figure 9.1-15: Bharatpur monastic site in its wider landscape context (source: author) 224
Figure 9.1-16: Axial arrangement of anchors and open spaces within Bharatpur monastic site (source: author) 224
Figure 9.1-17: Dimensional order and inter-relationship among built elements in Bharatpur site (source: author) 225
Figure 9.1-18: Monastic activities in Bharatpur site (source: author) 225
Figure 10-1: Environmental form evolution in the monastic sites of Jetavana, Sanchi and Bharatpur (source: author) 229

List of Tables

Table 1-1: Categories and characteristics of Lenas (Source: Author, prepared from Buddhist Monks and Monasteries of India by Dutt, Sukumar; 1962) 7
Table 2-1: Key international guidelines illustrating values on cultural landscapes and their relevance in current study 42
Table 2-2: Categories of cultural landscape and their implications on current study 44
Table 2-3: Key literature analysis with perspective of spatial interpretation 47
Table 2-4:Key literature analysis with perspective of philosophy and history 51
Table 2-5: Key literature analysis with perspective of environmental interpretation 60
Table 3-1: Research question and objectives 75
Table 6-1: Spatial inter-relationship amongst monastery, settlements and landscape (Source: Author) 147
Table 7-1: Comprehensive comparative inference of study site analysis – cultural landscape values (Source: Author) 151
Table 7-2: Notion of decoration in monastic art (source: author) 152
Table 10-1: Comprehensive understanding of environmental forms of Buddhist monastic sites (source: author) 230
Table 10-2: Influence of natural parameters on the landscape planning of monastic sites 232

Preface

The archaeological study of Buddhism had mostly been the interpretation of remains or ruins of monuments such as stupas, monasteries or some sporadic settlements deposits, sculptures and epigraphy. The places inherently connected to the life events and teachings of the historic Buddha such as Sarnath, Bodhgaya, Rajgir or Vaishali create a geographical focus in Gangetic valley. Buddhist monastic sites form a larger part of cultural landscape in India. The site planning principles were rooted to understanding of natural setting, which is yet to be read and interpreted in its full potential. India being one of the most significant abodes of Buddhist sites, though, have been scantily understood and not being studied in depth so far in terms of their environmental and natural heritage value in the cultural landscape dynamics. This research has been oriented toward inquiring and appraising all these potential roles enacted by Buddhist monasticism by directly examining their natural and social contexts of historic and post historic Buddha monastic sites in different environmental settings (forest grove, hilltop and riverine flood plain- the habitats mentioned in Vinaya pitaka suitable for monks). Prototype sites from each category is identified to illustrate the current study. They are Jetavana monastery in Sravasti in forest grove, Sanchi UNESCO World heritage site in hilltop and Bharatpur monastery in riverine flood plain category. Environmental concepts followed in Buddhist monastic sites had influenced the evolution of ***distinct identity, form*** and ***meaning*** in spatial planning of Indian Cultural Landscapes. The research focuses on this nature-based narrative of Buddhist landscape. Going further, the study enquires into the ***unique landscape planning principles*** (ULPP) followed in the planning of Buddhist monastic landscapes. The primary objective of the study is to emphasize on these dominant themes and perceptions towards nature that shaped Buddhist cultural landscapes over time in India.

The study is divided into three major sections to systematically achieve the research aim. Section 01 contains the background and context establishment with analytical literature review, identification of research gap and devising methods and tools (Figure.1). Section 02 deals with the environmental analysis of prototype sites and illustrates the results of the research. Finally, section 03 theorises and interprets the results and findings from previous section as conclusion and provides further study avenues. The research is comprised of the following steps,

Chapter 1 establishes the cultural, geographic and historic context for the current research work. An in-depth qualitative literature review of the historical account of Buddhist monasticism was conducted through contemporary, secondary literatures and translated primary texts as mentioned in chapter 2 in main thesis. This chapter investigates into previous studies and interpretations to establish the research gap for the current study. The aim of chapter 3 is to derive a conceptual and methodological framework for the present study. It also involves an analytical survey of the existing methodologies and tools employed and developed by various scholars and institutes to interpret historical/ archaeological landscapes of Buddhist monastic sites in the light of environmental principles. A micro-methodology for each section with theoretical framework was also devised to set the rationale of the analysis in this chapter. The study appraises the current extant form of the prototype sites and investigates the landscape and environmental parameters which is unique in the study of Buddhist monuments and architectural heritage in chapters 4, 5, and 6. Globally accepted theories such as Ian Mcharg's

site suitability interpretation through 'Design with Nature', DELFT tradition of European historical garden study had been adapted as a tool for physiographic assessment of the study sites. Landscape interpretation led to the understanding of siting principle of the monuments or built architectural components. Furthermore, INTACH's historical garden conservation principles had also been leveraged to collate with the factor of rootedness to ancient Indian context. A technical-analytical approach was taken to read the natural parameters that shaped the landscape configuration of the study sites. This comprised of investigating the landscape layers – topography, hydrological regime, vegetation and solar aspect over the extant form of the prototype sites. A Digital Elevation Model (DEM) image helps in capturing three-dimensional topographical details and shows variations in height as a sequential band of colors. When a DEM is visualized on a computer screen, the height associated with each pixel can be examined using Geographic Information System (GIS) software. GIS also enables analysts to overlay images with spatial information from other sources. In this paper, for example, village and ASI boundaries, tanks, temples, and monasteries traced from the satellite images obtained from LANDSAT. All the prototype sites, Jetavana, Sanchi and Bharatpur were examined against this common investigative process to find out their unique site planning principles; covered in chapter 4, 5 and 6. A field study was undertaken spreading over summer and pre-monsoon season at each of the prototype site to validate the outcome of geo-spatial analysis with the ecological measures adapted by the builders of the site. It was appropriate to search for hints such as exposed drainage corridors, paleo channel, low lying areas or water dots within the preserved boundary as well as its surrounding. They create the interpretive link between natural landscape and built components. A major part of the Buddhist monastic practice was performed through their association with plants and ethnobotanic activities. Buddhist environmental ethic was inherently imbibed with it. A study on plant and forest associated directly to historic Buddha was carried out from scriptures, museum visits and extant art and wall inscriptions. These were helpful to interpret the influence of nature on their art form and symbolism. The research suggested a set of interpretive characters to assess the interrelationship amongst philosophical, environmental and spatial parameters in Buddhist monastic sites in chapter 8. The traits are broadly aligned with the essence of Indian architecture theorised by Kurula Verkey. Eight such traits were found out in the process of interpretation such as – influence of symbolism in site planning, attitude to topography, attitude to water resources, attitude to plant resources, sense of anchor, visual treatment, spatial interrelationship among built elements, search for sacred dimension and proportional order (Figure 2). These interpretive traits are detailed out in main thesis based on spatio-environmental principles on Buddhist monastic spatial planning.

The study explored the opportunity to recreate the landscape of the Buddhist monastic sites under purview. The analytical observations were examined under the influence of the sites' respective landscape settings. The landscape architectonic principles were used to recreate a conjectural image of the Buddhist sites highlighting the architectural elements in milieu of landscape features which are extensively presented with visuals in chapter 9 of the main thesis. Chapter 10 reconnects the research objectives with the Buddhist environmental ethics and various eco-philosophies derived from modern day tradition of environmental understanding. It establishes an underlying connection among the technical, tangible aspects of study with the

embedded intangible philosophical constructs of Buddhist environmental approaches in site planning as concluding remarks.

In the essence, the research reads, theorises and interprets the identifying landscape features of Buddhist monastic sites. These are replete with multiple cultural and environmental dimensions imbibed in their spatial planning at ancient period. The findings could be valuable for conservation, preservation and management perspectives of these religio-cultural heritage sites with a deeper understanding of environmental principles. The framework could be adapted for other Buddhist monastic sites which are yet to be explored with renewed landscape approach.

1. Introduction

Historical and cultural built heritage in India is largely celebrated in art-historical, sociological and semiological perspectives. There is an unexplored area to study such extant historical remains from a technical-analytical and landscape-environmental approach to read their design composition. The Buddhist archaeological monastic sites are no exception in this regard. The plethora of information and material remains unearthed during more than centuries field work and offers potential resources for such analysis with a renewed perspective. The present study targets, therefore, to study, analyse, understand and interpret the knowledge of environmental concepts and their corresponding spatial expression in cultural landscapes of Buddhist monastic sites with a contemporary landscape design approach. The current research engages three components to achieve the aim of the study as follows,

i. Cultural landscapes in global and Indian perspectives
ii. Buddhist monastic sites in varied geo-climatic settings in India and
iii. Contemporary landscape study methodological framework

The various globally accepted notions of cultural landscape are presented in chapter 2 literature review. Buddhist cultural and built heritage is studied in chapter 1 to develop a sense of their significance and expanse in Indian cultural landscape. The contemporary landscape study approaches are adopted in chapter 3, research design and methodology. They are reflected in parts in the chapters of discussion and findings.

The study demonstrates that the architectonic design of Buddhist monastic sites is composed of multiple layers of interpretation with elementary-philosophical-spatial-environmental rationality. The sites have both landscape architectural values and unique contextual planning principles to reflect on the cultural landscapes of then period.

The findings of this study will open a dialogue reshaping the conservation and preservation policies on cultural and built historical heritage of India. The environmental connect in the spatial construct of Buddhist monastic sites is a game changer in the scholarship of Buddhist spatial design and gardens. This also underlines the implacability of the methodology adopted for further research on historical gardens and landscapes in India. They could provide insight into the typological aspects of Buddhist monastic sites and gardens in India and global contexts.

Figure 1-1: Buddhist Archaeological and pilgrimage sites in India (Source: Author prepared from Maps published in Buddhsit Monuments by Mitra, Debala; 1971 and Buddhist Monks and Monasteries of India by Dutt, Sukumar; 1962)

1.1. Context of the study

Ancient Indian knowledge systems have placed India on the universal map of scholarship prominently. In the Indian context, too, there is an impetus on the study of landscape system with focus on land-culture continuum and a search for regional roots and identity.

The research proposes to study the natural archetypes of ancient India and the entity "Indian Landscape", considering the multitude in topography, hydrology, vegetation, wildlife and anthropogenic cultural traditions. The main objective is to understand through set(s) of description(s), how varied ecological systems, dialectal societies and multi-cultural clusters affect and results into a discrete landscape form of then-India. The core of this research is how to qualitatively assess the distinct landscape patterns (best recognized) in places defined a "cultural landscape" at sacred sites. Long lasting human dwelling places with ecological and environmental wisdom or gardens of historical values, attracting pilgrimage or establishing nature-man communion, on local and regional scale.

The research focuses on the narrative of Buddhist landscape. This particular faith and belief system dominated the religious fabric at the advent of failing of complex ritualistic Brahminical system to command the faith of larger community for sixteen centuries approximately (483 BCE - 1200 CE). It was epitomized as religion with the influence of Gautama Buddha and later through his disciples and became the symbol of royals and aristocrats. The Buddhist Pilgrimage sites in India are mostly clustered around the Bihar and Uttar Pradesh states of the country with occasional dots in other geographical parts. (Fig. 1-1)

The advent of Buddhism occurred in India at an era when there was a global stir of change of religious landscape especially in Greece, Persia and China. Amplification of the Brahminic sacrifices had run an intensive course in the initial phases of the sixth century B.C. in India, growing into an intricate ritualistic system, which led to rising disbelief in many Hindus, whether the expenses and energy involved in their performance were worth or sustainable practice. Similar thoughts developed and opposed to the Brahminic rituals were already perceived by Sramanas before Buddha arose to preach his doctrines. The heresy of Brahminic sect was crossed by Buddha, to stop the flow of the religion.

1.2. Background and Relevance

"As I define the word, a landscape is more than an area of attractive or natural scenery. It is a space or a collection of spaces made by a group of people who modify the natural environment to survive, to create order and to produce a just and lasting society."

-J. B Jackson; "In search of proto-landscape"

The past of India is a repository of knowledge system. The vividness and diversity are well reflected both in scale and complexity. And this is not only true of just garden design, but design and planning at all scales contain lessons that are still of relevance today (Singh, 2016). If the principles of 'traditional' planning (described in the ancient Indian scriptures) is weighed against contemporary variants, some features distinguish out.

Taking inspiration to walk along the path of traditional Indian wisdom, the focus of the research work lies in not to chronologically list out the various examples of Buddhist landscapes (either designed or evolved) in the Indian subcontinent only but to emphasize on the dominant themes and perceptions towards nature that shaped the unique and distinctive Buddhist cultural landscape over time in India.

Since at the outset of archaeological exploration or discovery of hidden heritage in the nineteenth century, the study of ancient or early Buddhism has been influenced by the investigations of early Buddhist texts and extant remains of present day. The twentieth century brought renewed approaches and insightful strategies to the interpretation of early Buddhist monastic practices and other related socio-religious events. Two major approaches emerged to the understanding of roles of Buddhist monasticism in its wider socio-religious and spatio-temporal settings. The first infers monastic establishments or sites (often called as "vihara"s or "arama"s to give reference from Gregory Schopen) as retreats set at natural landscapes where monks could perform their spiritual rituals undisturbed by any human interventions (Brown, 1965 p.13). This view was endorsed by, in ditto or with some variations, with further studies by Fergusson and Burgess (1880, 1988), Cunningham (1854/ 1997, 1876/ 1962, 1892/ 1988), Basham (1967), Lamotte (1988) and others. Using early Buddhist literature, these scholars supposed the concept that monastic sites were places for extended meditation within abode of nature (Reference of Nalinakhha Dutta's book) and learning of religious environmentalism.

During 1960s, with a prominence on materialism, a new interpretation sprung up related to the monastic practices of Buddhism. This interpretive approach idealised the monasteries as a pivot for economic exchange and actively engaged in wider social and settlement networks. In the work of Romila Thapar (1966, 2002) the perception of Buddhism was made in the way of interaction of merchants and traders beyond the caste-divisions, which was the former system. This approach was further substantiated by scholars such as Ray (1986, 1989), Lahiri (1992) and Heitzman (1984, 1997). Situated strategically in proximity to the trade routes (both inland and water), the later Buddhist monasteries (600-1200 CE), served as a facility of trade and spiritual exchange. They were also actively engaged in promoting agricultural practice, forest preservation showcasing their stewardship with natural resources. This resonates the Buddhist doctrine of setting up a habitat not to close not too far from urban centres to facilitate the daily needs of the monks.

Upon comparing the newer and earlier interpretations of Buddhist monastic practices, a unique contrast has evolved – social disengagement versus economic engagement (Dutta, 1930). There is a growing support for a renewed perception – the place of nature or landscape setting in both the cases. The earlier one chose natural setting to make the monastic process being assimilated within the natural environment. While the later one consciously harnessed ecological planning to provide religious anchorage to various natural promoting the trade exchange. The engagement of nature is the common theme which shall be explored in this work of study. The current study takes a departure from the previous study approaches of treating the Buddhist texts and archaeological evidence in isolated manner and attempts to integrate to find the deeper ecological roots in the monastic practices.

Replicating this narrative for early Buddhist monastic establishments and/ or landscape system (their gardens and site planning), it can be interpreted that they were always working 'in' nature, respecting local resources and local ecosystems. In their design, Nature was a 'subject' rich with inherent meanings of environmental and social intents and not an 'object' for mere obsessive visual or conspicuous consumption, as perceived in west.

The mention of nature and environment preservation, attitude towards flora, animals and mute faunas in the several discourses of Buddha offer several dimensions like religious connotations, ethno-medicinal associations and most importantly, a deep veneration of Mother Nature. This spiritual perception or attitude towards landscape and environment is another aspect of study that relates scientific ideas like natural resource preservation-cum-bio-diversity conservation with spirituality.

Most of the earlier interpretations of the environmental role of monasteries make claims of religious or spiritual engagement following the Buddhist doctrines or rituals in daily or karmic practices. But they lack to reconstruct the spatial implication due to such institutional practice in spatio-temporal scale and their wider landscape context. This research has been oriented toward inquiring and appraising all these potential roles enacted by Buddhist monasticism by directly examining their natural and social contexts of historic and post historic Buddha monastic sites in different ecological settings (hilltop, riverine flood plain and forest grove).

1.3. Buddhist monastic settlement practices in ancient India

Buddhism has a reputation of being a religion comprising system of thought and doctrine. It has been presented this way in various manuals and treatises. However, in the course of conversation between the historic Buddha and Subhuti, *Vajra-cchedika* of famous *Mahayana sutra* it was mentioned that rather than a system to be imposed Buddhism should be regarded as message to be preached amongst common people.

Early Theravada scriptures show that the faith and messages delivered to the monks was not regarded by them as a 'system', but as a 'way of life' of directive of self-culture. *Dhamma* was considered a mean to bring cessation to all sorrows arising from the mundane world. It is expressed as a 'Way' (*magga)*, which was popularised by *Sangha* to make Buddhism *Bahujanna*. Buddhism throve and expanded through in ancient India through the effort of Sangha – preaching the practice of way of life, settlement practices and environmental ethics beyond just a practice of dividing monkhood and laity. From this point of view, Sangha is represented as an Institution. The ancient sect of Buddhists in *Kathavattu* noted the norms of functioning of Sangha in 'Mahasunnatavadins'. The growth, development and functioning of Sangha in early Buddhism has a clear mark in establishing relationship with community yet to be posited outside ancient urban centres in a natural setting. Sangha was founded with the ethos and principles of ancient community of wandering almsmen. *Vinaya pitaka* was formulated later on this system. *Vinaya pitaka* has documented lists of rules and practices governing interactions and exchange between monks and laity. The daily life activities and probable offenses in terms of karma and merit amongst monks are accounted in exact details. But Sangha brought its own institutional framework and modification to separate itself from its parental

organisation. It offered a specialised alteration in settlement practice of *Vassavasa* (Rain-retreat), observed by earlier wandering almsmen. It was the beginning point from where the Sangha started its evolution beyond the wanderer's community leading through several phases bringing variety into monastic settlement practices.

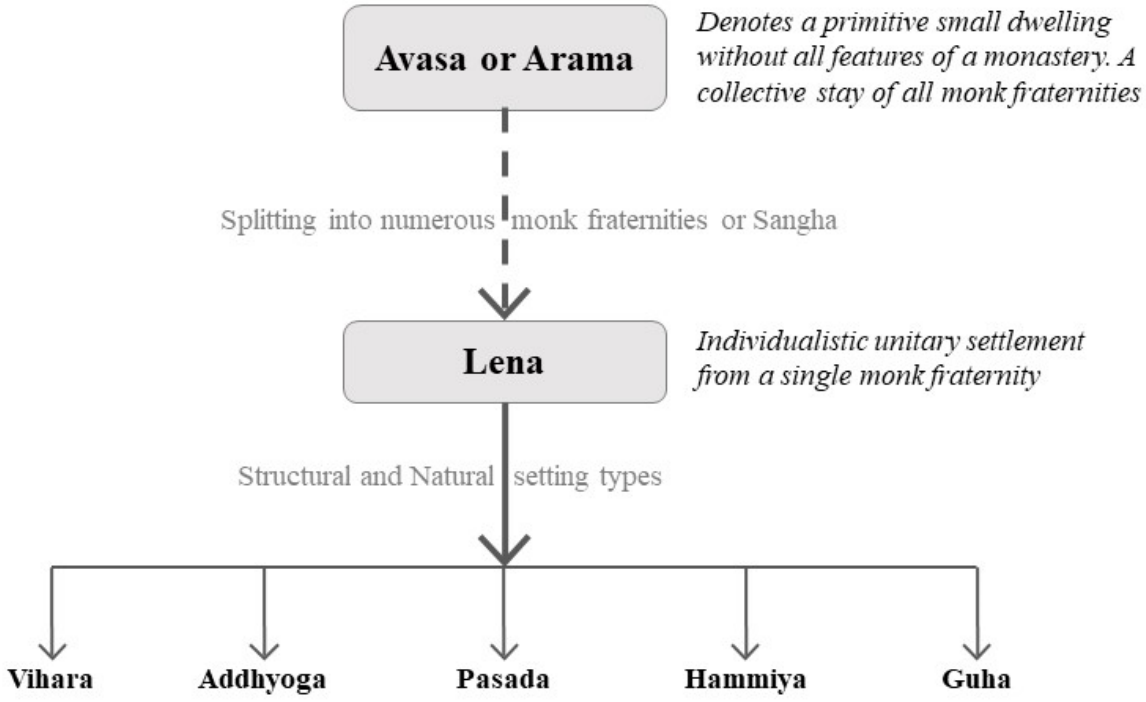


Figure 1-2: Evolution of Lena from primitive Sangha (Source: Author)

Following this the wandering sect of Buddhist monks became a settled order, unitary Sangha transformed into plural with the advent of Buddhist religion. A steady multiplication of Sangha communities was noticed which brought a change in their organisational order and. Consequently, the changes were visible in their settlement pattern; many monastic units started acting like a permanent establishment for dissemination of knowledge and scholarship. Hence, the monasteries, through the notion of permanence became a dynamic institution run by Sangha.

The development and evolution of monasteries also has a long story of growth in phases (Fig. 1-2). The earliest monk-settlement was characterized by the name *avasa* or the *arama.* A typical monastery referred as a *lena*, came to being when the Sangha was divided into numerous groups of monk-brotherhoods. A *lena* essentially comprised of monks from a single fraternity whereas *avasas* or *aramas* used to house monks from all quarters. Originally a *lena* was categorised into five structural types- V*ihara, Addhyoga, Pasada, Hammiya* and *Guha*. The characteristics of these are mentioned in the following table 1.1,

Table 1-1: Categories and characteristics of Lenas (Source: Author, prepared from Buddhist Monks and Monasteries of India by Dutt, Sukumar; 1962)

Sl.no.	Types of *lena*	Characteristics
1	Vihara	Communal dwelling of a private kind Not meant for reception of Bhikkhus from all fraternities Generally donated by wealthy lay community Well protected to ward of weather extremities and wild beasts Subjected to decay from natural phenomena
2	Addhyoga	Bengal house with thatched roof and often referred as "gold coloured" house for monks Private lodging with individual chambers Architecture was often associated with upturned eaves looking like wings of Gadura bird Prone to destruction due to climatic events
3	Pasada	Long-storeyed mansion Upper storey completely covers lower floors Communal living with more than one monk fraternity Generally donated by wealthy lay community Vulnerable to weather events due to traditional construction method
4	Hammiya	An off suite of *Pasada* Contained an attic on top of upper storey Open to receive Bhikkhus from all organisational quarters Subjected to year-round maintenance for keeping up the permanence
5	Guha	Naturally protected and occurring sites for monk fraternities on hilltop or slopes Often built as a hutment erected with bricks or scooped out of rocky terrain or made of forest wood or laterite (*parrisu*) Most permanent type of dwelling within natural setting

Amongst the above-mentioned categories only two types have survived even in archaeological exploration – the *Vihara* and the *Guha*. Considering the Vindhyan range in central India as the 'Great divide' (a natural physiographic barrier terrain), the *Vihara* represented the monastic sites to its northern part (mostly Gangetic valley) and the *Guha* to its south. The current study focusses on monastic sites situated in northern and central India region.

As *Viharas* were built (as human activity) upon natural grounds they had fallen into ruins. The archaeological sites bear the plinth marks or restored footprint fragments in today's extant form. On the other hand, the *Guhas* inset within natural rock formations provided an everlasting endurance to monastic activities. They are bearer of few of the best art and architectural marvels from the bygone era.

The expansion of Buddhism in new areas was enabled and strengthened by the monastic establishments. Building of monastery was perceived as act of piety by the lay communities whereas this also exhibited a pattern of royal patronage. Even during the decline of Buddhism, the monastery building was never stopped. New monasteries came upon the ruins of old ones. They were either built as single dwelling unit or as clusters bounded by a wall to form a unitary habitat of Bhikkhus from all quarters.

The first record of monastic establishments could be found from the descriptions of a foreign eye-witness – Fa-hsien, who came to India in early 5th century when Buddhism has already past its glory. His record was mostly based on the monasteries survived till that time in northern India. Most of the big or small viharas were in ruin by that time. The next extensive record could be found in Xuan-xang's description who visited widely in northern and southern India to record the Buddhist monastic activities.

There are various literatures from which the spatial connotation can be interpreted; how the monasteries functioned, the positioning of ritualistic objects and residential units, their garden and ethno-botanic practices. These will be discussed at large in chapter 2 especially with elaboration on spatial layout of *avasas* or *aramas* and *Vassavas* (Rain retreat).

1.4. India's historical built and cultural landscape of Buddhist Archaeological monastic sites: a schematic overview

Historic references in textual sources signify that India's earliest built landscapes were either the gardens under royal patronage or temple gardens that existed under royal patronage within urban precincts or core. During the Buddhist period (3rd c. BCE to 1300 AD), Buddhist monastic setup transformed the pattern of built landscape. Putting naturally occurring sites to monastic use the Buddhist settlement practice established a new administrative as well as spatial relationship with ancient urban centres and laity inhabiting near agricultural or productive land use areas. Therefore, the focus on built landscape development shifted to Buddhist monastic sites situated at various natural settings such as hills, forests or riverine flood plains at outskirts of urban centres. As per the historical notes of various chronicles especially Mahavamsa (ch 11:2-3, 15:1-3, 7-9) these Buddhist landscapes comprised of leisure and herb gardens have consisted of dense foliage, fruit and flowering plants, ethnobotanic medicinal herbs and aromatic shrubs offering opportunity for religious exchange to laity.

1.4.1. Sites associated with Historic Buddha (5th c. BCE)

a. Lumbini: the birthplace of the historic Buddha, Nepalese terai border, Northern India

Located across the border in Nepal currently, Lumbini (lat. 27°28'09"N long. 83°16'32"E) is the birthplace of Gautama Buddha. It could be accessed by road from Gorakhpur district (232 km approx. from Varanasi). Emperor Ashoka's inscription (249 BCE) was found in this site which depicts "Buddha Shakyamuni was born here, The Blessed One born here" (Singh 2011).

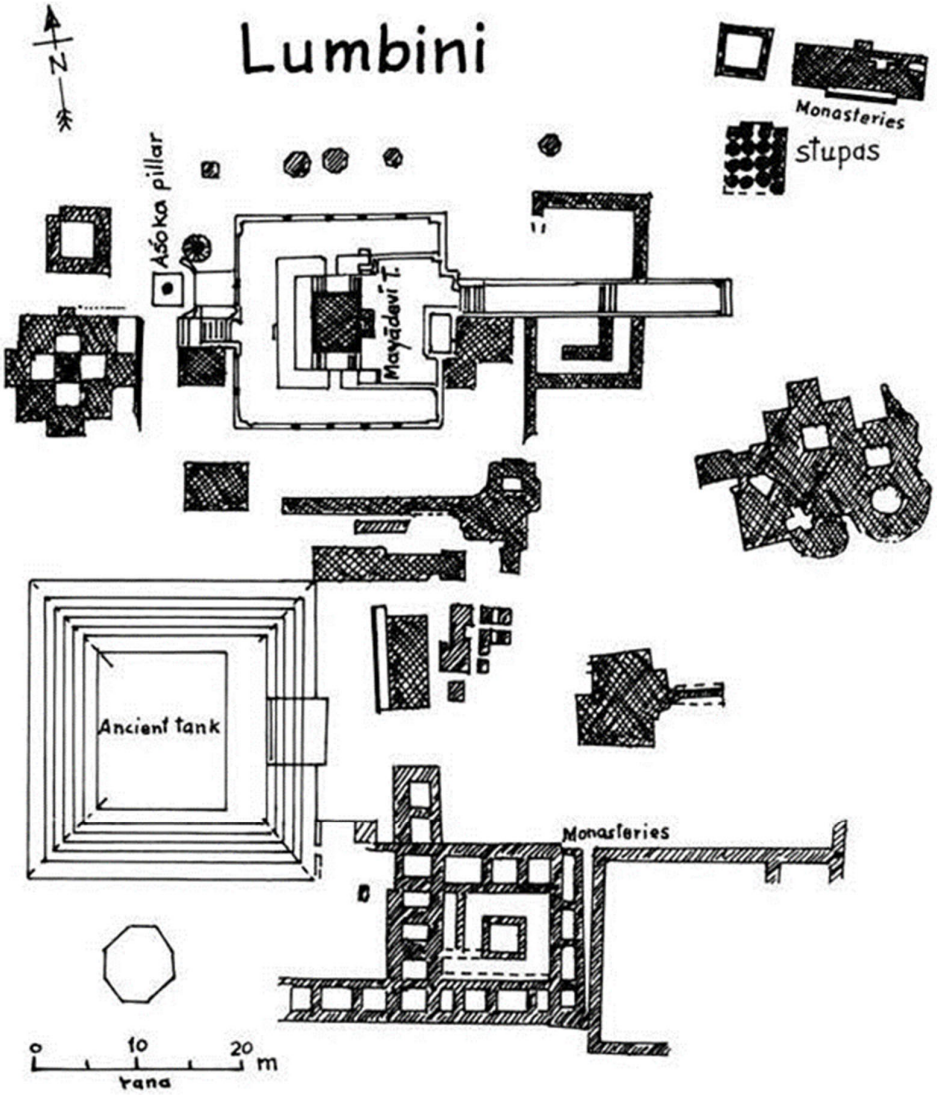


Figure 1-3: Lumbini site and surrounding (Source: Archaeological survey of India)

The birth of Siddhartha (Buddha's name in childhood) is depicted distinctly on a sculpture at one of the stone slabs in the Mahadevi Temple. The landscape scene was captured vividly in the sculpture and other subsequent paintings. Maya Devi, the mother of Siddhartha stopped to take rest in the Lumbini garden under a *shala* (teak) tree and gave birth to Siddhartha there. The site is humbled with this sacred narrative and being immortalised for the pilgrimage by the Buddhists all around the globe.

The site was visited by the famous Chinese pilgrim Fa-hsien in the 5th century CE. He mentioned about the sacred lake and the well in his account of travelogue. Mayadevi took bath in the lake before the birth of Siddhartha. Another Chinese scholar and pilgrim Xuan-xang, visited the place in the 7th century CE. A much more detailed account of the place could be found in his description. He calls Lumbini garden as 'La-fa-ni' grove (Watters 1973). A detailed nativity and spatial arrangement of the landscape could be perceived from his textual description. With an arduous attempt by Dr. Alois Anten Fuhrer, the Ashokan pillar was

discovered at the southern side of the foothills of the Churia Range in 1895-96 referring the spot of historic Buddha's birth. It is considered most significant monument at Lumbini which dates back to 250 BCE (Fig. 1-3). The inscription in Brahmi script reads 'Here Buddha Sakyamuni was born' and near the top of the pillar the mantra "*Om Mani Padme Hum"* is curved in Tibetan characters.

The *Lumbini Development Trust* was constituted in 1970 with the support from 13 nations. A restorative and management masterplan was prepared by Japanese architect, Kenzo Tange in 1978. It includes total 4.8 sq. km of land transformation divided in three parts. Though the sacred complex is yet to experience the realisation of the entire masterplan.

b. Bodhgaya: site of Buddha's enlightenment, Bihar, Northern India

Bodhgaya (lat. 24°41'44"N, long. 84°59'30'E) is an active Buddhist site for pilgrimage than an archaeological site. It is the most significant Buddhist pilgrimage site because of the narrative of Buddha's enlightenment. Xuan-xang had described in his account about the establishment of original Bodhi shrine to Emperor Ashoka. As per one of the rock edicts, Emperor Ashoka paid a visit to this place (then called Sambodhi) with his spiritual preceptor Upagupta (Mogaliputta Tissa), ten years after his consecration (260 BCE) and a shrine was dedicated by him to this sacred site. His visits are vividly described in *Ashokavandana*.

The site was discovered by Francis Buchana-Hamilton in 1811 in a dilapidated condition. The original temple and the immediate surrounding were in a greatly disturbed condition due to removal of bricks from this site for local construction works. A vast collection of sculptures found here date back to Pala-Sena dynasty period (8-12 century CE) after the Gupta period. The Bhumisparsa mudra (earth touching gesture) of Buddha became the most common form during this period as a symbol of Buddha's enlightenment. A major restoration work was undertaken by the British Government during 1880s influenced by few of the arbitrary renovation work initiated by the Burmese pilgrim missions in the early 19th century. But these unprecedented restoration works had diminished largely the early historical records at the site. Many original structures were demolished and many Buddha sculptural images were removed from the original location and being shifted to the display at the Bodhgaya Museum currently (Singh 2009).

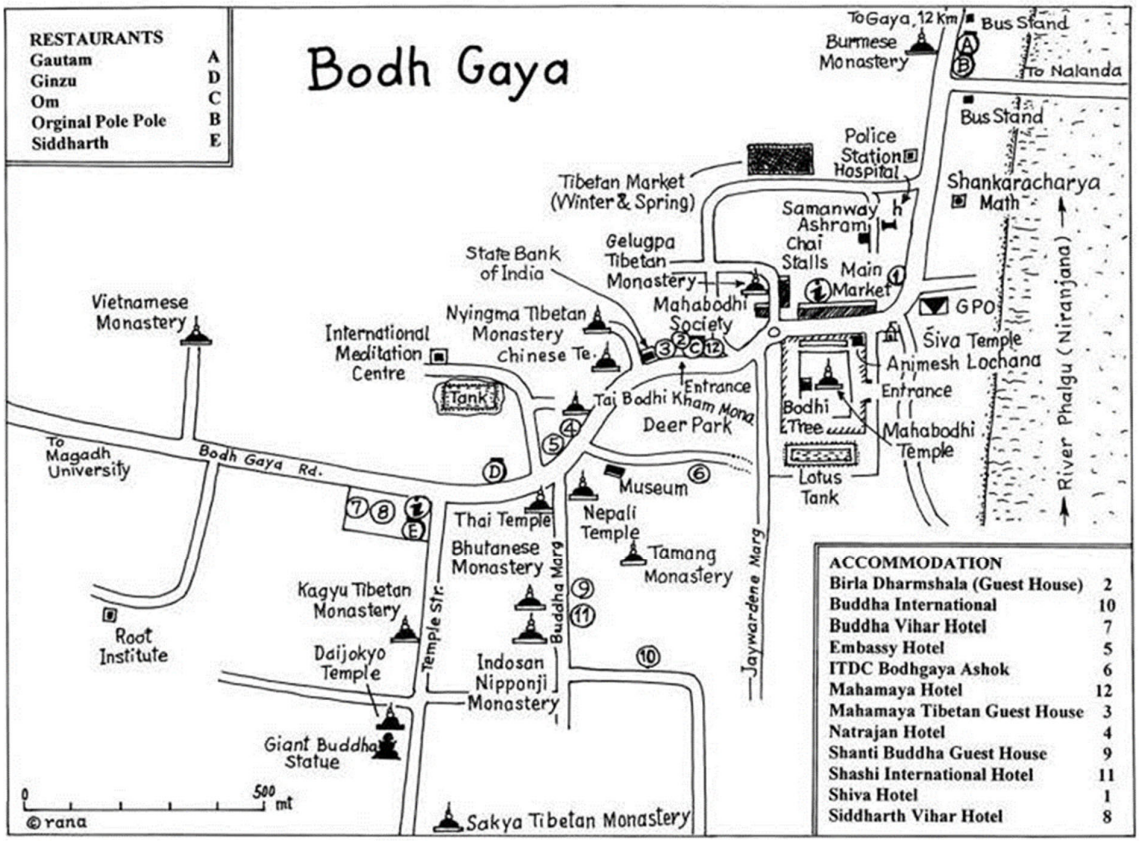


Figure 1-4: Bodhgaya site and current scenario at surrounding (Source: The Mythic Landscape of Buddhist Places of Pilgrimages in India by Singh, Rana P. B.)

The significance of this site earned a greater magnitude after the 6th century when the Buddha in *bhumisparsha mudra* (earth-touching gesture) became the most iconic form for a Buddha image during the Pala rule. This image refers to the symbol of Buddhahood achieved at the narrative states that Siddhartha attained supreme enlightenment on the full-moon day of *Vaishakha* in 528 BCE and became the Gautama Buddha, 'the awakened one'. The fig tree (*Ficus religiosa*) under which he meditated for six months became known as the Bodhi tree and the place as Bodh Gaya (Dhammika 2009, pp.43-72).

Buddha stayed at this place for seven weeks after his enlightenment and meditated at different natural setting. Each week was spent in a different part of the placed turned sacred by the divinity of the historic Buddha. The first week was spent under the *Bodhi* tree.

The Mahabodhi temple, located at the place of the Buddha's enlightenment, is the main site of worship (Fig. 1-4). It is a part of the listing of World Heritage Sites of UNESCO on 29th June 2002 (Dossier 1056rev under license CC-BY-SA IGO 3.0). The temple is resting on a high and broad plinth with a soaring 54m high pyramidal spire. It houses the iconic Buddha image in *bhumisparsa mudra* symbolizing his enlightenment. At the rear side of the tree, lays the rectangular stone slab, referred as '*vajrashila*' (the rock of diamond) assumed to be the spot for Buddha's meditation under the Ficus tree. It is the oldest object at the site which survived many invasions and desecrations by the Kushana ruler in 600CE and later during Islamic rule.

Xuan-xang (639CE) mentioned that every full moon of *Vaisakh* (April- May) thousands of devotees would gather at Bodh Gaya and perform rituals and meditate under the Bodhi tree.

c. Sarnath: first turning of the Wheel of Dhamma, Uttarpradesh, Northern India

Sarnath (lat. 25°22'51'N, long. 83°01'28E) finds its mention in a tale from the *Nigrodhamiga Jataka*. The story mentions that the historic Buddha was born in his previous life in the form of a mythical Golden Deer at Sarnath (or called as Isipatana then time). The Golden Deer saved the life of a pregnant deer and its herd from the king of Kashi. By this incidence this territory was declared as 'protected area' for mendicants and deer devoid of hunting by the king of Kashi. The historic Buddha delivered his first sermon of Dhamma on the four noble truths. The grove also witnessed Buddha's first stay during rainy season at Sarnath and his teaching against conservative Brahminism was compiled as *Anattalakkhana Sutta*.

Formerly the site was adorned with two stupas among which only the Dhamekha stupa remains till date from 6th century CE. The Dharmarajika stupa built by Emperor Ashoka was demolished by Jagat Singh in 18th century who consigned that the casket of the relic was a path leading to the River Ganges. Xuan-xang (635 CE) mentioned about the Ashokan pillar erected in front of the main stupa which used to reflect the Buddha image inscribed on the stupa. The main stupa was registered in the UNESCO World Heritage tentative list on 3rd July 1998 (Ref. No.1096). The site was discovered by Alexander Cunningham (1834-36) through his archaeological exploration initiatives. Several excavations were taken place in later period. The archaeological area is spread over an area of 16.73 ha, enshrined with many fragments of monuments and stupas (Fig. 1-5).

About 600m before the currently built museum, the main stupa referred as Chaukhandi stupa is situated. It is assumed that it is built around 5th century CE, prior to Gupta dynasty.

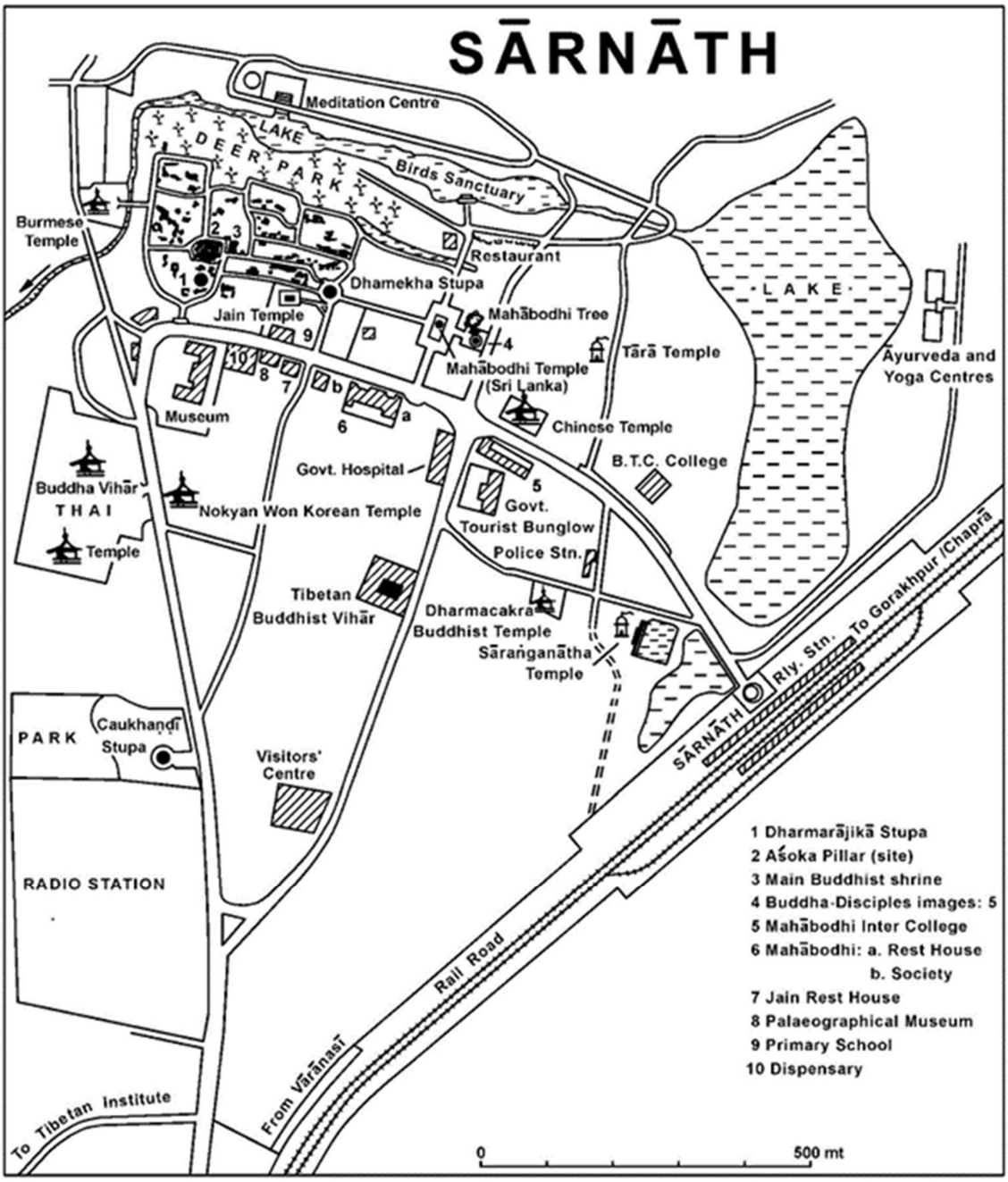


Figure 1-5: Sarnath and the religious landscape setting (source: Archaeological survey of India)

d. Rajgir: second turning of the Wheel of Dhamma, Bihar, Northern India

Buddha first visited Rajgir (earlier referred to as Rajgriha) (lat. 25°00'54"N long. 85°25'08"E), on his way to Bodhgaya. Magadhan King Bimbisara was the ruler of the place then and offered Gautama Buddha for stay in his capital city (Dhammika 2009, pp. 91-109). But Buddha promised he would return to this place after his enlightenment. Accordingly, after delivering his first sermon at Sarnath, the historic Buddha travelled back to Rajgir with several monks of this new order. King Bimbisara offered them sanctuary of stay at Veluvana, the bamboo grove

at the foothill of Sona hill and Vipula hill (Fig. 1-6). It was the first recorded property of the new order and one of the favourite forest grove stay of the historic Buddha. (Singh 2009, pp. 151-205).

On the Gridhrakuta hill the Buddha is believed to have converted the Magadhan king Bimbisara. On his first visit to Rajgir the historic Buddha stayed there for about three weeks. Many people did seek the new order and got ordained at this sacred site. Understanding the king's wish, the Buddha preached the Dhamma, the five precepts as a way to create peace.

After the Mahaparinirvana of the historic Buddha, Ajatshatru, the son of the king Bimbisara brought his corporal share of relics and enshrined them in the stupa, built here at the hilltop. A few months later the First Buddhist Council (Sangiti or Sangha) was held in the Saptapanni (Saptaparni) cave of the Vaibhara hill. A large hall was built in front of the cave to accommodate the monks arriving from various locations. On this occasion Buddha's teachings were written down under the guidance of the disciple of Buddha named Kashyapa (Kassapa) or Uruvela. The two codes of conducts (suttas) were shaped, known as *Vinaya sutta* (code of compassion) and *Dhammasutta* (code of moral acts). The proceedings are described in detail in the Pali text *Cullavagga*. As 500 monks attended this congress, it is referred as Panchashatika.

Travelling about 200m southeast of Satadhara, the outer fortifications of old Rajgriha near the narrow gap between the Vaibhava and Vipula hills. About 1km further south a stone compound wall containing a cylindrical brick structure, about 6m high Maniyar Math is located. The archaeological remains support the view that during the period of the Buddha and Bimbisara this was an active place for rituals and councils.

Along the currently made main road toward the new urban centre built by Ajatashatru are the extant remains of Jivakamravana Vihara (monastery). The main road bifurcates one into a Jivaka's mango grove, one of the favourite retreats of the historic Buddha. In this sacred grove the Buddha delivered his discourses, the *Samannaphala Sutta* (Digha Nikaya, I:47). It is said that the King Ajatashatru came to visit the Buddha on a moonlit night and was mesmerised with the serenity of the whole assemblage of natural setting. The second bifurcation, running parallel to the inner fortification in the east lies the "*Maddakuchchhi*" at the foothill of Gridhrakuta Hill, the "hill of vultures". Here the Lotus sutra was deliberated by the historic Buddha, the sermon of spiritual redemption for all- the monks and the laities.

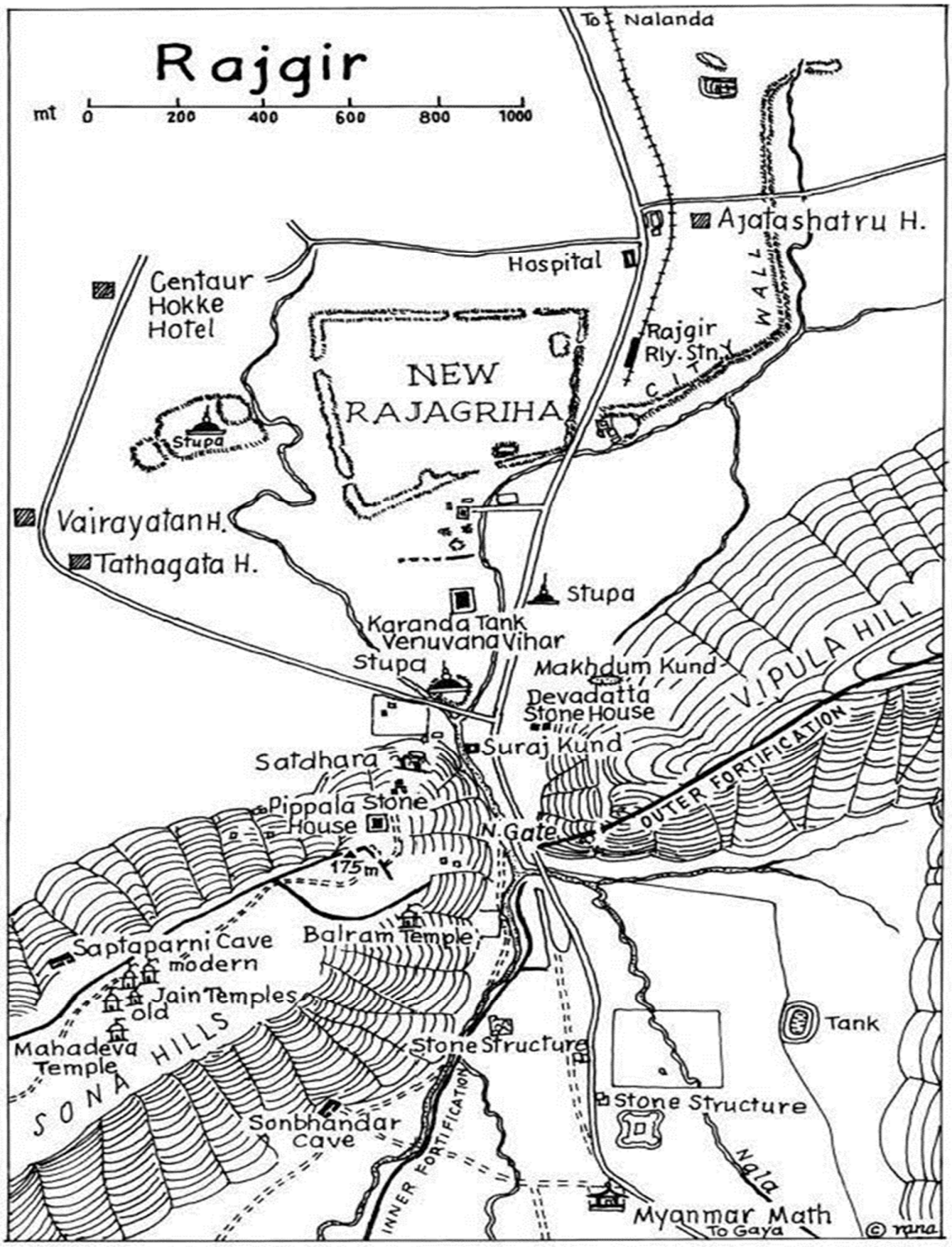


Figure 1-6: Rajgir and the archaeological landscape within natural setting (Source: Archaeological survey of India)

e. Shravasti: Saheth-Maheth, site for monsoon retreat in the Jetavana Grove, Uttarpradesh, Northern India

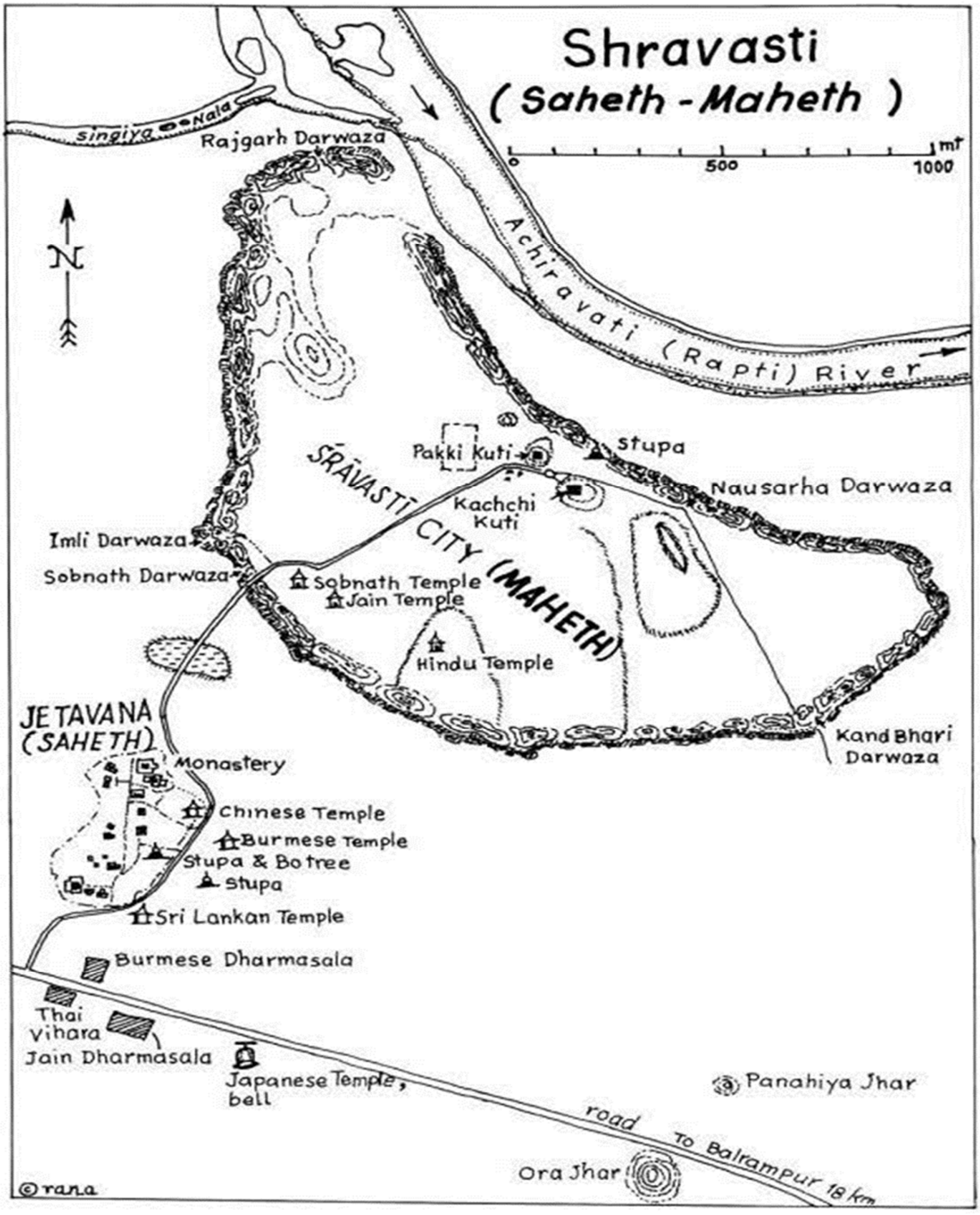


Figure 1-7: Shravasti and its wider archaeological landscape (Source: Archaeological survey of India)

Shravasti (lat. 27°30'30"N long. 82°02'21"E) is best remembered as the place where the historic Buddha performed the miracle and preached the law of Dhamma. At this sacred site, Buddha, through his miracles, defeated the six philosophers from different school of thoughts and

philosophies. As the mythology speaks the Buddha levitated in the air on a thousand petalled lotus, flames and water streams both were embodied in his body. Multiple representations of the Buddha emanated and reached the high heaven. The heretical religious leaders, discomfited at this miraculous event accepted their defeat to the Lord Buddha. Thus, his supreme position was vindicated. He preached his dhamma to a large assemblage of devotees and lay communities in front of the ruling king Prasenajit. This event is one of the most critical early Buddhist art forms (Venkataramayya, 1981).

A large hall with seven thrones were built by the king especially for this occasion, where the Buddha was challenged by six other religious leaders. His miraculous performance caused the philosophical defeat of others and their followers adopted the Buddhist doctrines. The mention of a tall temple with Buddha image could be found in the travelogue of Chinese pilgrims – Hsuang-Tsang and Fa-hien commemorating these events (Singh 2009, pp. 158-173 and Dhammika 2009, pp. 151-164).

The sacred forest grove of Jetavana witnessed 24 rainy seasons of the stay of the historic Buddha. Anathapindika bought this grove from the owner Jeta in order to build the monastery and monsoon retreat for the Buddha. The incident could be found on the medallion of Bharhut stupa railing. The natural setting and serenity of the grove and the grandeur of the relic stupa were mentioned by the Chinese pilgrims several centuries later. The extant remain of Anandakuti and Gandhakuti exude an aura of sacredness where the Buddha stayed during his many visits.

The first archaeological exploration was steered by Alexander Cunningham during 1863-75, where in the extant monuments were identified along with 16 no.s of stupas. In the subsequent excavations during 1875-76 and 1884-85 led by William Hoey, 34 more ancient monuments were excavated out. There are remains of 8 temples, 4 monasteries (viharas) and 14 stupas. In the recent excavations during 1999-2000 in the nearby village Kolga the entire monastic city of Shravasti was found, which is comprised of several monastic units, dormitories and a huge waterbody for sacred bathing for female monks. The twin-name "Saheth-Maheth" is applied for these two distinct archaeological monument sites (Fig. 1-7).

Maheth, the monastic city is situated about 500m northeast of Saheth (Jetavana), hint toward a much expanded and flourished site situated south of the river Rapti (Acharavati), which flows 300m north to the site. Within this fortified religious urban centre two stupas could be located locally named as Pakki kuti and Kachchi kuti, the latter is identified as Anathapindika's stupa. The fortification is distinctly demarcated with a massive earthen rampart at the top forming a circuit of 5.2km brick wall and punctured with 4 openings or gates with distinguished high bastions viz. Imli, Rajgarh, Nausahra and Kandabhari, located respectively at the southwest, northwest, northeast and southeast corners of the city wall.

f. Kushinagar: site of Buddha's Mahaparinirvana, Uttarpradesh, Northern India

In one of the last deliberations, the historic Buddha mentioned the Kushinagar (Kushinara) (lat. 23°29'N, long. 77°45'E) as the sacred site for his Mahaparinirvana. The reasons for his ultimate retreat were

i. The site was the proper venue for the preaching of the Maha-sudassana suttanta

ii. To admit Subhadda to the sangha prior to his death

iii. The availability of Brahmin Drona who would solve the issue of relic distribution.

iv. This site has been mythologically the sacred site of parinirvana of the historic Buddha in his previous seven births and he beheld no other spot "where the Tathagata for the 8th time will lay aside his body".

At this place under the two Shala trees beside the river Hiranyavati, the historic Buddha left his mundane self and finally accomplished *Mahaparinirvana*. Thus, the site was sanctified as one of the major Buddhist pilgrimage places (Singh 2009, pp. 254-267).

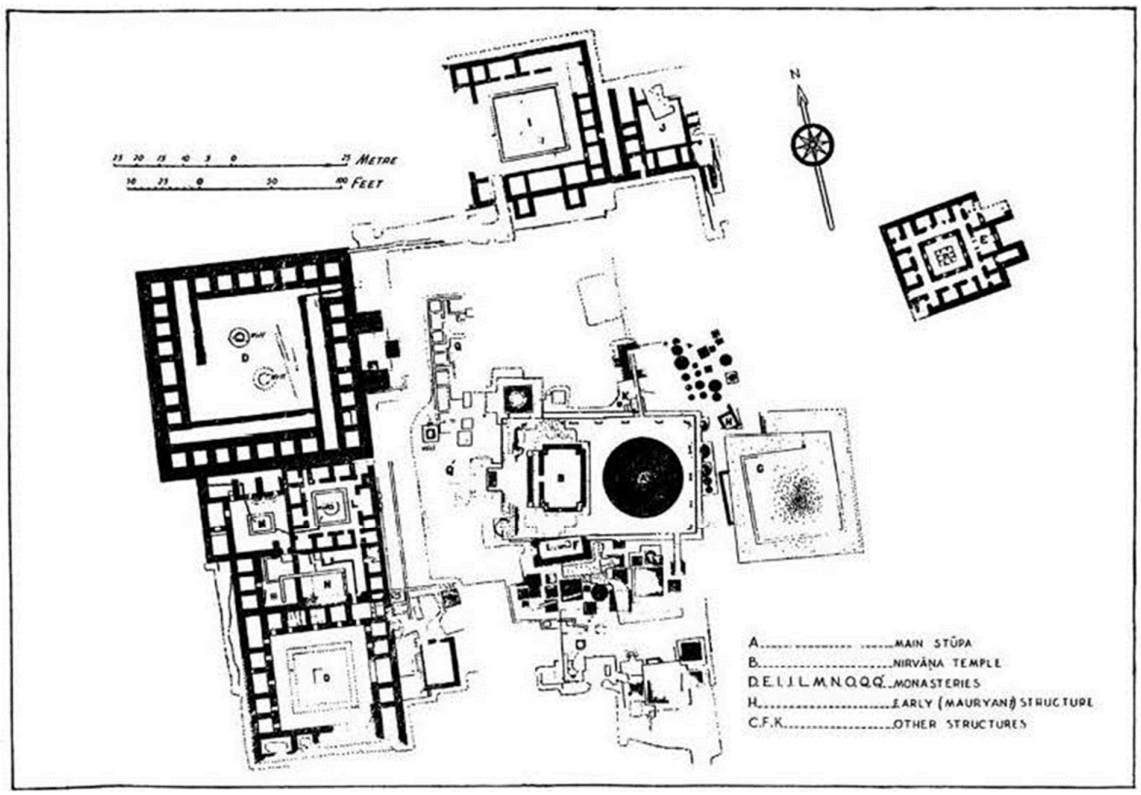


Figure 1-8: Kushinagar archaeological site after excavation by Alexander Cunningham in 1871 (Source: Archaeological survey of India)

The site was rediscovered during 19th century (Fig. 1-8). Excavations have revealed the signs of monastic tradition. Ten different monasteries dating back to 4th – 11th century BCE could be identified. Currently the archaeological extant monuments are made a part of a park with a modern enshrinement of a large recumbent Buddha image (Dhammika 2009, pp. 165-169).

After rejecting the request from his disciple Ananda to prolong his earthly life, the Buddha suppressed his bodily illness to continue till Vaishali. He called all the monks staying around the Vaishali town to assemble at Mahavana Kutagarasala and preached his Dhamma again. The legend of the place associates this episode of Third turning of the Wheel of Dhamma, where

his teachings were consisted of the 37 Bodhipakshiya Dhammas divided into 7 groups: Smrityupasthana, Samyakaprahana, Riddhipada, Indriya, Balas, Sambodhyanga and Marga *(the 'middle way')*.

The next day, upon arriving at the banks of river Hiranyavati, south of Kushinagar, between two pairs of unusually tall Shala trees (*Shorea robusta*), the historic Buddha lay down on his right side in the lion posture with his head to the north (Singh, 2011). He reminded Ananda on doctrines of faith, the ascetic and laity rules of discipline and instructions regarding the disposal of his mundane body. The earth shook and Shala blossoms covered his body, thus the Buddha attained Mahaparinirvana. His body was wrapped in new cotton cloth and twilled in cottonwood, placed in iron vessel and cremated. His relics were distributed amongst the stupas, erected at four crossroads of the urban centre thus creating an identity and long-lasting sustenance of the newly formed religion.

1.4.2. Post historic Buddha prominent sites (post 5th c. BCE after mahaparinirvana)

a. Sankisa: Site of Buddha's descent from Heaven, Uttarpradesh, Northern India

Sankisa (lat. 27°20'03"N, long. 79°16'15"E) is associated with one of the historic Buddha's great miracles, where the Buddha was mythically believed to be descended to the earth from the Tushita, 'Trayastrimsha' (heaven of 33 Gods), where he went to preach the Abhidhamma to his mother, Mayadevi after the Mahaparinirvana. The scene is distinctly represented in the Bharhut bas-relief (100-80 BCE). A three-fold ladder with solid stone steps with Indra and Brahma on both the sides. The detail mentioning could be found in Chinese pilgrims Fa-hsien and Hsuan-tsang. As well as by the Pali annalists of Srilanka.

According to the description of the Chinese pilgrims, it could be found that during 7th century, both religions Buddhism and Shaivism were prospering at Sankisa. A number of monasteries and temples could be noticed in substantial quantum then. The Mauryan emperor Ashoka established a number of constructions in the town along with a pillar with elephant capital to mark the sacred spot (Fig. 1-9).

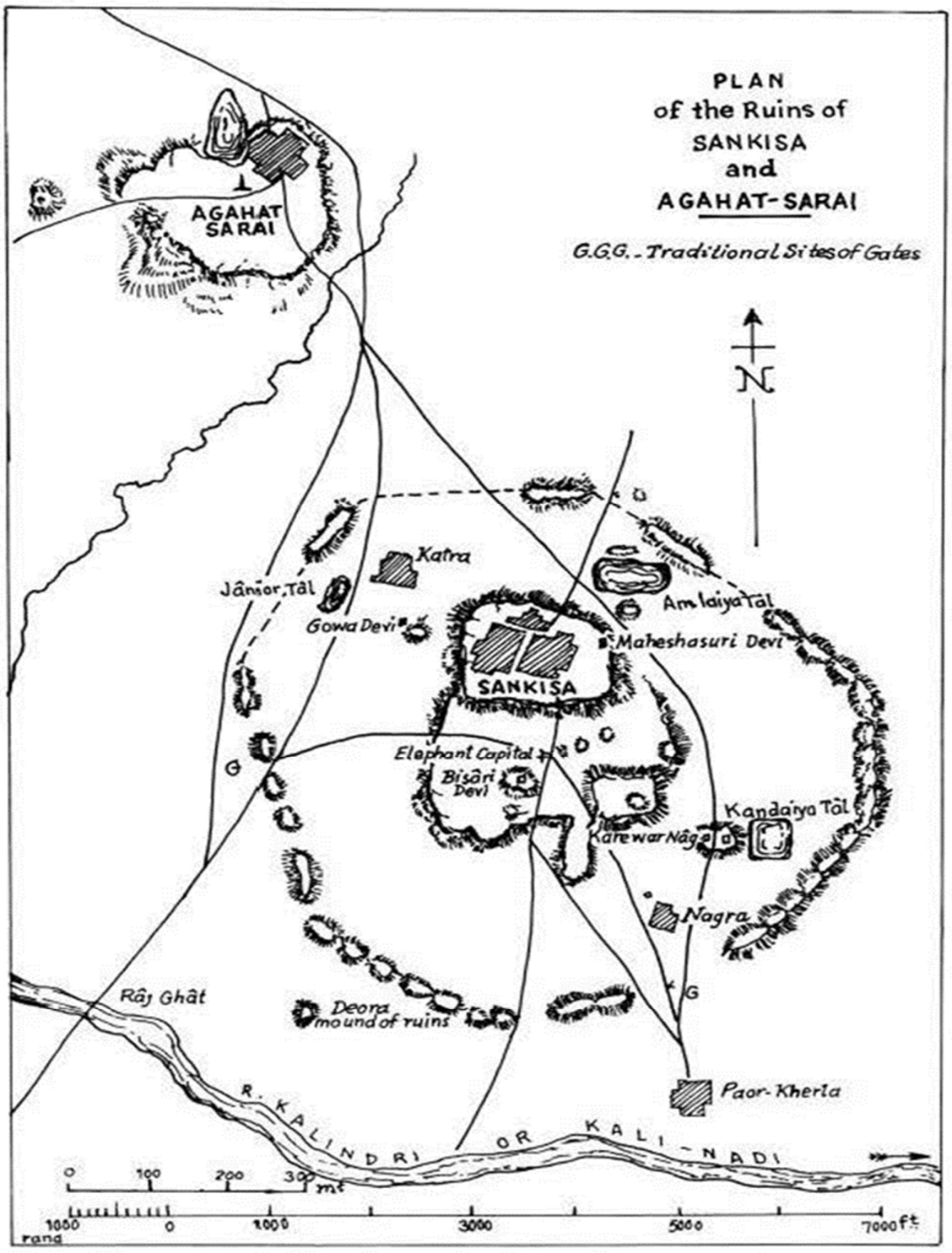


Figure 1-9: Sankisa archaeological site after excavation by Alexander Cunningham (Source: Archaeological survey of India report 1872)

b. Sanchi stupa, Madhyapradesh, Central India

The Sanchi monument (lat. 23°28'45"N, long. 77°44'24"E) and monastic site (Fig. 1-10) is considered to possess greatest marvel in art historical as well as architectural products. It is one

of the best-preserved monuments of early Buddhist monastic phase and post historic Buddha regime. It contains almost all kinds of Buddhist architectural forms. With its nucleus, the stupa 1 (relic stupa of the historic Buddha) dating back to 3rd century BCE, the monastic establishment sustained till 12th century A.D. through many political and dynastic changes.

The site has grown over the period with no relation to the master and one of the earliest structures, which were erected by emperor Ashoka on the flattened highest elevation of the hill. One of the major reasons for Ashoka's selection of the site might have been his early association with Vidisha. His wife was a daughter of a Banker from this city and happened to be a devotee of Buddhism. She had commissioned a monastery at the Vedisagiri (or with other mentioning as Chetiyagiri), mostly known with the Sanchi hill. The mention of her and Mahendra, son of Ashoka could be found in Ceylonese chronicles.

The site underwent a lot of addition and modification from the time of erection of the master monument – stupa1. The enlargement occurred during Sunga period (timeline) with the construction of drum-balustrade and ground-balustrade around the upper level and ground level pradakshina path respectively. Four gateways were added during first century BCE, which were rich in vibrant and exaggerated natural forms along with scenes from Buddha's legend. The entire surface of the gateways is replete with bas-reliefs depicting five Jataka stories – Vessantara Jataka, Mahakapi Jataka, Chhanddanta Jataka, Sama Jataka and Alambusa Jataka. These decorative reliefs in their vibrant details and edifying narration make an irresistible appeal to the eye and mind of the user of the space. These advanced artworks have their precedent at Bharhut stupa railings with their composition, perspective as well as modelling. The last addition to the stupa was made in Gupta period (timeline) with four seated images of Buddha, each under a pillared canopy, were consecrated against the drum of the stupa facing the four entrances.

The major free standing Ashokan pillar is now resting near the southern gate of main stupa 1. Apart from that there are many free-standing stone pillars from Sunga period.

Apart from the Buddhist enshrinements, there stand a large group of temples which were later additions to the ensemble. Temple 40, an apsidal hall built on a n oblong platform dating from the Mauryan period. It was enlarged in the 2nd century BCE and made into a pillared hall. Temple 18 is a 7th century A.D. structure set on the foundation of a previous apsidal hall of the Sunga period. Temple 31 is an oblong pillared shrine with a flat ceiling containing a large Buddha image.

The major components of this archaeological site are the monasteries built at various locations and elevations. Most of the monasteries do not date back to earlier than 6th century A.D. Monastery 51, developed on an accustomed monastic plan – an open brick-paved courtyard enclosed with a verandah running along and accommodated with a range of cells, twenty-two in numbers and a spacious chamber opposite to the entrance flanked by pylons. An irregular shaped man-made tank is made just at the foothill of upper terrace probably to cater to the daily sustenance of the monastic lives.

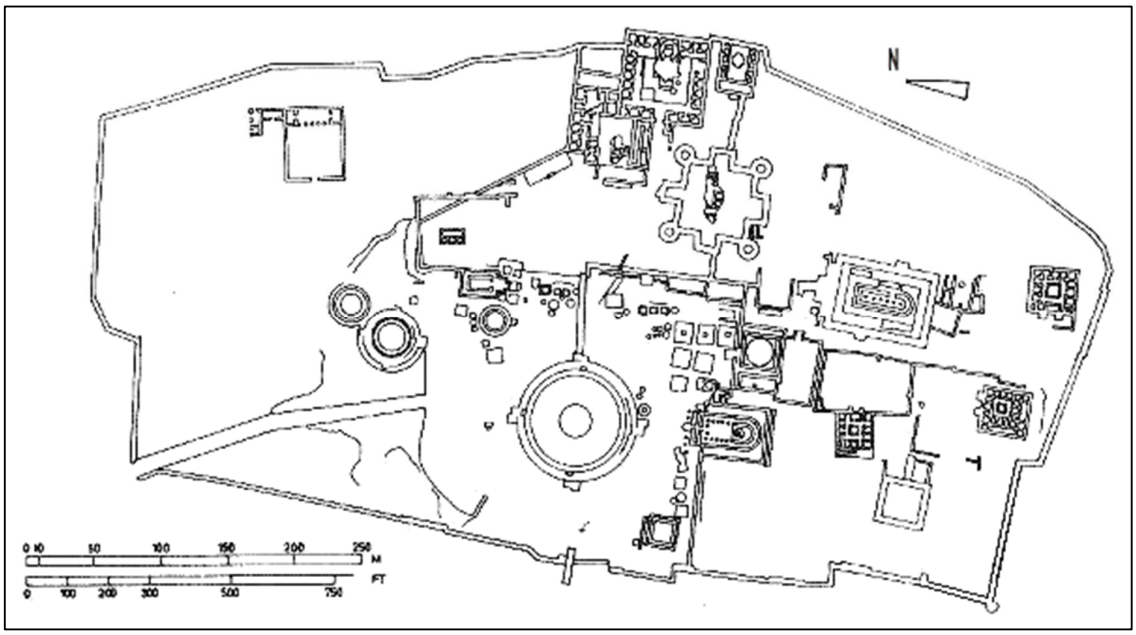


Figure 1-10: Sanchi main stupa and other archaeological monuments (Source: Archaeological Survey of India)

1.5. The key issue and principal objective

The Buddhist monastic and archaeological sites of Jetavana (Forest grove), Sanchi (Hilltop) and Bharatpur (Riverine plain) observed more than 100-200 years of archaeological study, research and interpretation from the time of their discovery during1800s to till date. However, the earlier scholarship has been limited to archaeological, art-historical, architectural and epigraphic values majorly. This study seeks to address the challenge of exploring beyond that to interpret the cultural setting of the ritualistic or monastic (archaeological) sites. Scarce attention was paid there to the relationship of Buddhist monastic (or monumental) sites with the surrounding natural or cultural phenomena. There existed the influence of landscape layers such as topographic forms, hydrologic resources, native vegetation covers as landscape indicators. In parallel to those cultural entities such as agricultural field, man-made irrigation network or sites belonging to other faiths and belief systems (Shaw 1998). A little focus was given to the study of the garden traditions associated with these monastic complexes as the garden elements were more susceptible to weather phenomena. After the declaration of UNESCO World Heritage status in 1989, scholarly attention produced substantial work on antiquarian values of monuments and some associated work for the built garden tradition but in isolated way. Hence, a renewed interpretation is being conceptualised considering environmental aspects for interpretation with respect to a wider archaeological landscape. Not only does the current study investigate the physiographic and landscape layers for the Buddhist monastic sites it also attempts to understand the process behind its development following Ian Mcharg's theory of "Design with Nature" (Mcharg 1969).

Contemporary archaeologists, see the historic Buddhist sites as a whole – a harmonious site planning exercise between architectural and landscape elements. Critical deliberation of the historically constructed monastic gardens or landscapes of India had primarily focused on

several individual cases confined within the ASI interpreted boundaries. With the commencement of this present study, much focus was developed not only to interpret numerous facets of the monastic site planning, but also to theorise the process that created this landscape archetypal exemplars. The influence and impact of the larger landscape settings in their planning methodology is also being inquired in this research. In this regard the prevalent monastic concepts of the '*arama'* or vihara must have followed the normative discourses and set the norms of living practice which could be traced back to the environmental ethics in Buddhism- their attitude towards nature, environment and karma.

These monastic complexes are the survivals of a 2000-year-old tradition of religious environmentalism and garden-art. Among them archival and textual reference materials, in full or parts could be found from the period of early Buddhism. The study sites for the current research are full-fledged expression of the early Indian Buddhist monastic traditions which had their roots to landscape understanding for environmental form to be generated and sustained over years.

On the basis of physical evidence and landscape features, the sites are categorised into three different distinct types of natural site settings: Forested grove at Jetavana - monsoon retreat of Historic Buddha, Hilltop mound at Sanchi - post historic Buddha expansion site and Riverine flood plain of Bharatpur – late Buddhism period expansion. Each of these sites exhibits the qualities of pre and post habitation practices within the Buddhist monastic settlement practices.

As many landscape archaeologists attempt to hypothesise that the Buddhist monastic sites, especially in post-historic Buddha expansion phase were not an incidental occurrence at those natural setting. The existing traditional knowledge system played a vital part to shape the landscape composition and environmental subsistence of the Buddhist monastic sites. This may not be incorrect to mention that the Buddhist landscape tradition was a climax of synthesis of regional landscape designs and environmental wisdom during the expansion phase in post-historic Buddha period. Thus, the abovementioned accounts emphasise two vital and interrelated notional issues regarding the built landscape monastic sites in ancient India. Did ancient Indian Buddhist monastic sites exhibit a distinguished landscape practice of their own? And are these historical archaeological sites a result of that Buddhist landscape practice?

Undoubtedly, the site planning process of then time in Buddhist monastic settlements was influenced by a many physical factors, such as philosophical, cultural and environmental concurrent to that period. But only a handful of studies have been carried out with landscape approach in this regard which require serious and in-depth studies. Therefore, it is one of the major tasks for the current study to address these issues. From a landscape design and environmental planning point of view, the theoretical issues lead to several significant interpretive queries that are linked to the landscape development and planning principle of historically built monastic complexes in India.

Hence, the key objective of the current research is to analyse and interpret Buddhist monastic sites as architectonic design with special emphasis on the landscape means (design tools, principles, norms of Buddhist religion, environmental techniques) implied and imbibed in the

scheme by the then designers (largely unknown due to lack of documentation) to spatially arrange/ organise the elements in the spatial layout. Understanding its environmental characteristics is an inherent action in this attempt.

1.6. The secondary objectives

Apart from framing the primary focus in the section 1.5, the current research has secondary objectives with technical and practical significance which are as follows,

1.6.1. Locating Buddhist monastic sites in the cultural landscape regime

Positioning the study sites of Jetavana, Sanchi and Bharatpur spanning over a spatio-temporal scale from historic Buddha period to early Buddhist proliferation to later stage transboundary expansion, several parameters could be reviewed with respect to other international landscape traditions. Antiquity tied with the environmental landscape approach is one primary factor. As far as heritage value is concerned, only time periods involved are considered as factor (Fig. 1-11). There, existed numerous garden traditions which belonged to Egyptian, Babylonian, Chinese, Assyrian, Persian and Roman traditions that predate Indian Buddhist Garden and landscape systems. If the degree of spatial scale and their extant physical fabric are compared, Buddhist monastic sites could rank well with the indicators of their unique contextual landscape understanding and site planning principles as could be witnessed in the royal gardens of Rome (Bandaranayake, 1993a). Despite scholarly materials published at global level on Buddhist archaeological sites in India and efforts to discover global parallelisms with the monastic garden traditions, it is yet to be interpreted to its maximum potential in the global landscape and environmental design realm. Buddhist monastic gardens and landscape systems are yet to be studied seriously in terms of landscape approach and environmental planning perspective.

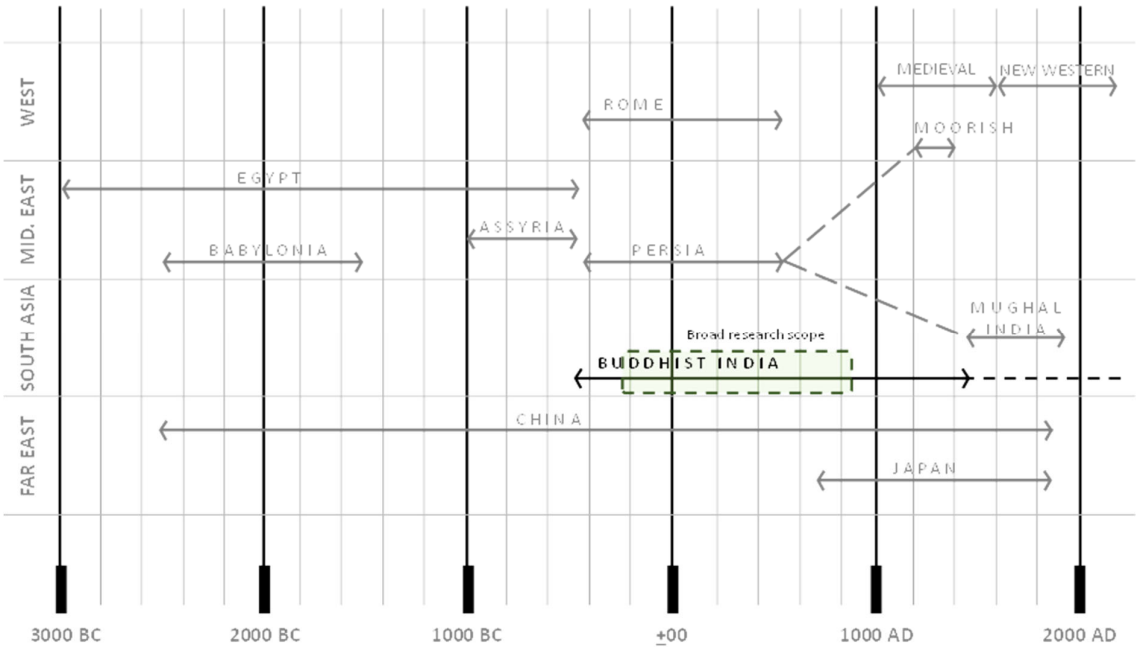


Figure 1-11:Antiquarian value of Buddhist landscape in relation to other global-historical landscape traditions (Source: Author, prepared from Sigiriya Royal Gardens, Cooray Nilan; 2012)

Therefore, one of the main objectives of the current research is to position Buddhist monastic sites in the landscape planning-cum-design and environmentally conscious design realm through a comparative study of varied natural setting in multiple phyto-ecological and geo-climatic locations within India. In doing so, the study attempt is appraised through West European and Indian landscape/ garden traditions.

1.6.2. Conservation, Preservation and Management with the perspective of landscape-environmental interpretation

The study sites of Jetavana (forest grove), Sanchi (hilltop) have been preserved, conserved and managed as archaeological and cultural heritage sites since 1800s through the exploration carried out by Archaeological Survey of India led by Alexander Cunningham. On the other hand, Bharatpur (riverine floodplain) was recently discovered in 1971-75 joint excavation of Archaeological survey of India, Eastern Circle and Burdwan University. But the degree of techno-analytical interpretation of the site since then has not been attempted with respect to the larger landscape setting of the study sites, as will be pointed out in chapter 3. The art-historic antiquarian value and architectural details have influenced the scholarship for the studies in early Buddhist monasticism in India. Hence the policies on conservation or preservation have been dominated by the archaeo-historical studies. Moreover, the advancement in cultural and religious tourism to these sites since the 1900s has dictated the scope for a better construed reading of the site from a larger landscape and environmental perspective. The historical ecology of such sites are the key learnings to today's environmental crises. Therefore, such interpretation would also influence the management and conservation strategies regarding the preservation of the sites.

Since the present study is focused to provide techno-analytical knowledge on the landscape planning and ecological stewardship value, one of the valuable objectives is to re-interpret the interventions and spatial planning methods of then time. This would contribute for the contemplation by the stakeholders of heritage in restructuring the sites' future conservation reflecting on the idea of architectural built elements and landscape elements as part of the same ensemble.

1.7. The approach of study, scope of work and limitations

The principal focus of the present study is to interpret Buddhist monastic sites with a lens of landscape architectonic design. Hence, the research is best approached from a technical-analytical perspective which is explained in detail from chapter 4-6. In such a study interlaced with strong religious connotation many parameters become crucial. For example, the programmatic requirement of that time period, availability of spatial design theories and architectural principles and approach of the original designer. Moreover, the Buddhist normative principles and philosophical parameters are major considerations in the spatial organisation. However, in the study of historical Buddhist monastic sites which existed 1000-2000 years earlier, the original designer remains unknown. Furthermore, the original creator's intent is also unknown. There are no records attributed to the same. Although there are brief indications through medallions or later stage royal accounts, those information cannot be fully

relied upon due to the biased nature of patronage narrative. Such interpretations can only be used to validate the results or site observations carried out for the current research work. Therefore, the only viable choice available to conduct the research work analysing and interpreting the archaeological extant elements at the prototype or study sites.

As the discussion will be followed in chapter 4, 5 and 6, the Buddhist monastic sites under analytical consideration are multiperiod sites preceding (in case of Jetavana) and following Buddha's Mahaparinirvana without any clear hint of transition. Therefore, the research will be restricted to analysis of the best preserved extant remains archaeologically uncovered at the study sites till date. The dominant features and hints of historical landscape structures should only be considered for the analysis.

Another challenge to conduct the study is that these archaeological sites have been overwhelmed by natural forces for many time periods, and due to desertion, the original landscape features such as planting scheme, pathway connectivity or ancient water regime have undergone substantial alterations without leaving behind any physical trace of its ancient original characteristics. Although there has been an attempt to examine the archaeological and historical ecology of Sanchi, one of the study sites in current research, such as pollen study, sediment study from ancient irrigation channels with a view to interpret the vegetation pattern of the ancient time (Shaw, 2007), the results are applicable to a wider landscape and do not look into the micro-level analysis of species richness or diversity.

Language barrier is one of the major challenges faced while carrying out the research work. As many primary documents are scripted in ancient Pali, this study is dependent on secondary literatures such as translated interpretations.

With reference to research focus stated in section 1.5 above, finding specific responses are possible after recognising the landscape and environmental design concepts of the prototype sites and other similar historical built landscapes in ancient India. Since a detailed study of all categories of monastic sites to validate such characteristics is a mammoth scholarly effort, which cannot be attempted through a single study. Thus, the current research is restricted to theorising and interpreting landscape design characteristics of the three prototype sites in their best-preserved representative forms. considered for analysis. Hence, this becomes the first step of a much longer process. In its current best-preserved form, the study sites do not produce all the relevant data needed for this research. Hence, the final result of this study should be treated as first step toward further elaboration in future with more findings. The next steps to be followed will be to read individually other similar built landscape examples to interpret their specific unique characteristics. The comparative features of these historical Buddhist sites will offer a comprehensive understanding of a widespread Buddhist cultural landscape in India over a spatio-temporal scale.

1.8. The structure of the study

Chapter 1 establishes the context of the research topic. It offers a general historic and cultural background for the current research work. Two relevant parameters to this research were inquired in Chapter 2. First, the literature analysis of previous studies and interpretations on

the selected sites of study, with a purview to assess that those approaches can provide a conceptual framework for the intended analysis to determine relationship between extant material remains and its landscape setting. Secondly, the gaps in understanding or perception in the approaches conceived so far at the sites to reinvigorate the essence of environmental planning and spatial organization from then time. The aim of Chapter 3 is to originate a conceptual and methodology for the current research. It also provides an analytical survey of other relevant academic theories and tools employed by academics and scholars and institutes to interpret historical/ archaeological landscapes of Buddhist monastic sites in the light of environmental principles. Considering the aim of the current study and thereby selected study sites, a suitable methodology was devised next with tools and sequential activities to interpret the landscape and environmental planning of the study sites. Chapter 4 analyses and explains landscape development and site planning of a forest-grove monastic site at Jetavana, Sravasti from historic Buddha phase (6^{th} c. BCE) by implementing the methodological structure adopted in Chapter 3. Similarly, Chapter 5 carries out the analysis on a hilltop monastic site at Sanchi, a post-historic Buddha site (3^{rd} c. BCE). Chapter 6 deals with a riverine site at Bharatpur, West Bengal, a post-historic Buddha sites of later phase when Buddhism is spreading out of India. These chapter analyses the natural and physical landscape characteristics – topography, hydrology, vegetation patterns, the interlinks between the laity and monastic site and their implications in the landscape configurations. Hence these three chapters become the fundamental chapters of the study. As next step, Chapter 7 derives precise statements to make a comprehensive and comparative analysis amongst the three sites. Along with that, it studies the association of Buddhism with various plants and ethno-botanic activities to interpret the environmental ethics practiced in monasticism. Chapter 8 is dealt with the parameters that discuss the attitude to various landscape and natural phenomena of Indian Buddhist monastic sites. A theorisation of various landscape traits or characteristics are interpreted in this section. Chapter 9 takes an attempt to provide a creative renewal of the sites back to the time of their pertinent existence. It could help to redevelop prevalent preservation policies and programmes for the archaeological preservation with a landscape understanding beyond monument centric approach. Chapter 10 reconnects the research objectives with the Buddhist environmental ethics and various eco-philosophies derived from modern day tradition of environmental understanding. It establishes an underlying connection among the technical, tangible aspects of study with the embedded intangible philosophical constructs of Buddhist environmental approaches as concluding remarks. Then the final segment suggests other possible future avenues of research that may occur following the current research.

2. Literature review and Previous work

Buddhist landscapes or monastic sites became an interest of contemporary environmental investigation from the 1900s due to the groundbreaking scholarly work of Masao Abe (1971), Alfred Bloom (1989), Ralph Abraham (1990), Robert Aitken (2000), Jason Hawkes (2008), Akira Shimada (2008), Asoka Bandarage (2013), Julia Shaw (2005), Gregory Schopen (2006) etc. The primary intention of these attempts was to record impressions of the natural setting to the sites. The archaeological excavations witnessed a paradigm shift in their programme of documentation, study and interpretation with an investigative nature. This laid the foundation to formulate scholarly practice of evidence-based approach toward landscape understanding between the site and setting. Therefore, from the commencement of UNESCO World Heritage sites listing and inclusion of cultural landscape in the Florence Charter, systematic documentation, study and interpretation of Buddhist monastic sites and other archaeological sites became much more relevant in contemporary planning practices. Thus, the previous scholarly efforts indicate that critical academic interest in Buddhist monastic and/ or archaeological sites can be associated with the following perceptions:

a. Understanding of the chronology of the evolutions of the site and related settlement network.
b. Associative qualities and symbolic virtue of the various features from Art-historical perspective such as decorative images and figurines.
c. Functional value of the monastic establishments from the view of environmental ethics.
d. Linguistic studies on inscriptions and religious tablets.
e. Landscape planning, design and techniques imbibed with architectural design principles.

Out of these, (c) and (e) are of specific interest of the present study. The following subsections are not focused on the critical evaluation of the rationality of the arguments or hypotheses presented by other scholars but an impression of the range of study resources. Thus the discussion is intended to frame an overview of the findings and interpretations from previous academic work forming a relevant context for the current research.

The process follows finding the research gaps from a set of literature in chronological “read in reverse” order,

a. Study of Contemporary literature:
   - Finding the current perspective on the research topic or similar research area.
   - Identifying contemporary scholarships, secondary reading sources.

b. Study of Secondary literature:
   - Finding different secondary reading sources – books, chapters from multi authored books, articles in journals,
   - Museum visits, interviewing scholars – Identifying Primary reading resources

c. Study of Primary literature
   - Identifying core areas relating directly to the research topic.
   - Interpretation to relate with research aim, objective and hypothesis

2.1. General Context: Global Cultural Landscape overview

The Indian cultural landscape setting is a vast plethora of knowledge resource in the context of global cultural landscape system where the Buddhist monastic landscape forms a major part.

2.2. Natural and Environmental Profile of India

The vast geographic extent of India is comprised of two broad bio-geographic regions subdivided into ten zones. With over forty-five thousand floral (Fig. 2-1) and seventy-five thousand faunal species India is recognised as one of the major bio-diversity rich zones.

Figure 2-1: Botanical Provinces of India (source: Hookers proposed from the Flora W640)

India's natural wealth and environmental resources have shaped the cultural landscapes since ages. Buddhist built landscape heritage is undoubtedly one of the outcomes of the same natural process through varied phytogeographical ecosystems. The medicinal practice based on plant resources gave advancement to the ethnobotanic practices by Buddhist monastic institutions. However, the distinct natural geographical landscape of India evolved through various geo-climatic phenomena.

a. Physiographic profile

India is comprised of three physiographic regions such as Peninsular, Extra Peninsular and North Indian Alluvial region (Fig. 2-2).

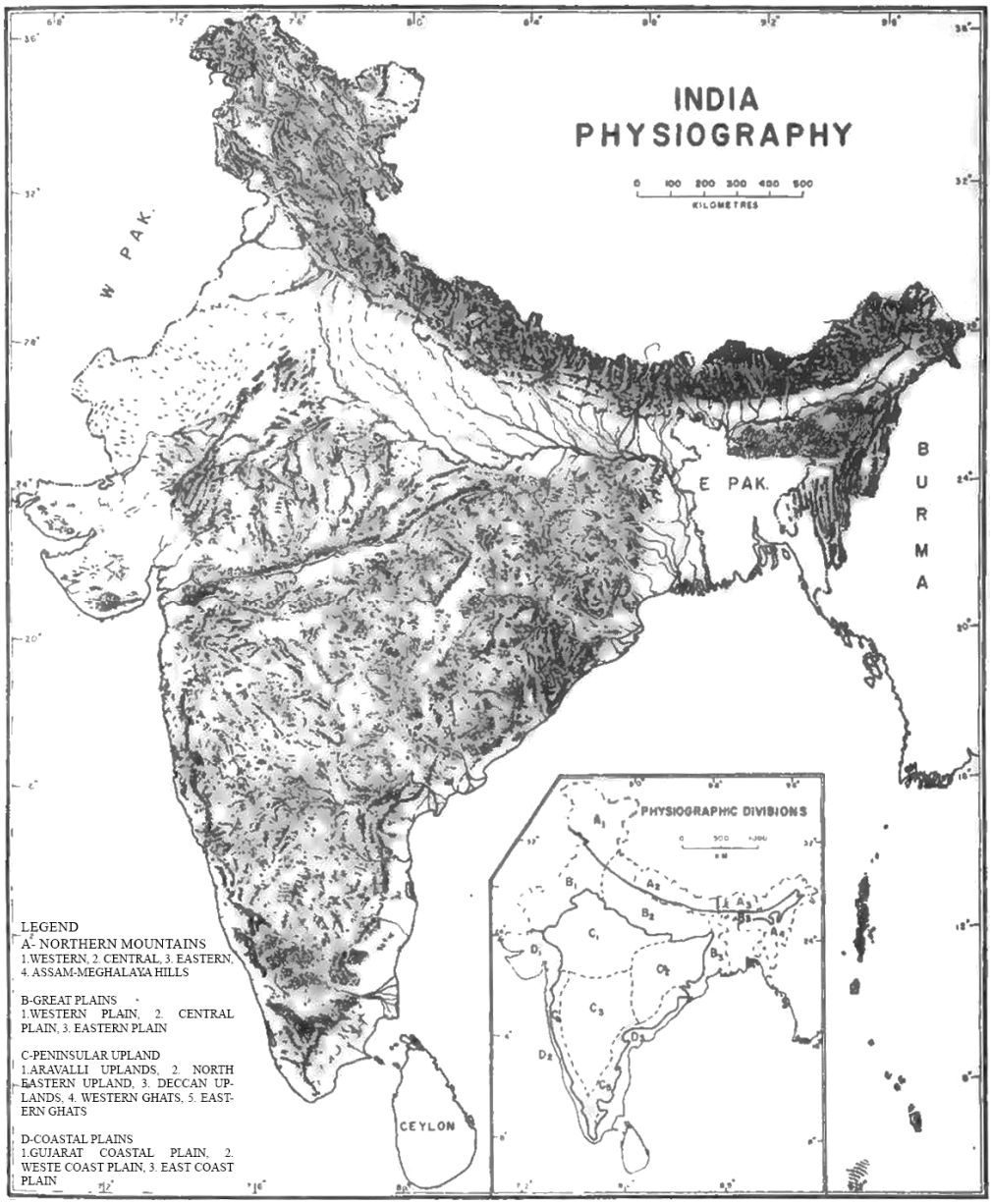


Figure 2-2: Physiographic Map of India (source: Survey of India, 1991)

India's extent can be mapped from Latitude 8º 4', 37º6' N to Longitude 68º7' and 92º25' E and occupies 3,229km (north to south direction) and 15,200km (east to west).

The Peninsular region is formed with plateaus sloping towards western and eastern coast. The MSL ranges over 600m to 900m in this region. The western and eastern ghats, the two plateaus run parallel to coast of India. The Eastern Ghats spread from the Mahanadi River, Orissa to Nilgiris. The land profile is discontinuous in many places.

The Western Ghats meet with Eastern Ghats at the Nilgiri region plateau. The three peaks in this region are Anamalai, Cardamom and Palni.

The extra Peninsular region falls in Arunachal Pradesh to Kashmir. The breadth of this region varies from 240 to 320 km. This particular region is consisted with Hindukush, Karakoram and Himalayan ranges. The average height of this region rises 4570 m MSL avg.

The North Indian plains comprise of Gangetic plain majorly. The states of Uttar Pradesh, Delhi, Bihar and West Bengal forms this part of land with fertile soil from the deposits of various rivers forming a dynamic hydrologic network. One of the study sites Bharatpur, West Bengal is located in this region of riverine flood plain. Punjab and Rajasthan form the upper northern plain as dry region.

b. Riverine hydrologic profile

India is comprised of three broad watersheds (Figure 2-3) namely, i. North Indian Himalayan region, ii. Central Indian Vindhyan region and iii. Western coastal region of Western Ghats. Most of the principal perennial or seasonal rivers are originated from one of these watersheds and impact the regional catchment area totaling up to 3.12 million sq. km. (Hajra, 1996).

The riverine system of Peninsular and North Indian plain regions contributes to 70% and 30% annual discharge respectively. The north Indian rivers are mostly fed with glacier melts from Himalayan region whereas the central and southern Indian rivers are either monsoon or spring fed which imparts the unique seasonal character to their catchments.

One of the study sites Sanchi Hilltop monastery for this current research falls in Peninsular River region which is impacted by the dry climate. The rivers are all rain fed. Hence, the water volume fluctuates annually. How it had created agricultural landscape with natural irrigation network during early Indian Buddhist period is one of the main focuses of the study. The environmental adaptation strategies devised by the monastic institutions gives the idea of environmental forms discussed in chapter 3 and 10.

Figure 2-3: Riverine network of India (source: Singh, R.L. 1971, India, A regional Geography)

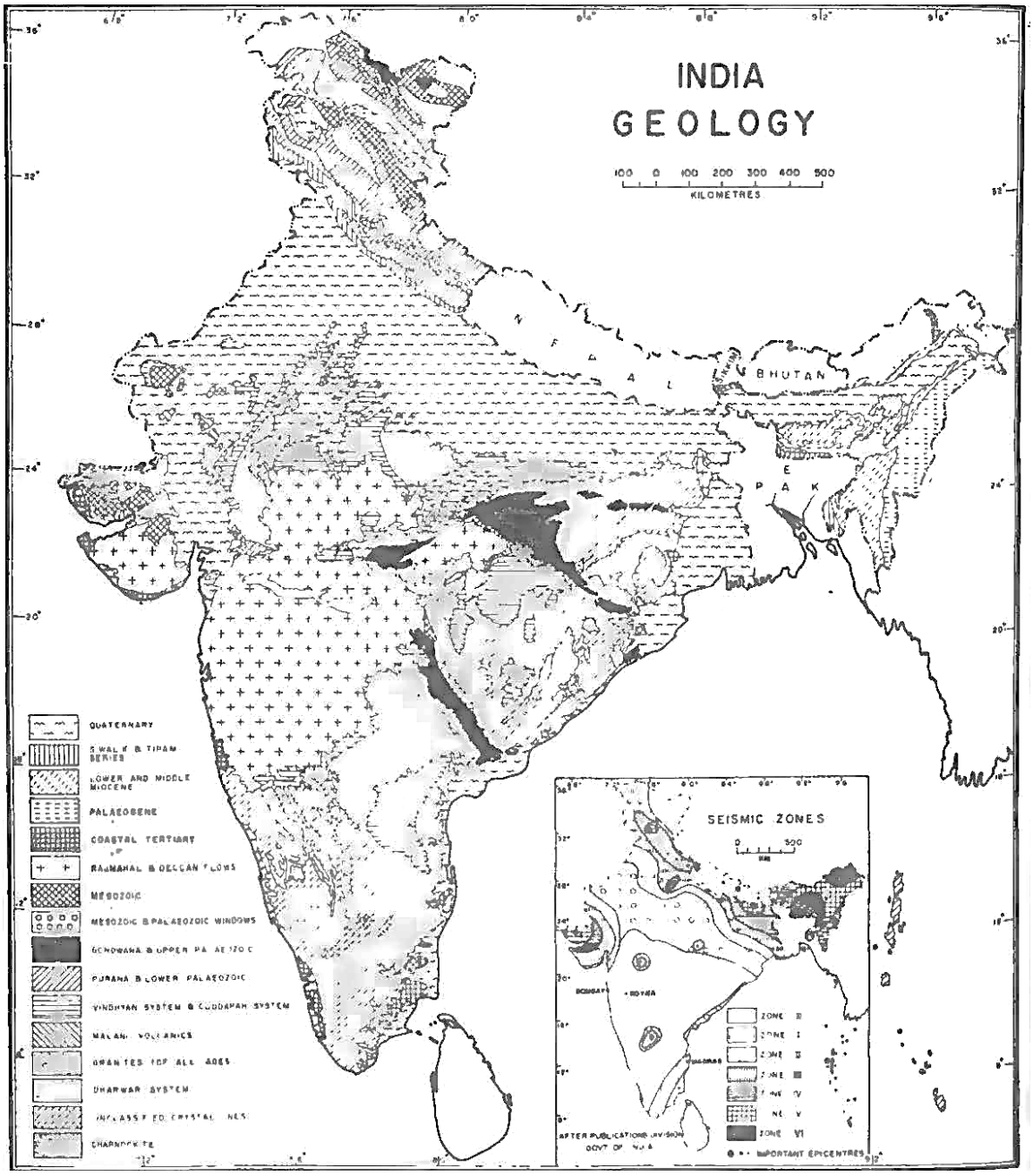


Figure 2-4: Geological Map of India (source: Singh, R.L. 1971, India, A regional Geography)

c. Geological profile

Being a vast country, India's geological profile is much stratified in variety. The rock and soil profiles of India have resulted in varied agricultural and forest patterns. Mostly the Mesozoic era rock formation can be observed in Indian geography (Fig. 2-4).

The Peninsular and Extra-Peninsular regions include Triassic, Jurassic and Cretaceous era rock formations. Spiti and Himalayan region is consisted of Triassic rock formations whereas the Jurassic rock formations can be observed in Kutch, Rajasthan and some parts of Kashmir.

The unique regional rock formation or natural landscape profile of Deccan trap can be seen at the western and southern India which is formed of lava.

The crust of rock, soil formation in India is divided in eight groups, i. Lateritic soil, ii. Black cotton soil, iii. Red soil, iv. Alluvial soil, v. Alkaline or saline soil, vi. Peat and organic soil, vii. Desert sandy soil and viii. Mountainous scanty soil.

The soil profile and their distribution are shown in the following map (Fig. 2-5).

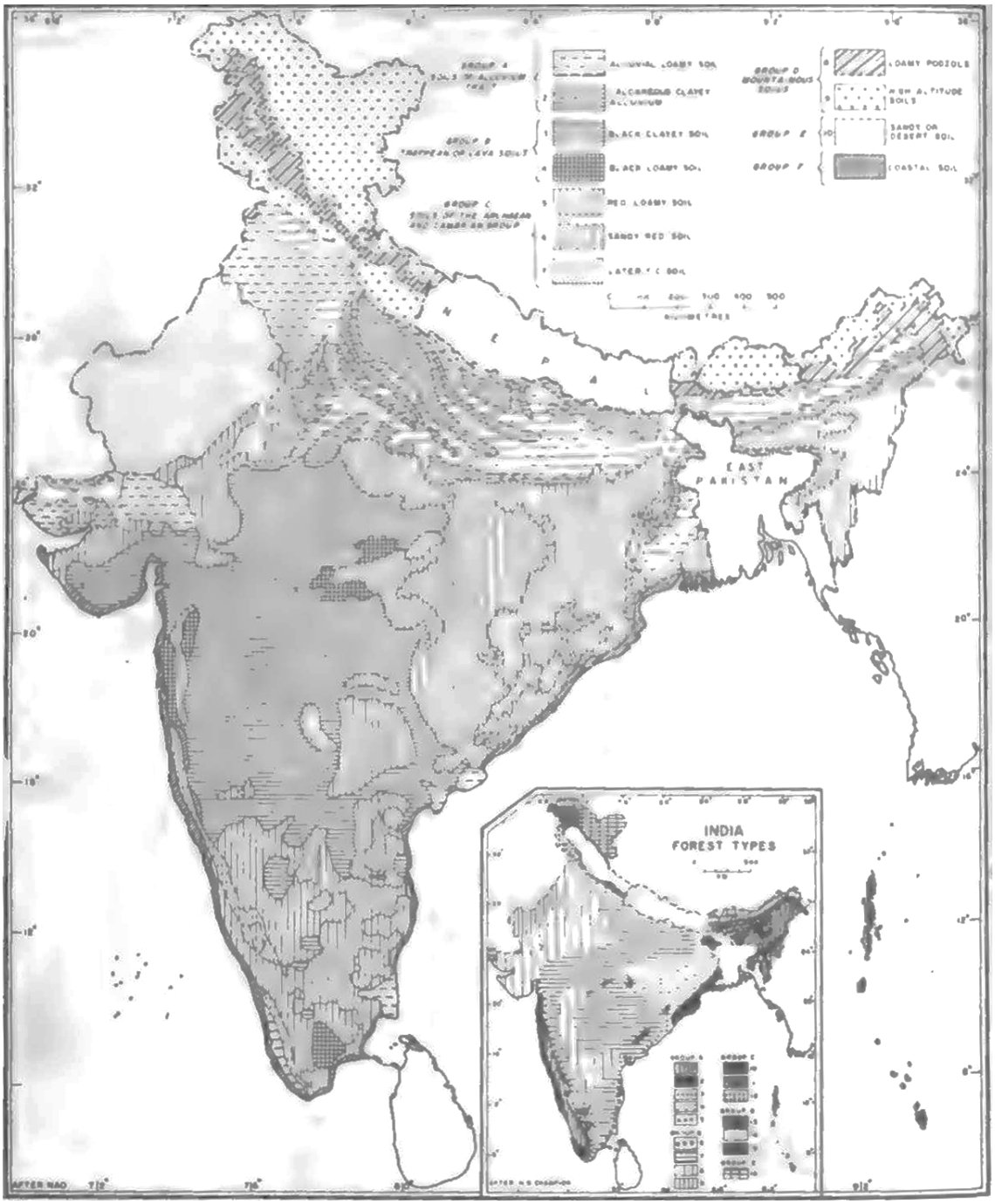


Figure 2-5: Soil profile of India (source: Singh, R.L. 1971, India, A regional Geography)

d. Climatic profile

The unique geo-spatial location of India and its vast land extent generate a varied seasonal and climatic character for itself. The rainfall pattern and its distribution, regional wind flow and temperature variation are major contributors to this.

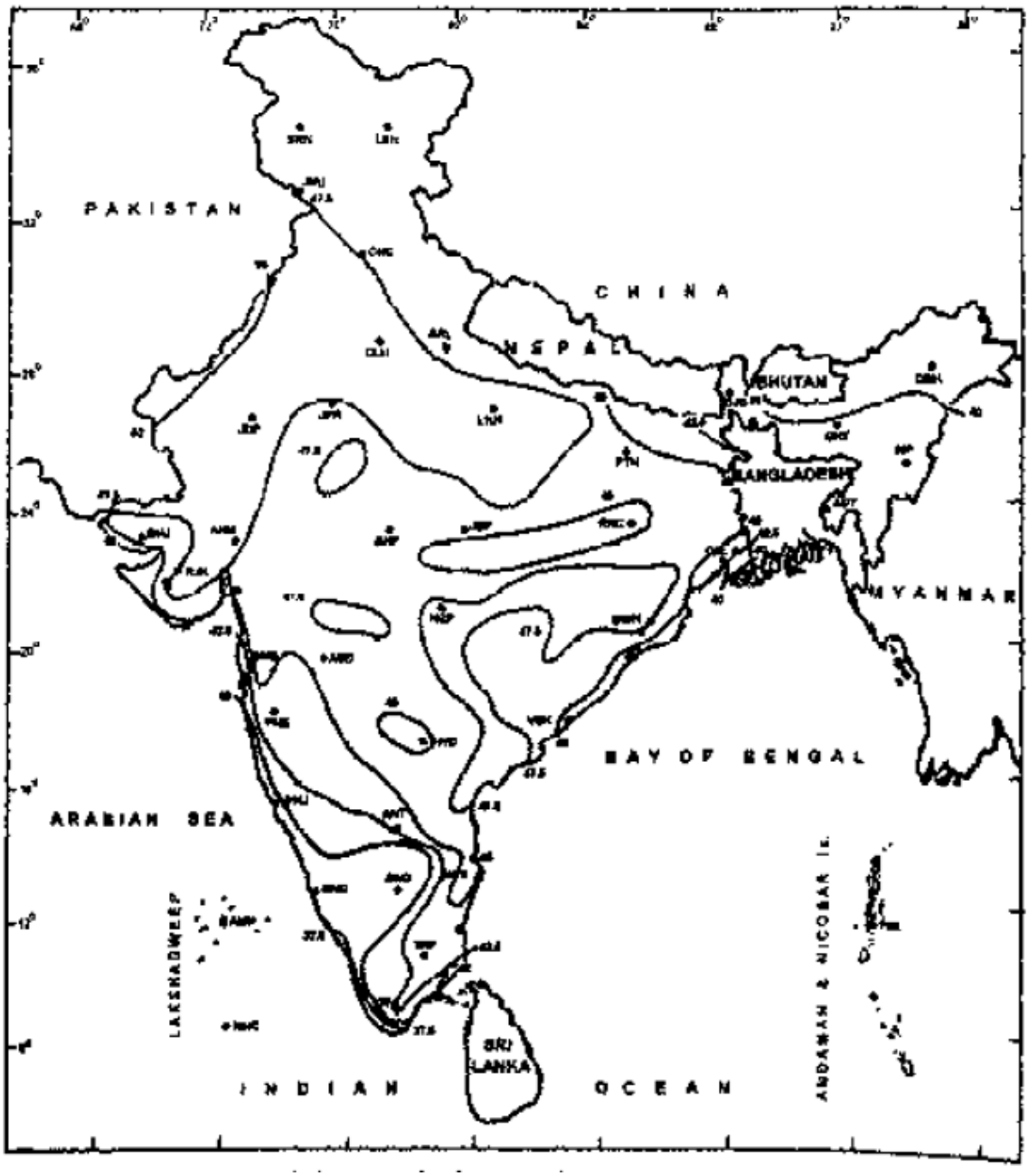


Figure 2-6: Annual Temperature of air in degree Celsius (source: Agroclimatic Atlas of India, Meteorological Department, 1986)

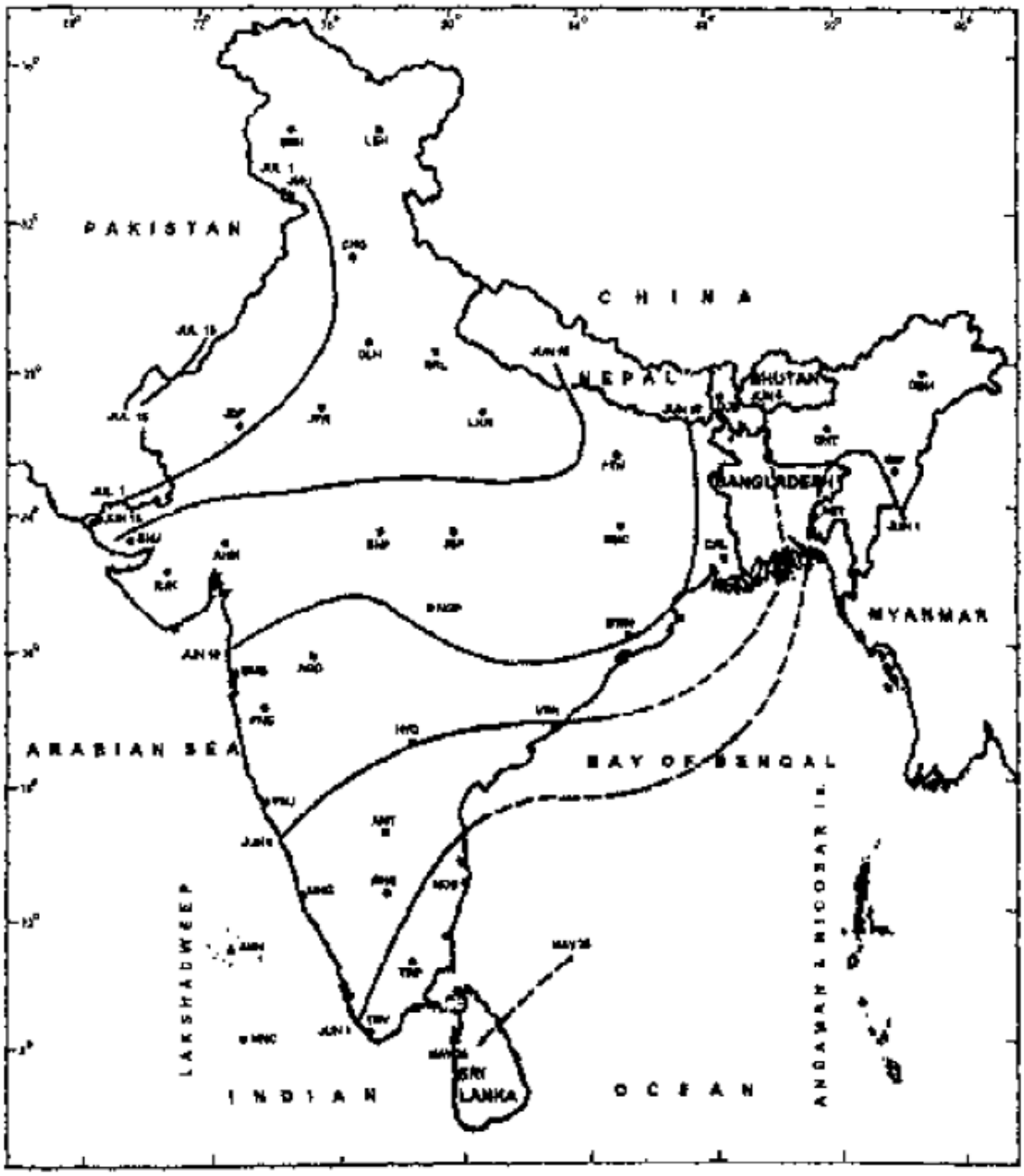


Figure 2-7: Southwest Monsoon pattern of India (source: Agroclimatic Atlas of India, Meteorological Department, 1986)

Two types of seasonal wind flow impact the climate of India, South-West and North-East Monsoon winds. Being in the tropical zone the country's northern part experiences temperate climate (Fig. 2-6 and 2-7). The presence of Himalayan zone is impacting this climatic pattern.

There are majorly four seasons in India, Summer, Monsoon, Autumn and Winter with a varied occurrence of Spring at some regions.

e. Vegetation profile

India, due to its varied physiographic and geo-climatic features exhibits a rich bio-diversity pattern. The richness in floral species surpasses many countries globally. Located in the tropical zone India houses almost forty-five thousand species of flora.

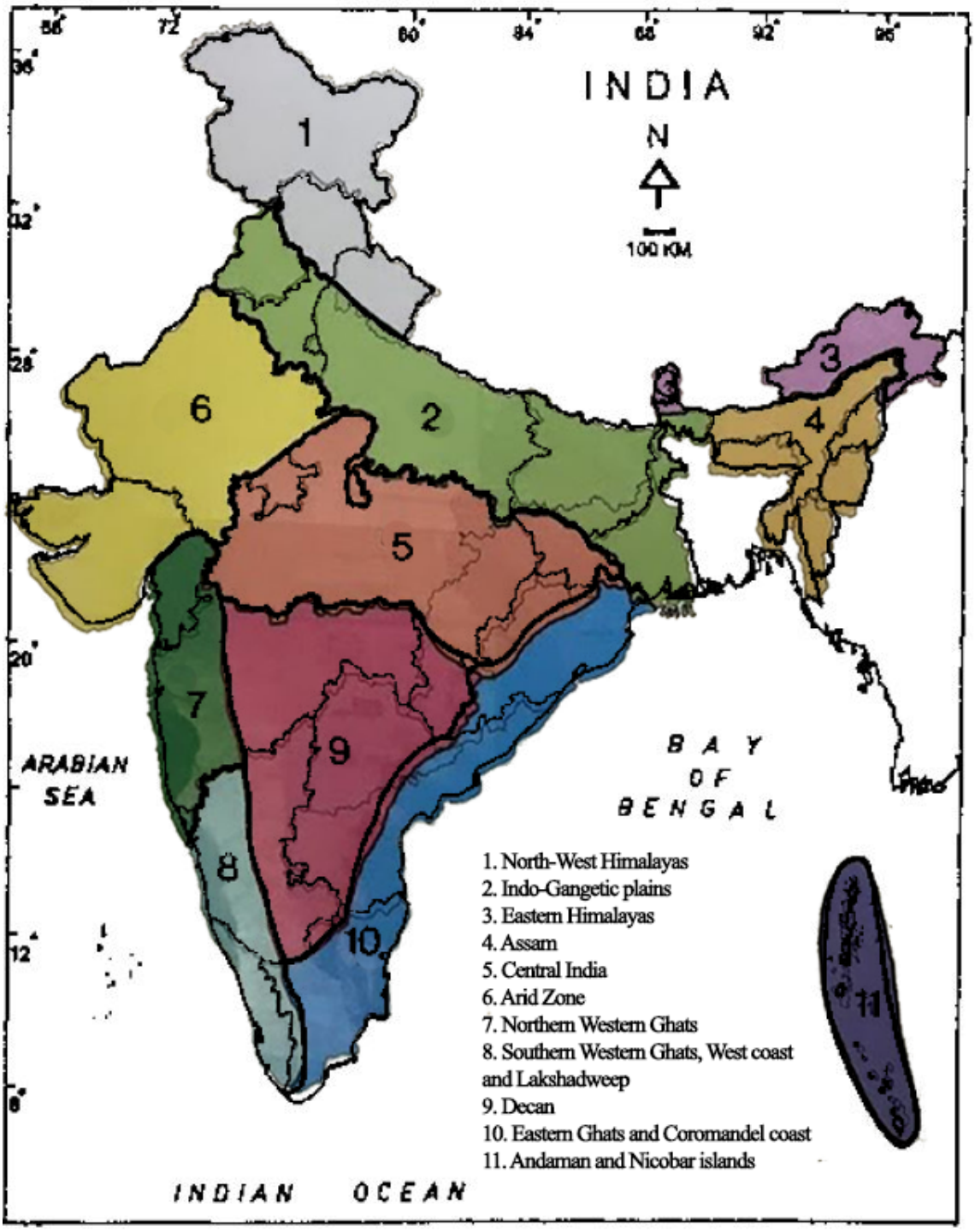


Figure 2-8: Phytogeographic regions of India (source: Botanical Survey of India)

6.8% of global flowering plants can be found in India (Hajra, 1996). A rich bio-diverse mix of endemic species is also found in the Indian landmass. With the present climatic regime India is comprised of total eleven numbers of phytogeographic regions (Fig. 2-8).

2.3. Cultural landscapes in global and Indian context

Various global organisations have defined cultural landscapes with their own unique interpretive qualities. A few most relevant to the current study are presented below,

a. UNESCO – "Combined works of nature and of man' that illustrate the evolution of human society and settlement over time, under the influence of physical constraints and/or opportunities presented by their natural environment, and of successive social, economic, and cultural forces, both external and internal" (UNESCO, 2011). According to the UNESCO World Heritage Convention the cultural landscape is narrated as,
"*The term 'cultural landscape' embraces a diversity of manifestations of the* ***interaction*** *between* ***humankind*** *and its* ***natural environment****. Cultural landscapes often reflect specific techniques of* ***sustainable*** *land-use, considering the characteristics and* ***limits*** *of the natural environment they are established in, and a specific* ***spiritual relation*** *to nature. Protection of cultural landscapes can contribute to modern techniques of sustainable land-use and can maintain or enhance natural values in the landscape."*

b. The National Park Service – "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values".

c. The Landscape Cultural Foundation – "Cultural landscapes provide a sense of place and identity; they map our relationship with the land over time; and they are part of our national heritage and each of our lives.' (Understand Cultural Landscapes, 2022).

d. International Council on Monuments and Sites (ICOMOS) – In current times, ICOMOS has increasingly focused on the ever-expanding evidence that natural and cultural heritage are closely interconnected in most landscapes and seascapes (ICOMOS 2016). The effective and lasting preservation and management of such heritage places depends on better integration of philosophies and procedures regarding their identification and management.

Cultural landscapes can be categorised into three identifiable regimes,

a. Clearly defined landscape – designed or created intentionally by an individual or an entity. Gardens, large parklands are examples of such cases where aesthetics are prioritised to complement monumental structures or building ensembles mostly. They are sometimes associated with historical religious sites also. For example, sacred groves in Ghana that foster traditional medicine and preserve biodiversity date to early peoples.

b. Organically evolved landscape – this is an outcome of complex inter-related social-economic-administrative-religious processes. The response is engraved on its natural

environment continued over time to evolve to their current features. The evolution process reshapes the landscape in two forms,

i. Relict landscape or fossil landscape where the evolutionary process came to a halt either abruptly or over a considerable period. The extant forms or remnant features offers insight to interpret their past forms. For example, Egyptian and Chinese tomb site planning, layout, earth forms and structures are ancient, designed landscape.

ii. Continuing landscape is one where the evolution process is still active with its natural and anthropogenic components. At the same time, it exhibits significant material evidence of its evolution over time. For example, in Norway seashore villages that express the interdependence of the sea and the community in ways of life, craft, work, settlement pattern, land uses and scale

c. Associative Cultural Landscape – is a type that is linked to cultural traditions. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the strong religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent. The associative cultural landscape is the physical place where intangible aspects of cultural heritage are embodied. For example, the sacred mountain of the New Zealand Maori peoples is associated with spiritual beliefs.

On the other hand, India perceives the cultural resources with pluralism, co-existence of contrasting ideas and most importantly, continuity (Thakur, 2011). In the context of abovementioned global categories Indian cultural landscape (ICL) explores more complex narrative of multiple belief systems, diverse cultural regimes and unique eco-geographic patterns. The idea of continuity in ICL makes it unique; natural and cultural heritage are seen as integral entity of socio-economic and socio-cultural living. History is read as renewing and regenerating knowledge system through nature-culture continuum as a part of larger context (Malik, 1975).

Indian cultural landscape could be referred as 'intellectual landscape' (Thakur, 2011), a collective of religious, cultural and semiological values imparted to geographical components. It evolved through collective memories continued through multiple generations and community engagement to shape the landscape around them. The meaning of the featured components often transcends from physical to metaphysical. ICL could be considered as repository of generational memories, interpretive values, cultural dynamism, ecological information and imaginative appreciations. Hence, ICL can indulge to broaden the UNESCO recognized definitions and parameters of cultural landscape and could bring the regional variety.

The narrative of ICL could be found in myths, legends, oral traditions, folklores, administrative archives and religious texts. They are influenced by cultural geography over history (Thakur, 1986). The meaning of natural physiography such as hills, forests, rivers are often associated with sacred values. These metaphysical values in cohesion with human activities shapes the cultural landscapes of India.

A few examples can be illustrated to support the abovementioned argument but unlike global notions ICL sites are overlapped with contrasting yet cohesive features. To name a few, archaeological sites, pilgrimage places, natural geographic lands, regional agricultural practices, biodiverse habitats set the unique spatio-temporal and environmental identity of ICL.

a. Historical monument sites – Best preserved historical and archaeological monument sites can be considered in this category. The remnant forms appear on the landscape such as domed structures, house relics or other architectural elements. These monument sites with horizontal excavations looks beyond to hint toward a settlement pattern in wider archaeological landscape. For example, Sanchi in Madhya Pradesh is one of the best preserved and much studied Buddhist monument sites.

b. Pilgrimage sites – Sites with unique discourse of mythical and/ or religious continuum whose values are imprinted on the regional landscapes forms sacred sites. These sites are continuously evolving over time with human activities reshaping the landscape and environment. Brajbhumi in Uttar Pradesh is one such site where the mythical prowess is sensed and experienced with Lord Krishna's miracles. Braj is revered as 1000-year age old pilgrimage and circumscribed with a 'parikrama' dotted with 12 *vans*, 24 *upvans*, sacred *kunds* and temple complexes including Trans *Yamuna-Gokul*, *Vrindavan*, *Govardhan*, *Nandgaon* associated with narratives of Krishna.

c. Sacred sites - Interweaving myth and faith with place sacred sites transcends their physical values to metaphysical status. have been depicted and illustrated in myths, stories, poems, oral traditions, and religious writings, as well as have been physically materialised via the construction of diverse types of built landscapes, including temples, shrines, funerary structures, and pavilions among others. The distinct pattern of natural characteristics and forms interconnected with the sacred geography of faith and its secular standards aids in developing a unified cultural landscape by integrating humans, place, and faith. The physical and metaphysical oneness establishes continuity, consistency, complexity and comprehensiveness, reinforcing the holistic cognition. The best example can be cited as Varanasi, Uttar Pradesh. The riverside architecture of ghats and the emergence of maths (social/ monastic institutions) and dharamshalas (pilgrimage accommodations) exemplify a sacred settlement typology. It experienced a metamorphosis from ancient holy site into culturally significant landscape of living tradition and intangible heritage.

d. Natural habitats – Eco-sensitive areas like rain forest, mangroves, hilltops, wetlands are large biodiverse habitats spreading across trans-boundary regions. The deep connection between the aboriginals or indigenous population with such places create a narrative of sustainable cultural ecology. Sunderban is a UNESCO World Heritage site as a transboundary mangrove ecosystem. It is home to a biodiverse flora and fauna. The conservation process of this unique landscape is nature-based by the communities.

2.3.1. Relevance of global charters and operational guidelines in current study

Cultural landscapes are gaining recognition in various global platforms nowadays. Starting from United Nations' 1st international meet on World Heritage Convention in 1992 various key parameters and guidelines were formed to strengthen the framework on cultural landscape preservation and management (Fig. 2-9).

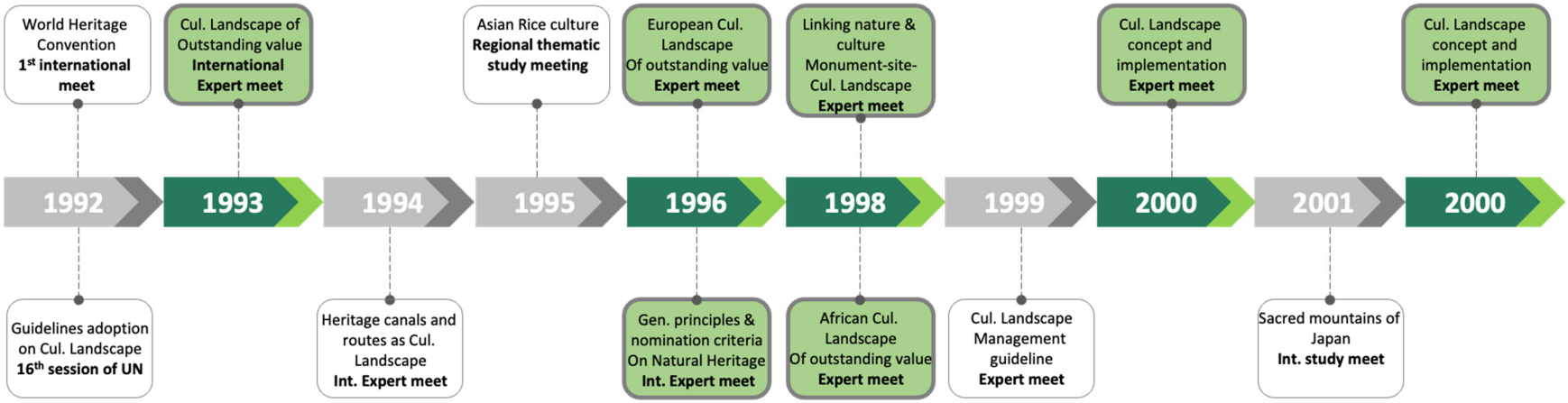


Figure 2-9: Benchmark events toward global cultural landscape recognition.

With the rising significance of preservation and management of cultural landscapes, the influence of Venice Charter and other subsequent guideline documents since late nineteenth century are highlighted in Table 2-1. This series of guiding documents provides insight into the changing concepts of heritage, the approach to preservation, and the issues, dilemmas, and sometimes heated debates of different decades (Cevat, 1977).

Apart from art-historical and built heritage values a simultaneous awakening impacted the cultural values and meaning of heritage; the rise of environmental movement (Goetcheus and Mitchell, 2014). Various weather phenomena have been recognised with the interest of understanding anthropogenic impact on nature as well as historical built heritage (Lowenthal, 2000). This initiative was elevated during the Burra Charter (The Australia ICOMOS Charter for Places of Cultural Significance) in 1975 and 1979 where "historic gardens, landscape and environment" (Ahmad, 1975) were included in the gamut of cultural heritage. The significance was further illustrated as "Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places, and related objects" (Ahmad, 1979).

Table 2-1: Key international guidelines illustrating values on cultural landscapes and their relevance in current study

Document	Organization that crafted document	Date	Terms used, not necessarily defined	Values articulated & implied	Influence on cultural landscapes	Relevance to the research
Athens Charter for the Restoration of Historic Monuments	First International Congress of Architects and Technicians of Historic Monuments	1931	monuments, sites	historic, aesthetic, scientific, artistic	suggested encompassing areas around monuments	
The Safeguarding of the Beauty and Character of Landscapes and Sites	General Conference of UNESCO	1962	beauty, character, cultural, heritage	aesthetic (natural or man-made), cultural, moral and spiritual regeneration, economic, social	acknowledged human degradation to nature and culture in nature, with an attempt to take action	
International Charter for the Conservation and Restoration of Monuments and Sites (Venice Charter)	General Assembly of ICOMOS	1964	historic monument, site, setting	authenticity (materials/ documentation)	formalized acceptance of site and setting as valued cultural heritage, first to suggest authenticity as a litmus test	
Convention concerning the Protection of the World Cultural and Natural Heritage	General Conference of UNESCO	1972	cultural heritage (monuments, groups of buildings, sites), natural heritage (physical/ biological, geological/ physiographical, natural sites/ natural beauty)	historic, aesthetics, ethnological, anthropological, scientific, conservation	Gave equal focus to both cultural and natural values as they relate to heritage; genesis of "landscape approach"	
The Australia ICOMOS Charter for Places of Cultural Significance (Burra Cheater)	Australia ICOMOS	1979	place, cultural significance, intergenerational equity, fabric	multiple co-existent values (historic, aesthetic, scientific, artistic, social or spiritual for past, present, future generations)	Significantly reinforced concepts of multiple co-existent values and intergenerational equity, moved beyond material significance	
Historic Gardens (Florence Charter)	General Assembly of ICOMOS	1982	historic garden, historic site, architectural and horticultural composition	historic, artistic	Applied value and significance to living materials (plants)	

Document	Organization that crafted document	Date	Terms used, not necessarily defined	Values articulated & implied	Influence on cultural landscapes	Relevance to the research
Operational Guidelines for the Implementation of the World Heritage Convention	UNESCO	1992	Cultural landscape, defined landscape, organically evolved landscape [relict (fossil), continuing landscape], associative landscape	outstanding universal value	defined cultural landscape types and acknowledged their value as cultural heritage	
The Nara Document on Authenticity	ICOMOS	1994	Cultural diversity, heritage diversity, authenticity, information sources	cultural diversity, heritage diversity, tangible and intangible resources, use and tradition	redefined authenticity as a qualifying tool for values, reinforced and enhanced tangible/ intangible concepts, socio-cultural values, and that different cultures value their heritage in different ways	
Natchitoches Declaration on Heritage Landscapes	US/ICOMOS	2004	Biodiversity, cultural diversity	interdisciplinary approach, community-based processes in planning and management of cultural landscapes, traditional practices, living traditions	Reinforced integral relationship of natural and cultural resources using updated terminology	
Recommendation on the Historic Urban Landscape	ICOMOS	2011	Historic Urban Landscape, sustainable development, historic urban landscape approach, historic urban landscape toolkit	social cultural, economic processes in the conservation of urban values, layering of values (cultural and natural), memory, cultural diversity, heritage diversity, creativity, participatory planning, stakeholder consultations	Applies the "landscape approach" to historic urban environments, reinforces concept of multiple values inherent in historic urban environments and the need to plan and manage them	

Keys:  Strong  Moderate  Minimal

As explained in chapter 1 the commonalities present in the study sites are nature, culture and historicity. They are weighed against the global categories of cultural landscapes mentioned in section 2.3. The relevance metrics is provided to correlate which characteristics are most relevant to the study (Table 2-2). On basis of that key literature, scope of work and methodological framework is devised.

Table 2-2: Categories of cultural landscape and their implications on current study

Operational Guidelines Category of cultural landscape	Definition	Relevance to the research	Remarks
Defined Landscape	The most easily identifiable is the clearly defined landscape designed and created intentionally by man. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.		- Association with Buddhist monuments
Organically Evolved Landscape	This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:		- Association with Buddhism - Evolution through time - Natural significance of monuments
Organically Evolved Landscape Subcategory 1: relict (or fossil) landscape	Relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.		
Organically Evolved Cultural Landscape Subcategory 2: continuing landscape	Continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.		
Associative Landscape	The final category is the associative cultural landscape. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.		- Association with Buddhism - Monastic cultural practice - Monastic site establishment - Nature based selection

Keys:  Strong  Moderate  Minimal

2.3.2. Learning values of Indian Cultural Landscapes

Indian cultural landscapes are replete with multiple learning values. In depth study offers a renewed and refreshed approach to learning about the unearthed values of these nature-culture continuum imprinted on historical frame. The learning values could be interpreted from Florence charter (1982) on historic garden (Singh, 2022) as follows,

a. **Historic value** – ICL sites are repositories of our past heritage; social art and architectural and natural heritage. The built remnants are the narrative of that period frozen in time which bears the meanings through various association with nature and surrounding contexts. In connection to that, they can also reveal the human settlement patterns and their socio-cultural transformation and evolution over a period of time.

b. **Cultural value** – The nature-culture continuum illustrates how man shaped their surrounding natural setting out of social, cultural and/or environmental necessities. The habitation practice was also in turn reshaped by the nature. Historic and archaeological sites are filled with such interpretive cues which this study attempts to explore. The benchmark events and their commemorative memorabilia are signs of such cultural practice of that particular site and region. They offer insight on customs, rituals, land use pattern and design intent of built heritage reflecting the religious and symbolic values also.

c. **Ecological value** – Archaeological sites, living monuments sites, sacred landscape sites exhibit a sensitive response as siting principle to the contextual natural systems and ecological processes. They are also habitat to various flora and fauna as they are comparatively less frequented by visitors. Furthermore, pollen analysis could offer knowledge on the flora of past time. Historical ecology of the sites surely can unearth the environmental stewardship followed during then time.

d. **Technological value** – These sites display a technical innovation of that period how natural resources are leveraged to create the built fabrics. This may include sustainable irrigation pattern, planting techniques, water structures at higher elevations. Skills and technologies adapted by socially cohesive communities of the then period inform us of the scientific temper and harmony with nature.

e. **Knowledge continuity value** – Cultural landscape sites act as system of traditional knowledge which could be implied to contemporary design and planning. By virtue of being them used as research and teaching sites, they have potential to yield information of both natural and cultural histories.

2.4. Archaeology of religion and Early Buddhism in India

Archaeologists have faced challenges establishing relationship between extant remains and the ancient religion to which it belonged. Ancient Indian Buddhist monuments still have fair indications left in their ruins to corelate its religious functions with the archaeologically interpreted spatial entities. Through the literary sources it is obvious that many of the largest

and grandest archaeological remains of the monastic sites have had noticeable religious activities and meaning to the surrounding communities in the past. But the process of archaeological interpretation often disregards this interaction or vis-à-vis influence of the religious monuments and its contextual setting. At times, archaeological interpretations have been little more than fanciful reconstructions, with religious monuments serving as elaborate tests for archaeologists carrying their own religious understanding and bias. When dealing with relating the extant remains with the past religion, the archaeologists have heavily depended upon the literatures and text-based materials. Thus, there has always been a push to working toward confirming the occurrence of events as mentioned in the written scriptures. With the assumption of the occurrence of those events at the site the process was made more convenient to adopt. So, finding the place of occurrence became the key purpose for archaeology than to interpret the process or reasons of occurrence through a prolonged period of time in the past. Cultural landscape approaches the same event in other way round. It focuses on the process of change and tries to interpret the site as a harmonious whole of architecture and landscape interaction.

In case of early Buddhist monastic practice in ancient India the predominant mode of interpretation was art-historical or architecture in isolation. But the landscape and natural setting influenced the monastic site planning substantially. As the discipline of archaeology takes multidisciplinary platform, landscape becomes a significant part of the interpretive reconstruction.

With a substantial growth in the demands for rigorous archaeological interpretations and scientific reasoning, a new approach to the archaeology of religion emerged – avoidance. This approach was most articulately advocated by Christopher Hawkes in his 'ladder of inference" (Hawkes 1954, p.162),

"if material techniques are easy to infer to, subsistence-economics fairly easy, communal organization harder, and spiritual life hardest of all, you have there a climax of four degrees in reasoning."

Many a number of new approaches and theories to the archaeology of Buddhism have developed in last decades. These could be largely represented into two types. The first is an outgrowth of procedural archaeology, taking into account the idea that past religions could be inquired through the interpretive approaches for the identification of the extant remains at the sites. This approach has been pronounced by Colin Renfrew (1985, 1994). He inferred about the religious connection with the material remains in the archaeological site of Greek island of Melos. The method is referred as cognitive archaeology (Renfrew and Zubrow 1994).

A second approach toward the archaeology of Buddhism focuses on more theoretical and philosophical issues regarding religion, arguing that a fundamental misunderstanding of what religion actually is has clouded the archaeological inquiry (Insoll 2004).

2.5. Previous studies and interpretation on Buddhist monastic practices

A comprehensive literature study was conducted to understand the extent of previous work and presented in the following tables 2-3, 2-4 and 2-5 on spatial, philosophical and environmental aspects.

Table 2-3: Key literature analysis with perspective of spatial interpretation

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
1	Journal: Buddhist monasteries facilitated landscape conservation on the Qinghai-Tibetan Plateau	Naixin Cui · Tong Wu · Yi-Chen Wang · Huiting Zou · Jan Christoph Axmacher · Weiguo Sang · Luo Guo	2022	Spatial (Landscape components distribution)	The existence of monastic establishments within natural setting is uniquely inter-related with the sustainable habitation and safeguarding of natural environment and resources.	The outcome of this study strongly agree to the notion that Buddhist monasticism, as established through its physical institutions and communities, are influential in achieving landscape environmental sustenance.
2	Journal: Remote sensing investigation of the Buddhist archaeological landscape around Sannati, India	Gupta Ekta, Rajani M.B., Menon Srikumar	2019	Spatial (geo-spatial analysis)	Use of remote sensing techniques to unearth pre-occupied culturally significant archaeological heritages and places. Reading and analysis of technical maps and data to interpret the extent of Buddhist monastic site which existed in 3rd c. BCE.	Substantial hint given on the process of discovery of other potential archaeological sites around the study site. A deeper study can be conducted to understand the spatial and environmental form of the cultural landscape extent of the site.
3	Journal: New Understanding of Buddhist Cruciform Temples in Early Medieval Bengal	Hoque Seema, Hoque M.M.	2019	Spatial analysis, architectural study	Bringing clarity between the difference in Buddhist temple and Hindu temple forms and architectural styles. Comparative study of architectural plans of	Any bearing on topographical features were not explored in this study. Contextual adaptation or selection of site to establish a typical norm-based form within natural setting needed more attention.

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					temples' extant forms situated in Eastern India to generate a volumetric perception.	
4	Journal: Nature and Buddhist Architecture: Sri Lanka	Silva W. De	2017	Buddhist performance, Buddhist architecture, natural landscape	-Natural landscape influences Buddhist performances, shaping built landscape and architecture. It studies literature in Buddhist philosophy, phenomenology of landscape and place. It analyses the relationship of settlements patterns with the physical features and landscape layers of its location, focusing on ritualistic activities. A figurative expression of different typology of Buddhist sites is provided.	Buddhist understanding with natural landscape and divine experience of natural landscape with mythical landscape in a variety of ways, resulting natural–cultural–archetypal places. These kinds of place understanding reflect inherent relationships developed between people, nature and their designs. Nature and architecture are interlaced within these complexities of landscape phenomena.
5	Journal: The expanse of archaeological remains at Nalanda: A study using remote sensing and GIS	Rajani M. B.	2016	Spatial analysis, Archaeological interpretation	Use of remote sensing techniques to unearth pre-occupied culturally significant archaeological heritages and places. Reading and analysis of technical maps and data to interpret the extent of Buddhist monastic site	Substantial hint given on the process of discovery of other potential archaeological sites around the study site. A deeper study can be conducted to understand the spatial and environmental form of the cultural landscape extent of the site.

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					which existed in ancient India.	
6	Journal: Stūpa to Maṇḍala: Tracing a Buddhist Architectural Development from Kesariya to Borobudur to Tabo	Chemburkar Swati	2016	Architectural, spatial interpretation	A cosmological and philosophical connection with Buddhist architectural endeavours. Planning of various elements of monastic establishments are seen as outcome of the philosophical construct.	The relationship with site and wider landscape setting was not fully explored. The extension of the philosophical form how influences the larger cultural landscape extent could be studied further.
7	Journal: The Reconstruction of Buddhist Landscape Planning of Kagyu Samye Ling Monastery in Scotland	Li Xin, Ma Pinlei, Ma Xiuyao	2015	Spatial interpretation on landscape, Reconstruction methodology	Well documented account on historical Buddhist site and revival techniques of the spatial characteristics matching with various old and archival references and resources.	The process and methodology has been adopted for the current research in the chapter of conjectural impressions of the study sites.
8	Book: Garden and Landscape Practice in Pre-colonial India: Histories from the Deccan	Ali Daud by Routledge ISBN-13: 978-1-138-65986-5 (pbk)	2015	Analytical, Narrational, Interpretive	A narrative account on different garden styles and practices observed in southern India to throw some light on the history of built landscape from medieval India.	Ancient historical gardens are not explored much due to lack of documentation and physical evidence of extant remains of ephemeral components of landscape such as plant materials or temporary garden elements.
9	Journal: Rethinking of Buddhist Architecture of	Hoque Seema, Hoque M.M.	2014	Spatial analysis	Varied types of architectural forms evolved in later phase of Buddhism is studied in this paper.	Any bearing on topographical features were not explored in this study. Contextual adaptation or selection of site

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
	Bangladesh in Typological perspective				Focus on architectural forms unearthed the regional variations and their reasoning behind it.	to establish a typical norm-based form within natural setting needed more attention.
10	Journal: The Buddhist "Monastery" and the Indian garden: aesthetics, assimilations and the siting of monastic establishments	Schopen Gregory	2007	Landscape history, Spatial interpretation	Narrational account on Buddhist gardens, their elements used and a faint hint on ethnobotanic practices. Well documented resource for understanding scripture influenced practice of built landscape designs.	No spatial extent is interpreted. Components of gardens have influenced the chapter of theorisation and conjectural reconstruction for the current study.

Table 2-4:Key literature analysis with perspective of philosophy and history

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
1	Journal: A Study on the Ruins of Buddhist Monasteries in West Bengal	Das Bhaskar, Mandal Prasenjit Kumar, Chakrabarty Premangshu, Das Saswati	2022	Archaeology, History	West Bengal's position in Buddhist cultural landscape heritage.	A new purview is brought, spatial analysis of the Buddhist monuments to interpret its potential for religious tourism
2	Journal: Roaming free like a deer: Buddhism and the natural world	Capper Daniel	2020	Philosophical	A critical analysis of Buddhist environmentalism is showcased here.	Impact on spatial planning is not described. Socio-religious perspectives are given more importance for the discussion.
3	Journal: A Holistic Evaluation of Buddhism Literature: A Bibliometric Analysis of Global Publications Related to Buddhism Between 1975 and 2017	Senel Engin, Ghouse Modin Nabeesab Mamdapur	2020	Statistical, Analytical account of history and scholarly articles published till date	A comprehensive scientific study and analysis of the research conducted on typology of Buddhist literature.	This helped in formulating the literature analysis for the current study. A well-documented source to find the appropriate research material repository.
4	Journal: Study on the Sanchi Stupa Ruins	Panyalertsinpaisarn Kongpop	2020	Buddhist Studies, General history	Archaeological and historical account of the World heritage site	Spatial analysis is missing.
5	Journal: Existence of Buddhist Monument	Shahi D.K.	2019	Philosophical, Historical	A morphological analysis of the Buddhist cultural landscape of Central Asia. It reveals the history and	Interpretation for environmental and ecological roots are not elaborate in this study.

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
	in the Cultural Landscape of Central Asia: Interpretation and Reinterpretation				geography of the spread of Buddhism along the Silk Route. Besides, it also evaluates the role of cultural landscape in the diffusion of Buddhism in Central Asia.	Architectural spatial category is not interpreted for the perception of scale or spatial arrangement in the site within the landscape setting.
6	Journal: Research-Based Design Approaches in Historic Garden Renovation	Fekete Albert, Kollányi László	2019	History, Philosophical	Scientific approach and its detailing for historic garden's character re-establishment	Helpful for current study in formulating the theorisation chapter for revival of landscape features.
7	Journal: Sigiriya: An Early Designed Landscape in Sri Lanka	Dumas Divya Kumar	2018	Historical landscape evolution	A detailed account of a cultural landscape site set on similar climatic zone from ancient era.	Similarities found with Indian Buddhist monastic sites in spatial and environmental forms.
8	Thesis: A study of stupas and votive stupas in Orissa	Chauley Meenakshi	2015	Historical account of evolution of stupas in a region	Evolution of stupa typology in easter state of India and their philosophical connection with laity	No diagrammatic approach was taken to manifest the translation of philosophical idea into built monastic landscape.
9	Book: An Archaeological History of Indian Buddhism	Forgelin Lars Oxford University Press ISBN 978–0–19–994821–5 (hbk.); 978–0–19–994823–9 (pbk.)	2015	Historical account, Archaeological details	Theoretical and conceptual approach to understand Buddhism from a material perspective. Major focus on written accounts of Archaeological remains forcefully demonstrates the impermanence of even the	Focused on written accounts of transcendent beliefs concerning the spiritual world at the expense of material expressions of faith in the mundane, earthly world. Departure from ascetic sangha life at the marginal areas of city and joining with city laity, who started

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					greatest architectural and art works from ancient timeline. Accordingly, an archaeological history of Indian Buddhism have been combined with both textual scholarship and archaeological scholarship to produce a more comprehensive understanding of the origin, development, and eventual collapse of Buddhism in the place of its germination.	pilgrimage to key sites related to Buddha's life or the burial stupas. Sangha gradually settled into the monasteries (a hint of modification in spatial configuration) the sangha began adopting the practices of lay Buddhism—worshiping at stupas and, by the early to mid-first millennium CE, Buddha images. thus began a gradual degradation of the pure, ascetic tradition of forest monks in favour of scholastic Buddhism centered in monasteries.
10	Journal: Buddhist and Buddhist legacies in Modern Bengal	Datta Karubaki	2014	Analytical, historical	Account of later phase Buddhist monastic expansion and institution in easter India.	No spatial configuration given to assess the potential of Buddhist monk and laity exchange at the days of past they glory.
11	Book: The Sacred Garden of Lumbini Perceptions of Buddha's birthplace	Published by UNESCO Compilation by Kai Weise ISBN 978-92-3-001208-3	2013	History Sacred landscape narrative	Lumbini, where Siddhartha Gautama was born, was a forest or a garden. The discussion here revolves around the question whether the setting was a natural clearing in the forest or	Varied details regarding the setting of Lumbini (garden or forest or village or forest clearing) The outcome of the approach (finding historical facts), which definitely was embedded in a colonial

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					whether it was an artificially created environment All of the Buddhist literature available agrees on the existence of a salvana ('sal forest'), a Lumbinivana ('Lumbini forest') and Mahavana ('great forest') in Kapilavastu. An important part of knowledge about Lumbini is based on archaeological records. The notions of tranquillity, universality and clarity that permeate the Kenzo Tange Master Plan reflect an attempt to translate the spirituality of the place into a physical environment. Native trees and trees associated with Lord Buddha page no.146	context and discourse, was that different aspects of the textual, art-historical and archaeological sources became neglected during the hunt for positivist results, which tried to answer questions like: did it, and if so, when, where and how did it happen?
12	Journal: Luminescence dating of brick stupas: an application to the hinterland of Anuradhapura, Sri Lanka	Bailiff Ian K., Lacey Harriet R., Coningham Robin A.E., Gunawardhana Prishanta, Adikari Gamini, Davis Chris	2013	Scientific methodology, Analytical, Chronological study	Archaeological process in detail is presented here to find antiquarian value of the archaeological heritage site.	An account of landscape extent interpretation is presented and interaction with settlement network.

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
		E., Manuel Mark J., Strickland Keir M.				
13	Journal: Study on Cultural Landscape and its Research Path of Cultural Geography: A case study of Tibetan Buddhist Cultural Landscape	Xu Wenting, Lin Jianqun	2013	Buddhist Cultural landscape, Research methodology	An account of cultural landscape formation over time influenced by physiographic layers of the place.	Landscape and environmental values of the cultural landscape sites in Buddhist practice are not explored to the fullest.
14	Book: The Sigiriya Royal Gardens: Analysis of the landscape architectonic composition	Cooray Nilan	2012	Architecture and the Built environment, Sirene Ontwerpers, Rotterdam ISBN 978-1480030978	Architectonic and techno-analytical approach is taken to understand, analyse and interpret the cultural landscape site at Sygiriya.	The methodology is adopted for the current study context.
15	Journal: The Mythic Landscape of Buddhist Places of Pilgrimages in India	Singh P.B. Rana & Pravin S. Rana	2011	Philosophical, Historical narrative	Sacred places in Buddhism creates the notion of pilgrimage as preached by the historic Buddha himself. Association of sacred sites to Buddhism (Gangetic plain) and their significance in archaeological and historical perspective are explored here. A schematic ideation of spatial quality of the sites and	Mostly the philosophical and historical purview of the sacred sites are given. Provides a rough illustrious imagery of the sites but in isolation; not relating to the landscape context. The interrelation with the geographic setting is not clarified in detail.

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					geographical setting is presented	
16	Book: Early Buddhist Transmission and Trade Networks: Mobility and Exchange within and beyond the Northwestern Borderlands of South Asia	Neelis Jason Koninklijke Brill nv, Leiden, The Netherlands ISBN 978 90 04 18159 5	2011	Philosophical, Historical narrative	Exchange between Buddhist monastic institutions and laity network is explored. The normative instructions were modified to adapt to the contextual changes of space and time.	No account on landscape context or bearing on resource management is proposed in this study.
17	Report: The Anuradhapura (Sri Lanka) Project: The Hinterland (phase II), Preliminary Report of the First Season 2005	Coningham Robin, Gunawardhana Prishanta, Adikari Gamani, Katugampola Mangala, Simpson Ian and Young Ruth	2009	Analytical, Scientific methodology	Account of archaeological explorations of the site and its surrounding.	The report does provide a hint for landscape extent interpretation but no philosophical construct.
18	Book: Buddhist stupas in south Asia: Recent Archaeological, Art-Historical, and Historical Perspectives	Hawkes Jason, Oxford University press ISBN-10: 0-19-569886-X	2008	Historical analysis and interpretive account	A detailed analytical account spread with philosophical, art-historical narrative for various archaeological Buddhist sites in early ancient India.	Hints for interpretation for environmental, cultural and landscape values for Buddhist monastic archaeological sites.
19	Journal: The Buddhist "Monastery" and the Indian Garden:	Gregory Schopen University of California, Los Angeles	2006	Philosophical, Narrational	Gardens are termed as Viharas or "aramas" in early Buddhist texts	No mention of size or scale No mention of spatial organization

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
	Aesthetics, Assimilations and the Siting of Monastic Establishments	Journal of the American oriental society 126.4			Gardens associated with "monasteries" or "cloisters" invoke a vision of an isolated, chaste, serene, ascetic and austere space	
20	Book: Sacred places and Modern landscapes – Sacred geography and Social-Religious Transformations in South and Southeast Asia Ch.I – Mapping the sacred in Theravada Buddhist Southeast Asia	Ronald A. Lukens Bull, Juliane Schober Arizona State University program for Southeast Asian Studies ISBN 1-881044-32-7	2003	Philosophical, Narrational	Social and historical location of Buddha illustrates notions of Theravada Buddhist sacred geography Locating the presence of Buddha with concepts of local places, actors and communities/ laities legitimates the agency of temporal powers and lends enduring meaning to the variants of local histories and contexts. Delineation of a genealogy of scholarship in the epigraphic interpretations of Buddhist beliefs. A theoretical approach to mapping cultural hegemonies Constitution of sacred objects in landscape in religious terms Four types of sacred objects (1) the corporeal remains of Buddha (2) Objects used by Buddha (3) reminders and	Colonial scholarship was limited by orientalist preconceptions that largely discounted the significance of sacred landscapes and rituals till 1960s. The significant sacred remains of Buddha pose a predicament for interpretation in spatial terms due to unique variations of local attributes No spatial hint for ritual practices or sacred places

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					other representations of Buddha including Stupa, images, inscriptions etc. (4) the teachings.	
21	Journal: New research on Paharpur Buddhist monastery (North Bengal)	Breuil Jean-Yves and Gill Sandrine	2004	Historical, Archaeological interpretation	Art-historical value is presented in this study of the later phase Bengal.	No account for spatial understanding is provided here.
22	Journal: Archaeology and Asoka: Defining the empire	Ray Himanshu Prabha	2003	Historical, Archaeological account	A historical narrative of early Indian Buddhism and influence of royal patronage in the spread of Buddhism monastic institution.	Entirely historical account. No connection is made however for philosophical or spatial dimensions for Buddhist sites.
	Journal: Sources on the Gauda period in Bengal- Essays in Archaeology Ch. I – Gupta and Post Gupta settlements in hinterland, Varendri	Sen Swadhin	2000	Historical, Archaeological	Sacred places in Buddhism Notion of pilgrimage as told by Buddha himself.	Specific study on Bengal region Buddhist monastic practices which has helped in the current research formulating chapter 6 of Riverine plain monastic sites.
23	Book: Middle Land Middle Way: A pilgrim's guide to the Buddha's India	Ven. Dhammika Shravasti ISBN: 978-955-24-0197-8 Buddhist publication society Inc.	1992	Philosophical narrative	A detailed historical and pilgrimage guide for modern day cultural and religious tourism.	Information and account of the mythical as well as scriptural history of the sites associated with the historic Buddha.

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
24	Book: Buddhist monuments	Mitra Debala Archaeological survey of India Sahitya Samsad	1971	Historical account of Buddhist monuments in India	A detailed account on archaeological explorations and history of the Buddhist monastic sites from all the states of India.	No spatial or philosophical account has been provided here.
25	Book: Early History of spread of Buddhism and the Buddhist School	Dutta Nalinaksha Archaeological survey of India	1930	History of the spread of Buddhism	A well-researched resource on Buddhism following doctrinal, philosophical point of view.	Spatial or environmental accounts are not elaborated here.

Table 2-5: Key literature analysis with perspective of environmental interpretation

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
1	Journal: Subsistence-base and Resource Mobilization of Buddhist Monastery: A case-study of Nandadirghi Vihara of Varendra	Majumdar Somreeta	2021	Natural, historical landscape and archaeology	Buddhist vihara named after a waterbody signifying the impact of natural resources on monastic establishment. Seek the complex relationship between the hydrological and settlement dynamics of the landscape. The reference point for archaeological study to understand the subsistence-base, resource mobilization, the change and continuity of the geographical and cultural aspects of the flood prone landscape integral to the Vihara. The four requisites for life are robes, food, lodging, and medicine.	Proof of Structural activity on the riverine/ fluvial setting of landscape and the dynamics developed thereby. A schematic dimension of the courtyard and cells generates a perception of scale. Architectural description of the monastic set up. Indication on the material culture influenced by landscape and environment of riparian landscape. Constant threat of seasonal flood made the inhabitants live in small scale non-permanent dwellings of wattle and daub structure in contrast with the brick built massive structure of the monastery situated in comparatively stable area of the landscape.
2	Journal: Historical Ecology: A Robust Bridge between Archaeology and Ecology	Carole L. Crumley	2021	Historical ecology	Based on evidence of environmental change and human activity, the framework termed historical ecology assembles tools to construct an evidence-validated, open-ended narrative of the evolution and	Philosophical interpretation of modern day environmental concepts with Buddhist environmental ethic is provided.

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					transformation of specific ecosystems and landscapes.	
3	Journal: Archaeological landscape of the Buddhist stupa of Bharatpur	Majumdar Somreeta	2020	Natural landscape and archaeology	Understanding of natural setting for monastic site establishment. Local geo-archaeological influence on the habitat system and settlement network. Dynamic of spiritual exchange and material exchange near trade routes.	Seeks the relationship between the monastic establishment and the regional landscape. Spatial scale of the monastic site is yet to be explored.
4	Journal: What is in the Location: A Geo-archaeological Study of the Landscape of the Buddhist Monasteries of Western Bengal	Majumdar Somreeta	2019	Natural landscape and archaeology	Landscape feature analysis and study of siting principle	Spatial expression is not included in the study; however, the exchange between laity and Buddhist monastery is well presented with philosophical justification.
5	Journal: Locating the Monastery in Landscape Context: A Preliminary Study of Raktamrittika Mahavihara of Karnasuvarna	Majumdar Somreeta	2019	Natural landscape and archaeology	Spatial analysis and study of siting principle	Spatial expression is not included in the study; however, the exchange between laity and Buddhist monastery is well presented with philosophical justification.
6	Journal: Evolution of the dry zone water	Nuwan Abeywardana, H. M. T. G. A.	2019	Historical landscape management	Natural landscape systems and hydrologic systems are studied and interpreted for relating with laity exchange.	Geo-spatial extent is not provided for the study. Cultural landscape extent

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
	harvesting and management systems in Sri Lanka during the Anuradhapura Kingdom; a study based on ancient chronicles and lithic inscriptions	Pitawala, Brigitta Schütt, Wiebke Bebermeier				interpretation can be done to further the case.
7	Journal: Breathing life into monuments of death	Shaw Julia	2019	Analytical, Landscape interpretation	Walter's idea of "Buddhist world map" through 'presencing' of the body of Buddhism through the construction of relic stupa and monastic practices. Absorption of landmass into a local landscape region achieving custodianship over land and natural resources. Role of monasteries in spreading new agricultural and water management regimes during late centuries BC. The strategic positioning of stupas at hilltop was through the persuading aim of ensuring that stupas were seen throughout the surrounding landscape.	A regional landscape perception is generated. Hilltop Buddhist monastic complexes form a part of local and inter-regional pilgrimage networks. The villages and towns in the valley and lower slopes established the exchange between monasteries and settlement networks. The urban culture and "monumentalisation" are thus underpinned in the socio-ecological landscape setting. The selection of hilltop for monastic establishment are influenced by the crucial ideas – non-agricultural land, refuge from monsoon flooding, limited accessibility and naturally secured. The recent

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					This created a strong sense of connectivity with the laity and nearby urban centres. This proves the social interaction between the monasteries and laity through phenomenological and experiential modalities. The picturesque quality of Buddhist monastic sites including the pleasant panoramic views or inter-monastic site visibility is another matter of interest. The obvious point here is that intellectual and spiritual pursuits are not possible without time, leisure and comfort, and that an agreeable environment would be in keeping with such aims.	research attests the link of hilltop sites to pre-historic rock-shelters. The 'Arthasastra' from Muryan period refers to the designation of non-agricultural land for the purposes of scholarly and ascetical activities.
8	Journal: Whither 'early medieval' settlement archaeology: a case study of the Varendra region	Panja Sheena	2018	Historical, Archaeological, Analytical, Natural setting and environment	An account of natural and climatic phenomena and their impact on laity network in Bengal dry zone.	It helps in understanding and interpreting settlement network pattern in the current study, chapter 6 and chapter 7.
9	Journal: Religious Relationships with	Woodhouse Emily, Mills Martin A., McGowan Philip J.	2015	Religious environmentalism, nature-	Religious environmentalism and its relationship with laity network.	How landscape physiographic features contributed in the formation of environmentally

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
	the Environment in a Tibetan Rural Community: Interactions and Contrasts with Popular Notions of Indigenous Environmentalism	K., Gulland E. J. Milner		human settlement relationship		sustainable, religiously rooted cultural landscape.
10	Journal: Ecological Sustainability in India through the Ages	Sharma Rajeev, Aggarwal Naveen, Kumar Sandeep	2014	Analytical, Interpretive, Environmentalism in ancient India	An account of historically sustainable practices is provided here.	Philosophical connection between the cultural practice and religious practice is not explored to the fullest.
11	Journal: Ecology	Nelson, Lance E.	2012	Philosophical, Interpretive	Philosophical narration of ecology in ancient time.	Spatial account is missing.
12	Book: Buddhist Ecology (in Pitaka and Nikaya)	Huong Gioi Eastern Book Linkers, New Delhi ISBN:978-81-7854-229-4	2012	Account of normative literature	An account of scriptural reference to natural phenomena and environment is provided.	This study helped in formulating the interpretation of Buddhist environmental ethic and spatial form of the study sites in the current research.
13	Journal: Botanical Technology and Garden Culture in Somesvara's Manasollasa	Ali, Daud	2011	Historical garden and landscape practices	A specific study on historical built landscape and the design philosophy are presented.	Detailed account of garden elements are not provided.
14	Journal: Ancient Dams and Buddhist Landscapes in the	Shaw Julia & Sutcliffe John	2010	Sanchi Buddhist landscape and natural	A historical account of Sanchi area, a hilltop site is provided with a contribution of monastic institutions for	Archaeological and historical evidence finding and process of interpreting the cultural

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
	Sanchi area: new evidence on Irrigation, Land use and Monasticism in Central India			resource management in historical time	irrigation network on a dry hydrologic regime.	landscape form of the natural setting.
15	Journal: Writing Buddhist Histories from Landscape and Architecture: Sukhothai and Chiang Mai	Blackburn Anne M.	2007	Philosophical, Reconstruction of Landscape methodology	A detailed account on how to recreate the landscape characteristics from the early timeline.	This study contributed formulating the chapter of conjectural landscape impressions for this current study.
16	Journal: Buddhist environmentalism: an approach to sustainable development	Thendup Sangmu	2007	Environmentalism in Buddhist religion	Natural habitats of monks and their setting is read here.	Physical attributes of landscape layers are not linked to the final outcome.
17	Book: Buddhist landscapes in Central India: Sanchi hill and archaeologies of religious and social change, c. third century BC to Fifth century AD	Shaw Julia The British Association for South Asian studies	2007	Landscape interpretation of monastic establishment in Sanchi area	Sanchi and Bhilsa tope sites are starting point for studying/ interpreting the perception of surrounding landscape in ancient times The principal contention here is that the ritual and social significance of these sites can be more clearly understood if they are envisaged as interrelated parts of a wider social, ritual, and economic landscape.	Why hilltop sites were chosen by incoming Sangha (Site selection criteria) due to paucity of information Ritual and social landscapes have, until recently, been neglected by scholars of Indian religions (both archaeologists and non-archaeologists alike) who have tended to concern themselves with the architectural merits of single

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
					Sanchi's sacred landscape: 'Landscape archaeology, as it is practised, involves the study of systematic relationships between sites. - A time-space perspective, on the other hand, is concerned with the routine movement of people through landscapes, constituted by the locales in which they came into contact' A convincing spatial dynamic of the stūpa-sites, thanks to the relatively complete state of the monuments and the rich body of textual, inscriptional, and art-historical evidence which can be drawn from them. Typology of Buddhist sites in Sanchi area	(and especially religious) sites and monuments viewed in isolation from their wider archaeological landscape. Fails to take phenomenological concerns for interpreting spatial dynamics The lack of coordination between active archaeological research and text-based analysis means that many received models of Buddhist history have gone unchallenged. there is a need to look at these monuments from a phenomenological angle, applying what can be gleaned from texts and inscriptions with what can be found on the ground at specific places. the enquiry envisaged goes beyond scriptural texts and archaeological remains per se and attempts to make a 'somatic' assessment of the ways in which people in the past responded to and interacted with their surroundings

Sl.no.	Literature	Author	Timeline	Key focus	Findings	Remarks
18	Journal: Monuments in a flood zone: "builders" and "recipients" in ancient Varendri, (Eastern India and Bangladesh)	Panja Sheena	2003	Interpretive, historical and regional landscape understanding	An account of natural and climatic phenomena and their impact on laity network in Bengal dry zone.	It helps in understanding and interpreting settlement network pattern in the current study, chapter 6 and chapter 7.
19	Book: A manual for Buddhism and deep ecology	Henning H Daniel ISBN: 1-4033-7006-0	2002	Interrelationship between the global body of knowledge of ecology and Buddhist practices	Based on evidence of environmental change and human activity, the framework termed historical ecology assembles tools to construct an evidence-validated, open-ended narrative of the evolution and transformation of specific ecosystems and landscapes.	Philosophical interpretation of modern day environmental concepts with Buddhist environmental ethic is provided.

2.6. Finding and establishing research gap

Buddhist monastic sites (with the stupas) were often built for the reverence of the historic Buddha and to provide a temporal shelter primarily to his disciples, devotees, bhikkhus (ascetic monks) and other visitors from the nearby urban centers. These religious monuments started to appear in the Indian subcontinent (then spread across Afghanistan in west till Bangladesh in east) around 400-300 BCE after the "*Mahaparinirvana"* (passing away) of Gautam Buddha regarded as Historic Buddha. The practice of building votive stupas became widespread throughout the South Asia between c. 200 BCE and 300 BCE. Although with the decline of Indian Buddhist tradition, the practice of building monasteries diminished significantly around 600 CE-900 CE. A considerable number of early historic period Buddhist monastic sites are still visible in many naturally occurring landscape setting e.g. hill tops, riverine planes and forests etc. The extant forms attest to their environmentally conscious nature and synergistic presence in the natural and cultural landscapes of ancient Indian history.

With the advent of Islamic ruling coupled with inclusion of Buddha in the pantheon of Hindu religion, Buddhist monasteries in India were largely abandoned. In the late eighteenth and early nineteenth centuries European colonials re-discovered them. The intent of this was treasure hunt rather than interest in archaeology or historical study. The successive study of these monuments and their associated extant landscape entities has unlocked a various avenue of scholarships in the study of Buddhism. The earliest religious architectural marvel, stone sculptures, crafts and epigraphy have demystified many a historical myth about the presence of Buddhism in early India. However, despite this, our understanding of this significant religious monuments and their site planning wisdom from the ancient past to which they belonged, remains largely challenged. Due to the incomprehensive ways of interpretation lacks in many ways. During their rediscovery, prior information of then builders/ designers was largely pertained as unclear regarding the siting principles of these monastic establishments. Furthermore, there was a lack of archaeological expertise and academic understanding to facilitate the excavation works and related studies. Spanning over the period of next two centuries, the study of Buddhist monastic establishments has been dominated by art-historical or monument-centric values. Buddhist stupas, monasteries, sculptures and epigraphy constituted the focus area, including archaeology, art history, history, and religious studies. The progress of these disciplines has generated specific trends in the means that monastic sites are read and still impacts several current views related to the monuments. These monastic sites in varied geographic and environmental contexts exhibited contextually responsive subsistence techniques in spatial planning. But the landscape purview is yet to be explored for the Buddhist monuments in ancient India.

The research work on Buddhist sites were closely associated to the development of the European understanding of Buddhism – a global notion/ perspective developed based on the fragmented accounts and vested interests of individuals. By this method a comparative analysis was unavoidable between two cultural system of viewing and understanding nature, environmentalism and religious association to natural events. One example can be cited is a detailed narration of the life of the historic Buddha that was recorded by Marco Polo, the

famous Venetian traveller, who stayed in China between 1275 and 1291 CE (Benedetto trans., 1994: 319–20). Over the successive time, a noticeable amount of ethnographic resource materials was generated about the monastic and religious practices of Buddhism in various Asian contexts. The missing component was the innate understanding of the land from which Buddhism evolved itself and subsisted for around 1000 years. This would have given a holistic understanding of Buddhist monastic expansion and their physical manifestation of eco-philosophies on habitational practice.

These numerous (and invariably inconsistent and unsystematic) accounts with Buddhist monastic practices were unable to yield a comprehensive perception of the existence of early Buddhism in ancient India. Although, much effort and studies have been given for re-discovering the religious philosophy, architectural endeavour, construction methods but their spatial interpretation in a landscape setting remains unearthed.

2.7. Points of departure: recent developments in the study of Buddhist monastic sites

Over the last few years, several developments and parallel study disciplines have taken place in the study of ancient India's past and Buddhist archaeology in general. To this effect, many new research areas and techniques have sprung up intended to solve the challenges or unresolved issues related to the understanding of Buddhist monastic practices from the past studies. These new research methods are an outcome of the growing awareness towards the wholesome understanding of archaeological sites beyond monument centrism. Furthermore, the knowledge and understanding of Buddhist monastic practice was largely developed based on the discourses from the colonial explorers or scholars which has clouded the judgement in many cases in the context of ancient India. To overcome this challenge, seeking a better interpretation of the origin and presence of Buddhist monasticism a growing number of critical-historiographical and regional approaches are growing (cf. Lorenzen 1982; Inden 1990; Thapar 1993). Buddhist archaeological sites, in particular, is experiencing a paradigm shift in their approach of study. Significance of context and surrounding landscape in the siting principle of monuments are getting place in the research ideas (cf. Almond 1986; Lopez 1995; Shimoda 1997; Guha Thakurta 1998; Leoshko 2003; Singh 2004). This renewed approach has provided valuable insights into the other disciplines of archaeological, art-historical and textual approaches with significant implications for the current studies. The new study methods also help to bridge the gap between studies done in the past which created certain problems for future examination and interpretations. Understanding of site setting and influence of landscape have become an indispensable component for the inquiries into the past of Indian Buddhist monasticism.

The enhancement of such a critical awareness in the general approaches to the study of Buddhist monuments and history has been a rather self-reflective re-appraisal throughout the various study disciplines e.g. archaeology, art and architectural history, textual studies, epigraphic studies etc. The impact could be experienced in the course of studies becoming inter

and multi-disciplinary, taking into consideration the evidence and interpretations from other disciplines and with these new inquiries are set about Buddhist monastic sites.

These new research ideas have evoked several new queries in many of the traditional scholarships. In text-based studies of Buddhism, a number of problems surround the exclusive focus on secondary literature in the reconstruction of ancient Indian Buddhism. In the absence of primary literature or linguistic challenge the original design and planning ideas often gets diluted or mis-guided. The uncritical application of the text-based notion of a religio-philosophical practice in Buddhism and their manifestation in ancient planning regime creates an unclear perception. Studies have been initiated to explore the evidence gathered through archaeological findings to interpret the monastic activities and their synergy with the surrounding landscape. One of the most noteworthy outcomes of this has been the search for fundamental importance of stupas in worship and their association with monastic sites in early Indian Buddhism. The issue was further addressed by more comprehensive overlap and critical analysis of interpretive texts available, epigraphic information and archaeological record (Schopen 1997, Shimoda 1997, Trainor 1997, Willis 2000, Shaw 2000). According to these studies, stupas and relic worships are integral part of Buddhist monastic practices and are regarded as physical embodiment of the historic Buddha himself. So, the spatial planning, geomancy of the sites selected for establishment of monasteries are very significant to their philosophies and Buddhist environmental ethics.

2.7.1. Archaeological and art history point of view

In archaeological and art-historical discipline which have traditionally concentrated on the detailed chronological, architectural and iconographical classifications of monuments and excavated objects, have produced a specific sectoral knowledge base. This kind of traditional study approach has created an isolated focus on the subject area. With the current study an attempt is taken to look beyond these segmented knowledge areas and explore the broader religious, societal and natural backgrounds in which the monastic sites and the objects were positioned. It adopts to the idea of perceiving the Buddhist sculptures and art objects as narrative of the surrounding context creating a synergy in art expressions too. It is no longer perceived as mere visual representations of particular Buddhist legends and iconography described in written literatures. Instead, there is now a growing concern with how individual sculptural scenes fi t in with wider architectural and sculptural programmes of embellishment (Behrendt 2006, Shimada 2006) and what they can tell us about the actual religious practices that took place at these monuments (Brown 1997, Dehejia 1998, Williams 1998, Brancaccio 2006). In the field of archaeology too, scholars have revised the traditional approach that concentrated on the vertical excavation of the stupa and monastic remains and have begun to situate monastic sites and objects within their comprehensive survey of archaeological landscapes (Chakrabarti 1995b; Shaw 2002, 2004; Fogelin 2004). The various remains of Buddhist stupas and monasteries have been considered in relation to the wider archaeological and geo-physical extent of their surrounding context. Landscape and natural setting performed a vital part for the planning and evolution of monasteries. This has reinvigorated the assessment of the archaeological evidence from two perspectives. Firstly, the monastic sites themselves, have been largely ignored in many cases due to the dominance of monument centric approach

and secondly the natural landscape at immediate vicinity of those sites, which never have been investigated meticulously. Such an approach has provided a better suited questions to examine the archaeological evidence in a new light; a landscape and ecological approach emerges. This includes the issues like influence of local patronage on the monasteries and their functions, relationship between Buddhist monks and lay communities, the spiritual and material exchange (in the trade routes) between monasteries and the local resources for subsistence, the nature of pilgrimage and the social roles of Buddhist monasteries.

2.7.2. Textual account point of view

In addition, aided by the increasing textual and non-textual data, the epigraphic enumeration of early Indian Buddhism, architectural details, further archaeological exploration for landscape construct discovery, detailed relationships between the Buddhist Sangha and the settlement networks, this study explore the idea of reconstructing the landscape of the monastic sites in relation to the monuments. The contemporary studies tend to combine the evidence from archaeology and canonical descriptions of monastic lives in a more complex dynamic of landscape and environmental influence on the site planning of the monasteries. Systematic surveys of the donors in the inscriptions at Sanchi by Upinder Singh (1996) and Kumkum Roy (1998) have revealed much about the pattern of patronage to the Buddhist monastic community and the construction of Buddhist stūpas. Furthermore, Jonathan Walters' essay on the patronage of the stupa construction (1997), included in this volume, has proposed a sophisticated theory for the motivations behind donations to the monastic community reflected on the inscriptions on stupa monuments, by combining textual and archaeological evidence with modern historical theory. In short, current studies of Buddhist stupas have started to become much more comprehensive, including almost all major disciplines of historical studies, and in doing so many questions have resolved.

2.7.3. Landscape and environment point of view

Besides the documentation of the discernible extant ruins above the ground datum and exposed built forms due to archaeological exploration and the vivid narration of architectural spatial layouts. Less attention has been given to the surrounding context in terms of survey or further excavation to interpret the landscape understanding. These could be referred as only conjectural reforms and/or artists imprints of buildings on those archaeological sites (Mitra, 1971). Due to lack of evidence-based approach. A few of these approaches provide acceptable, impressionistic imageries; others are incoherent as they carry barely any relation to the formal architectural layouts or to the fine responsiveness that inform all the principles of interaction with natural landscape. Also, it is a complex process to reconstruct the landscape scheme with deficiency of substantial extant remains of the archaeological information or hints of landscape extents. The reason behind this is the 'living' aspect of nature which distinguishes individual monuments from its landscape setting. Thus, the interpretation of a historic landscape, in dealing with nature and many attributes of natural resources have to be acknowledged and addressed appropriately.

The 'living' elements of nature, in the form of vegetation, water and the cycle of seasons, landforms behave differently in an everchanging manner compared to its hardscape or built components. In interpreting and/ or conserving monuments, the approach may often be to conserve the extant form as found or a minimal reconstruction intervention. In case of landscapes, with nature evolving and changing with every passing season, this may not be possible. The design intentions would need to be interpreted based on evidence which might be found farther from site of interest.

Because of the living aspect, landscapes have always been more vulnerable to climatic and anthropogenic phenomena. It has evolved in ways different from architecture. There are few accounts from scholars which could be considered as basic attempt to address the landscape aspects of the Buddhist monastic and sites and settlements in relationship with them.

Buddhist landscapes are greatly influenced by 'Nature' shaping landscape, architecture and performances. An attempt made by W. De Silva in the article titled "Nature and Buddhist architecture: Srilanka". It examines literature in philosophy, Buddhist philosophy and phenomenology of landscape and place. It analyses the relationship of patterns of settlements with the physical features and geography of its location, focusing on Buddhist performances. Buddhist understanding with natural landscape and divine experience interplays with mythical landscape in a variety of ways, resulting natural–cultural–architectural places bounded by cultural performances. These kinds of place understanding reflect ontological relationships developed between people, nature and their designs (settlements) rather than as traditional or modern. How physical features of landscape – mountains, rocks, stones, trees, valleys, sloping lands etc. guide the place for Buddhist divine understanding and shape architecture and the place.

Many of these natural features have been converted to Buddhist architecture; natural landscape constitutes significant role in these places. Small stupa is placed on many of rocks, hills and hillocks; many caves are converted to image houses and meditation places; entire hill is converted to mediation place in some cases; trees became shrines as well as shading the tropical sunlight; water in ponds and lakes enhance the spirituality of the place.

Buddhist place and architecture were perceived as a harmonized concept in traditional settings. A figurative expression of different typology of Buddhist sites is provided. These places are specific examples of compositions of Buddhist understanding with natural landscape and divine experience of natural landscape with mythic landscape in a variety of ways, resulting natural–cultural–architectural places bounded by cultural performances. These kinds of place understanding reflect ontological relationships. Nature and architecture are inter-woven within these complexities of relationships.

3. Research design, Hypothesis and Methodology

3.1. Conceptual framework

The contemporary study of ancient historical sites or archaeology interprets the monument as an integral part of the landscape and breaks the dichotomy of perceived notions of site, setting and settlements evolved as harmonious living. Landscape plays a pivotal role to shape the habitation regime and garden history with a complex dynamic of hydrology, material and natural environment evolving as a diversified socio-religious setting.

The extant landscape forms in present day may vary significantly from that of the period of their original establishment (Panja 2003). The structural mounds become immediate dots of attraction in the landscape breaking the monotony of the horizon and the terrain, while the imprint of ephemeral settlement remains buried (Panja 2003). The spatial organization and site planning varied vividly with local micro-ecology, topography, watershed and flora-fauna. The interaction of all these landscape resources resulted in the philosophical construct of ritualistic sites or gardens. The epigraphic narrative and symbolic pattern were also inspired from natural phenomena, often crafted in mythical spirit instilling the spiritual reverence of stewardship with natural forces. Monasteries sited there under patronage of either royals or traders acted as icons of religious attention and spiritual permanence. The pattern of cultural association of the monasteries varies with the diversified geographical and cultural characteristics of the landscape.

The historical and archaeological narratives regarding Buddhist monastic sites are denoted by a distinguished recognizable monument-centric process. The narratives produced from these perspectives have formed a stereotyped perception of the Buddhist sites. The current study is attempted to cross the limits of the knowledge base of this monument-centrism and dominant text-based narrations on Buddhist monastic practice by implementing the means of investigations However, the study region belongs to a distant historical past. The original designer and records are beyond finding. So, analysing and interpreting extant form of site and hints directing toward an inter-related landscape setting are the only accessible media to conduct the current research work. This interpretation has been further based on secondary texts, inscriptions or chronicles of the agrarian expansion and its socio-political connection with nearest urban centres during this period.

The current study focuses on interpreting the underlying connection between Buddhist philosophical paradigm and environmental ethics (Fig. 3-1). The outcome of this process is reflected on the spatial construct of the monastic sites. The natural landscape provided the apt setting for the builders following the norms mentioned in *Vinaya pitaka* on habitats of monks. The final form was guided by the site's ecology and environmental parameters and the overarching religious philosophy. The building activities as well as ritual activities were bounded by this common thread.

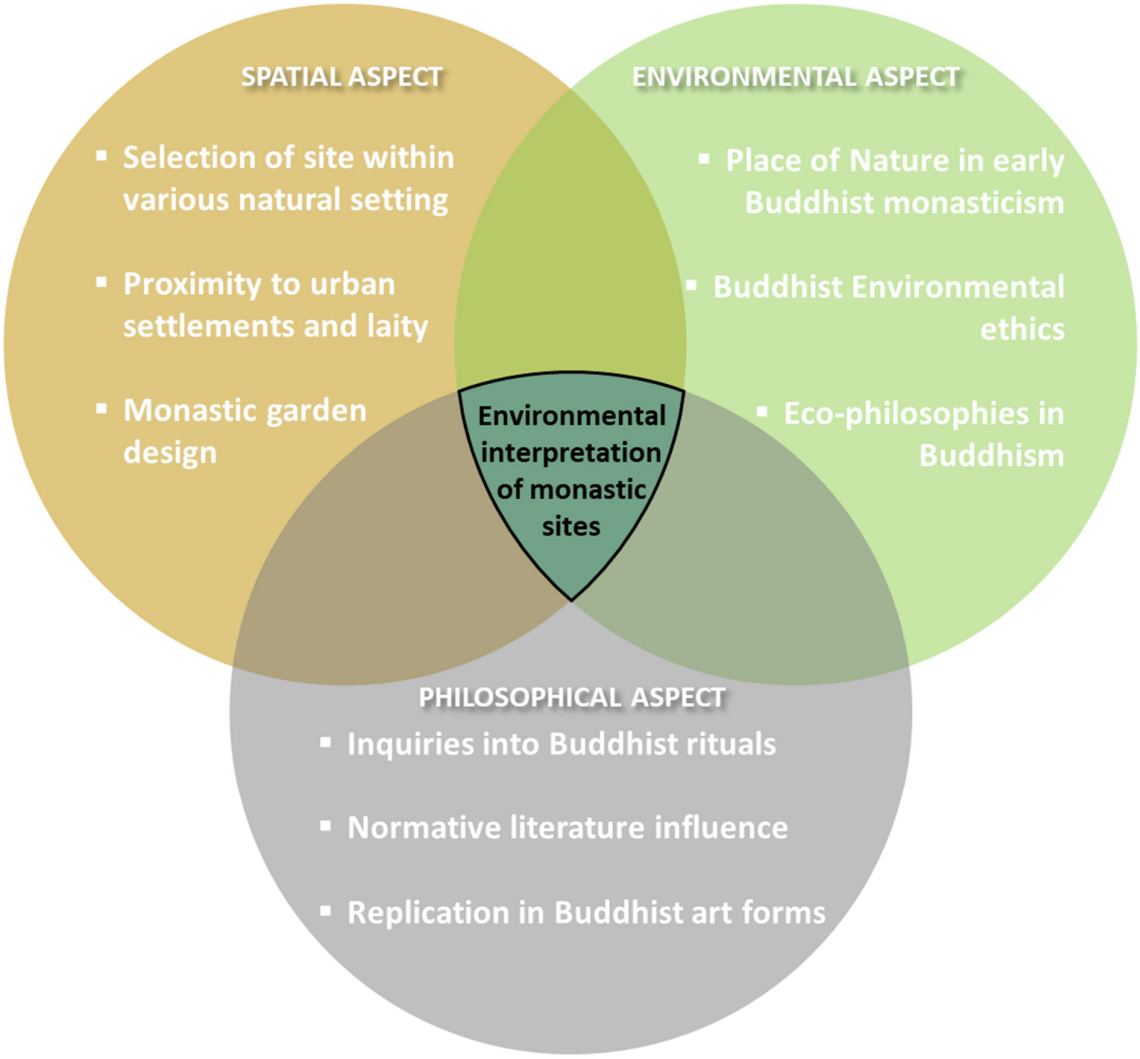


Figure 3-1: Conceptual framework of the study (Source: Author)

3.2. Hypothesis

Environmental concepts followed in Buddhist monastic sites had influenced the evolution of ***distinct identity***, ***form*** and ***meaning*** in spatial planning of Indian Cultural Landscapes.

3.3. Research questions and objectives

The primary aim of the research is to bridge the gaps amongst various theoretical issues through the interpretation of Buddhist extant sites. This is inquired over their topographical and archaeological setting from various secondary texts and epigraphy. Furthermore, this included revisiting and unearthing the spatial narrative of habitational settlements, rock shelters, gardens and refuge sites.

The significant research questions could be concisely put in Table 3-1 as follows,

Table 3-1: Research question and objectives

Sl.no.	***Research questions***	***Research objectives***
i.	Do Buddhist monastic sites with their historical built landscapes belong to one ***family of common characteristics***?	To read and analyse Buddhist monastic sites as a ***landscape architectonic design*** with an emphasis on design principles/ tools.
ii.	Which ***natural criteria*** offered design components to the creators of Buddhist monastic landscapes? What are the ***ethnobotanic contribution*** of Buddhist monastic practices in ancient landscape systems of India?	To interpret the ***influence of landscape***/ environmental forces on the architectonic planning and composition of monastic sites. To study the plants and herbs associated with ***Buddhist monastic rituals*** of India to interpret their value and significance.
iii.	Were Buddhist monastic sites acted as a prototype of new architectural inventions? Or were they a ***synthesis*** of many elements of ***Indian environmental and cultural landscape*** tradition? or was it both?	To provide scientific knowledge on the landscape design of Buddhist monastic sites and thereby to ***underline its ecological value*** to re-examine the validity of traditional knowledge system in spatial planning regime.
iv.	What are the ***unique landscape planning principles*** **(ULPP)** or identification traits of Buddhist monastic landscapes in this ***tradition***?	To compare the Buddhist monastic sites from varied ***geo-climatic regions*** of India to assess their unique contributions.
v.	What are the ***values*** and ***symbolism*** embedded in Buddhist sites with respect to the development of environmentally sustainable indigenous model?	To interpret ***nature oriented art*** and ***symbols*** in Buddhist monuments which evolved from their surrounding landscape context to unearth their embedded meaning in sustainable site planning.
vi.	What are the ***learnings*** related to the wisdom of Buddhist landscape and environmental systems of India applicable in contemporary planning regime?	To highlight the scope in contemporary planning regime which are linked to environmental efficiency and stewardship such as nature-based solution, ecosystem-based adaptation.

The abovementioned research questions are addressed with specific objectives. The Buddhist monastic sites are read with landscape architectonic approach with an emphasis on design principles and tools. To interpret the influence of landscape/ environmental forces on the architectonic planning and composition of monastic sites is the second objective. Interpreting the value and significance of plants and herbs associated with historic Buddha and Buddhist monastic rituals are linked with the second objective. Exploring the scientific knowledge on the landscape design of Buddhist monastic sites underlines its environmental and ecological values. It further facilitates validation of traditional knowledge system in spatial planning regime of Buddhist monastic settlement practices. Furthermore, the research takes into account a comprehensive comparative study of Buddhist monastic-built landscape sites from varied geo-climatic regions of India to assess their unique contribution in landscape design principles.

3.4. Analysis of Existing Methodologies

To devise a justified research methodology for the current study, an extensive literature study was conducted in order to examine what methodologies have been employed in analysis of historic landscape planning and design. Literature dealing with subject interest such as historic ecology was specifically included from this literature survey, as they represent a wider vision for the research. But discipline like horticulture has been excluded from this analytical literature review as they belong to a narrowed down subset of landscape research.

Since landscape and environmental design/ planning is regarded as combination of science and art, the survey tells that the operational approaches to read a historical landscape pattern could be broadly categorised into two ways: interpretive and techno-analytical.

Several publications were made related to this historical tradition. Such scholarly work primarily deals with cultural-historical features, scenic qualities, art-historical parameters, and interpretation of landscape as works of art and architectural evaluation. This method of evaluation is heavily backed up by art/ architectural historians and other culturally oriented academics. Textual content becomes the predominant medium of communication in this regard. Historical maps, geo-spatially analysed maps, Photographs, archival drawings and other spatial information are used essentially to support and prove their arguments. A smaller number of studies from the reviewed publications have taken a technical-analytical approach.

Among them Monika Zin's (2010) work stands out for Jetavana forest grove monastic site. The historical events were presented with linkages to its wider landscape setting; Julia Shaw (1998) investigates the wider archaeological principles of Sanchi monuments and surrounding archaeological setting in Sanchi Survey Project (SSP); Somreeta Majumdar (2019) studies the natural setting and their impacts on relationship between monastic establishment and settlement network at Bharatpur, West Bengal. Studies that have attempted to recapture the perception of the past with conjectural visuals or maps are scantily found without any deeper understanding of environmental and ecological principles reflected on spatial planning. The key principles/ main themes that came out through this survey of methodology are summarised below,

i. Topographical relationship: how the landscape planning principles is in milieu with the topographic features such as flat land, mounds, hilltops, valleys and existing man-made components such as settlements and tanks, were reflected in the realisation of the formal layout. Further, how these features have impacted the site planning of the monasteries in relationship with natural context.
ii. Definition and statement of threshold and limits (Natural and built): what the spatial extents of the formal layout were, how they were well-defined and treated within the planning scheme. The sense of center to the Indian traditional design was meta-physical; the notion of the primordial centers of creation- 'bindu' or of the potent void 'shunya'. The concept of void as per Buddhism to be presented here with "dependent origin theory". This notion of center as emanation, beginning or origin is distinct and clear in the manifestations of built forms and the landscape associated with it. From this notion of center, the 'directions' were held and limits defined establishing the notion of physical accessibility or panoramic gaze beyond site.

iii. Axial organization in Spatial scheme: recognisation of the varied types of axes in the layout (for example, principal axis, open space connecting axes), and how they are created, strengthened and visually connected across elevation changes on terrain using various design tools (visual composition, direction and culmination); interpretation of the spaces forming the focus in the spatial configuration and how they are connected or related to other built and open spaces, and so on.

iv. Visual qualities of the elements: how the built forms such as monastery, stupa, temples or prayer halls of the scheme are fitted in the visual composition with interrelatedness, and how they change with the perception and movements of spectators. Termed as "Eye catcher" in Transylvania 100 castle garden research how the analogous elements e.g. Asokan pillar, Asokan edict, Stupa harmika or other extant remnants are impacting the siting principle of Buddhist monasteries. These "Eye catchers" are categorized as following – sacred elements, ruins, artworks and others.

v. Attitude to the monuments (siting principle of most significant venerated object): what were the means, the architectural components of the planning such as stupa are emphasised and made visible as identity marker, and the various ways they are revealed to the spectators.

vi. Symbolic connotation (mythical and embedded): what are the symbolic gestures connected to Buddhist philosophical construct in the spatial layout and their countenance with the ideals of "*dassana*".

vii. Attitude to settlement network (patterns of habitation and urbanity): As per Vinaya Pitaka the monks were advised to stay "neither too close nor to far from the towns" as collecting alms was the only mean to lead the lives. According to the Buddhist canonical texts, the four requisites for life are robes, food, lodging, and medicine (Birnbaum 1989: 3). The monastic establishments attempted to establish a legitimate mechanism of Vihara's accessibility to its subsistence-base and mobilize the resource of the landscape.

For the analysis satellite images were used to express the inter-relationship of the monastic sites to its wider setting of landscape, analytical maps with corresponding interpretations with respect to siting principles, a series of inter-related physiographic maps to examine the composite scheme.

Moore, Mitchell and Turnbull (1993) took an effort to appropriate and interpret the historical landscape using of the past in various climatic regions. The process involved looking at the great examples of historically built landscapes around the world. The methodology was a hybrid between these two categories. Spatial drawings, perspectives and axonometric 3d geometries emphasising the landscape components are used as tools. The analytical interpretive maps are used to distinguish various physiographic layers in the landscape such as the landforms, terraces, paths, water regime, vegetation and solar aspect of the landscape.

3.4.1. Methodology for site suitability interpretation by Ian Mcharg

This groundbreaking theory of ecologically sensitive design approach was propounded by Scottish Landscape architect and regional planner Ian Mcharg in 1969. The sustainable environmental approach in a large-scale design was manifested in the book named "Design

with Nature". The ideas and concepts of analysing and interpreting physiographic layers of natural and environmental setting of any site acted as predecessor events for geographic information system (GIS).

The geo-spatial interpretation of the landscape layers are adopted in the current research to understand and analyse the siting principle of Buddhist monastic establishments in various natural landscape settings.

The systematic approach in this methodology brought forth the significance of ecological systems and environmental processes in site planning. The same process with the aid of geo-spatial tool is applied on the study sites belonging to three varied natural settings of forest, hilltop and riverine flood plain.

The landscape layers are read with reductive manner and at the end simulated to produce suitability index or landscape performance index for the site. A set of programmes are generated as per the suitability quotient of the various spaces on the site.

McHarg's design process nurtures the application of an ecological wisdom in an actionable and realistic manner (Yang, 2016).

3.4.2. Methodology of the Research of European Garden study by Delft

This approach evolved from the 'Delft tradition of research' (Cooray 2012) on architecture and urban design, employs comprehensive and specific analytical principles with an outline of landscape discipline. This research method and tradition were spearheaded by Steenbergen (1990, 2008), Van der Ree, Smienk (1992), Reh (1996), Aten (2007), Bobbink (2009) and Niemeijet (2011) in their studies of Italian, French, English, Dutch and other European landscape or garden designs.

This methodology was developed to analyse and compare spatial planning values underlying landscape design principles of all dominant examples of Western European landscape traditions (Cooray 2012). The methodology was based on the architectonic design and analytical procedure of the same faculty and the typological and morphological research devised by the Venetian School in Italy. The same methodology has been utilised in the current study with its techno-analytical tools to find out the underlying landscape approaches devised for the prototype cases.

The analysis is carried out by scrutinizing the theoretical body of knowledge – the architectural principle, ideology (or philosophical probes), artistic elements, and concepts of nature and space of the then period. An outline of the history of each landscape in relation to its commission is then provided. The morphology and topography of the site is analyzed to explain the basic form of the design. Next comes an analysis of the site planning scheme with a landscape design approach.

Such a methodology implies departing from the romanticized preconception of historic examples in favor of "unearthing" the dynamic and creative thinking process behind them. As

Reh (1996:496) mentions, 'the original design process cannot be precisely reconstructed, as it is forever lost in history. But it can be brought to life by inviting the reader to 'redesign in his own mind' the landscape gardens' The result of the analysis is a hypothetical compositional scheme of the design: an abstract model including all active compositional elements of the design.

The analysis uses topographic maps of the prototype site and its surrounding landscape, longitudinal/ cross sections of the topography and digital three-dimensional terrain models to show the geomorphology, axonometric of the scheme, plans with sight lines, and perspectives of how different elements of the scheme relate to each other. The text only complements the above, becoming a secondary medium of communication. The most important aspect of this methodology is that it provides an insight into conceptual thinking and the three-dimensional aspects of the landscape design, and one can thus arrive at precise conclusions with a rational and logical language. As such, this research methodology has made it possible to examine design techniques and make comparisons of different designs from all the influential periods of the West European landscape tradition.

The principal objective of the present study is to read Buddhist monastic sites set amidst forest, hilltop and riverine plain as landscape architectonic design. A special emphasis on the architectonic means employed to order the elements in the composition and thereby to understand its design characteristics. It is essential that this study adopt a technical-analytical approach. Out of the technical analytical methodologies mentioned above, that of the Delft tradition of research is comprehensive and has delivered positive results. In order to adapt this methodology to carry out the present study, it is important to be familiar with the analytical keys and tools developed thereby. For this reason, site visits were made to Indian monastic settlement sites of Jetavana, Sanchi and Bharatpur examined against those tools of landscape tradition.

In this current research the landscape is 'read in reverse' order (Cooray 2012), the landscape scheme is theoretically anatomised into following five characteristics. This establishes a linkage between the architectonic design and its perception in a systematic manner and offers understanding to the spatial dynamic of the natural landscape settings.

a. The Elementary Form or the basic layout of monastic settlement in which the topographic features of the natural setting and culturally evolved landscape are interlinked with a spatial tension or philosophical binding.
b. The Spatial Form or the architectonic form and their impacts of the three-dimensional landscape, which allows the creation of landscape dynamics and visual conformities.
c. The Philosophical Form in which the symbolic references of natural and cultural elements are integrated. They are linked with normative doctrines and their spatial references.
d. The Programmatic Form brings the reductive approach in the landscape that scrutinise all the landscape architectonic expressions against the physiographic elements. The pattern of spatial organisation is tested against topography, hydrology, vegetation and aspect to interlink them.

e. The Environmental Form creates an underlying common thread to connect the abovementioned ideas. The spatial expression and layout is an outcome of the integration of environmental values into the planning scheme.

3.4.3. Methodology of the INTACH historical garden conservation

This approach is developed by Indian National Trust for Art and Cultural Heritage (INTACH). The principles on historically built gardens mentioned in Florence charter has been considered as basis for conservation of various historic gardens in India. The research framework was formulated by Dr. Priyaleen Singh (2021). The Florence Charter is interpreted and adapted for the Indian historic gardens and culturally significant archaeological sites.

This method took a departure from the monument centric or architecture focused conservation techniques and put a focus on the unbuilt part of historical sites. The landscape focus is created by this method. Using the articles of globally followed charter, this method of conservation pursues to develop more awareness on historic garden conservation.

The process followed a scientific analytical and interpretive sequence. First the design parameters are well documented and understood for the historic garden in focus. The typology, scale and design style prevalent in that particular era is analysed from various literature resources or similar examples belonging to the same timeline. The conservation protocols are then followed to understand the living and non-living materials of the garden. The most important stage comes at documentation of the historic garden. The multicultural sites are investigated to read and interpret the significant alterations.

The recreation of the historic gardens to their earlier form through rejuvenation of the spaces as whole, especially planting media. The knowledge of regional planting is a key skill for this. This method is particularly helpful for the current research in chapter 9 where the conjectural reconstruction of the Buddhist monastic sites is reimagined.

3.5. Architectonic forms of Buddhist monastic sites

The primary goal of this study is to interpret Buddhist monastic sites as landscape architectural design. This section aims to identify its landscape design features, drawing on the analysis presented in chapter 4, 5 and 6. These features will be discussed alongside the design tools, principles, rules, and techniques employed by the designers of monasteries. They are categorized into four areas, elementary form, philosophical form, spatial form and environmental form upon which the conclusion has been derived in chapter 10.

3.5.1. Elementary form or landscape form

a. **Characteristics of natural setting -** Using topographical maps, contour plans, digital 3D terrain models of the geomorphology, along with engravings and written descriptions of the sites, the features of the natural landscape prior to changes through built component insertion (such as natural axes, boundaries, focal points, views, panoramas and viewpoints) are examined to comprehend the inherent logic of the landscape. Therefore, it is important

to analyse these aspects with regard to the site features of the surrounding natural contexts. Three different landscape settings at forest, hilltop and riverine plains influenced the monastic site planning in their own ways. These ancient archaeological sites went through massive changes especially temporal features of landscape. Hence, current topographical configuration, contour maps, extant monuments and three-dimensional terrain models will be used for the analysis.

b. **Dialogue between built and natural landscape –** A process of finding out the interaction between the formal layout of the monasteries and the natural setting. This analysis focuses on aspects such as location, orientation, the positioning of the house and garden, and the visual harmony between the design and the terrain's natural form. The goal is to explore the relationship between the inherent logic of the natural landscape and the design's response to it. Such an analysis reveals whether the formal layout operates as an independent architectural system (with no interaction with the natural landscape) or is fully/partially adapted to it. Since the study sites are associated with prominent and distinct natural features the interaction between monastic units and the landscape resulted into unique landscape planning features.

c. The geometry - The analysis of the formal layout of the western examples, focusing on its geometry (including the system of measurement, proportion, grid system, and its placement in the landscape), has determined whether the design follows a structured geometric system. This can potentially lead to a hierarchical or centralized composition, or if the design intentionally deviates from this system to disrupt such a composition. This expanding system of measurement consists of three main scales: the house, the garden, and the estate. When the measurement schemes are overlaid, a hierarchical structure emerges, featuring a continuous series of scale transitions between the interior and the landscape. As it is observed for the study sites that no rigid geometric grid was used, analysing the geometric relationship of the layout could provide insight into how much it was employed to control the composition and organise the scale of the design elements. The layout plans and detailed plans are used for the present analysis.

3.5.2. Spatial form or organisational form

a. Spatial entities and their incorporation in the natural site - The analysis of the spatial structure of the western examples, focusing on how the spatial elements (the house, garden, and open landscape beyond site's physical extent) are integrated and organized, has helped in understanding its hierarchical arrangement. Since the study sites offer myriad view interests: panorama, inward and outward view angles from its various topographic levels, it is imperative to analyse spatial organization of the built elements and their siting principles. The plans and sections are used for analysing this site embedded parameter.

b. Three-dimensional visual composition - Examining the three-dimensional aspects of the panorama and horizon (which marks the boundary of the outer landscape) in the spatial layout of the western examples also aids in understanding its spatial design. Given that the panorama and horizon are prominent features at study sites, analyzing the three-dimensional aspects of those sites in relation to how the panorama and horizon are

addressed provides insight into its spatial design. Plans with visual analysis marked with visual barrier and viewpoints are used in this analysis.

c. **Spatial depths of site entities and their interrelationship -** The analysis of the spatial design of the western examples in relation to the arrangement of spaces reveals that the spatial depth created by the visual or optical boundaries of a scheme helps in understanding its design. In the case of study sites, it is crucial to analyse how this affects the spatial design by examining the scheme's spatial depth and how the natural features of sites were leveraged to create the scheme. Plans and cross-sections are utilized for this analysis.

3.5.3. Philosophical form

Natural elements like trees, rocks, forests, water, the horizon, and agricultural landscapes, along with man-made features such as springs, pools, ponds, parterres, sculptures, and architectural objects, play a key role in the western examples. Analysing their visual representation, materialisation, and symbolic meaning helps to understand the elements that shape the overall image and how they are visually arranged within the composition. In case of Buddhism, the philosophical construct is the primary governing force which shaped their art and architecture. The historic Buddha's teaching on nature affinity, setting up temporal habitats amidst natural settings gives conformity to this aspect. Even setting up of *avasas* or *aramas* followed certain nature preservation principles in terms of site extent or measurements. Analysing the visual structure in terms of the visual representation, materialization, and symbolic meaning of these features within the architectural context will help clarify the pictorial composition of the design. Similar to the western examples, maps, plans, images, and diagrams are utilized in this analysis.

3.5.4. Environmental form

Examining the organisation of functional spaces and the balance between daily life functions) and cultural and religious pursuits, as well as contact with nature in the western examples has provided insight into how the functional aspects of the design are reinforced through architectural elements. All the study sites exhibited remarkable stewardship with natural resources available there. Preservation of land profile, vegetation, drainage corridors, fauna around were primary focus of the Buddhist monastic site planning which was expressed in each case with the site suitability principle. Maps, plans and diagrams are used.

3.6. Methodological framework for the present study

The methodology mentioned in segment 3.4.2 of the Delft university is mainly used for analysis of monastic sites (best preserved extant forms) having enough validated information derived from previous documentation and literature resources to visualize the three-dimensional scheme of the site to its original form. As far as Buddhist monastic sites are concerned, the extant ruins have been preserved only in a skeletal form (plinth bases that have survived till date/ stupa base, retaining walls etc.) and scantily textual evidence is available to understand the original design intent of the monastic sites. Additionally, there is a vast gap with regard to the time frame (1500-2000 years) in order to place the contemporary perceptions of spatial planning principles to that ancient context and also with the Western landscape tradition.

In this segment, with respect to the context of Buddhist monastic sites, the analytical keys and tools of the surveyed methodology are implied to carry out the investigation (Fig. 3-2). The tools are used to testify the environmental understanding of the monastic layouts interpreted over the three prototype sites of monastic establishments. These habitat types were introduced by the historic Buddha himself which corresponds to the current study and analysis. Forest or grove monastic site in Jaetavana at Sravasthi, Uttar Pradesh (3rd-6th c. BCE), hilltop monastic establishment at Sanchi, Madhya Pradesh (3rd c. BCE – 12th c. CE) and riverine plain monastic site at Bharatpur, West Bengal (6th-9th c. CE); these created the focus of the current analysis.

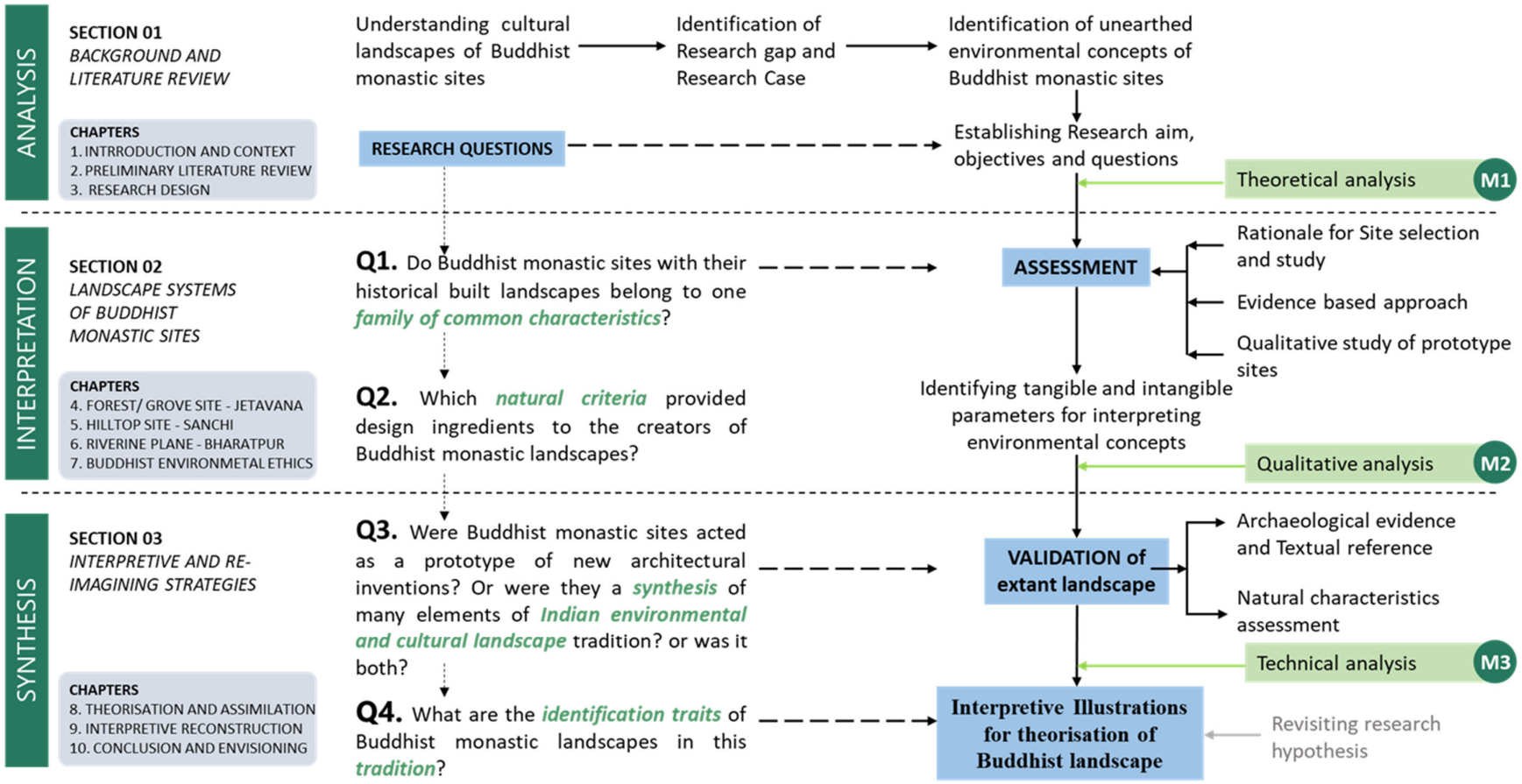


Figure 3-2: Methodological framework of the study

4. Environmental analysis of forest site- Jetavana monastery, Sravasti, Uttar Pradesh

4.1. General outline of the site

Sravasti (lat. 27°30'30"N long. 82°02'21"E) existed as one of the significant ancient urban centres of Kosala kingdom (Oudh region) during when the historic Buddha was alive. Currently it is located in district Gonda of Uttar Pradesh. The city finds its vivid mention in many Buddhist texts and literatures. It is mentioned in *Mahaparinibbana-sutta* that it is one of the six significant cities during the time of historic Buddha. A large number of followers were gathered here due to the auspicious presence of the enlightened one. The monastic site of Jetavana was Buddha's second favourite monsoon retreat; twenty-four monsoons were spent by the historic Buddha here. The legend of donation of Jetavana monastery at Sravasti by a merchant *Sudatta-Anathapindaka* to the historic Buddha testifies the economic prosperity of the city and its tradesmen under the rule of king Prasenajit.

An earthen rampart surrounds the site, measuring 5.23km (Fig. 4-1). The area which is enclosed by the rampart volumes to 160 hectares. The site is shaped as a crescent plan oriented to an ancient river named *Achiravati* (currently known as Rapti). The archaeological site has two major components with monuments sparsely dotted around. In ancient times, the walled fortification was referred as *Maheth* and the site of monastery as *Saheth*. Fa-xien had described about the city and the monastic site in his travelogue from 5th c. CE. With this monastery being established and popularised as *Anathapindakarama,* Jetavana monastery flourished into a larger monastic establishment and nucleus of Buddhist pilgrimage for laity. One of the medallions on the railing of Bharhut stupa (currently preserved in Indian Museum, Kolkata) depicts the historical event of the ceremonial journey of the ruler there to pay a visit to the historic Buddha.

The site of Jetavana was hallowed by the presence of historic Buddha and the 'Great Miracle' performed by him. The place earned its reputation and place of veneration due to that. Another significant historical event was conversion of infamous burglar *Angulimala* who used to kill passersby of the forested areas and cut a finger off from the deceased ones in order to make a garland.

Jetavana monastery was also partaken under the royal patronage of the great emperor Asoka. Xuan-xang witnessed two Asokan pillars at the eastern gate of the monastic establishment. The left one was crowned by a wheel and the right one had a bull atop. There was a stupa also made by Asoka enshrining the relics of historic Buddha. Buddhist scripture *Divyavadana* has description of Asoka's pilgrimage to this site and his worship at the stupas commemorating the disciples of historic Buddha: *Sariputta, Maudgalyayana, Mahakasyapa* and *Ananda.* When Xuan-xang visited the place in late 7th c. CE, most of the buildings had fallen into ruins.

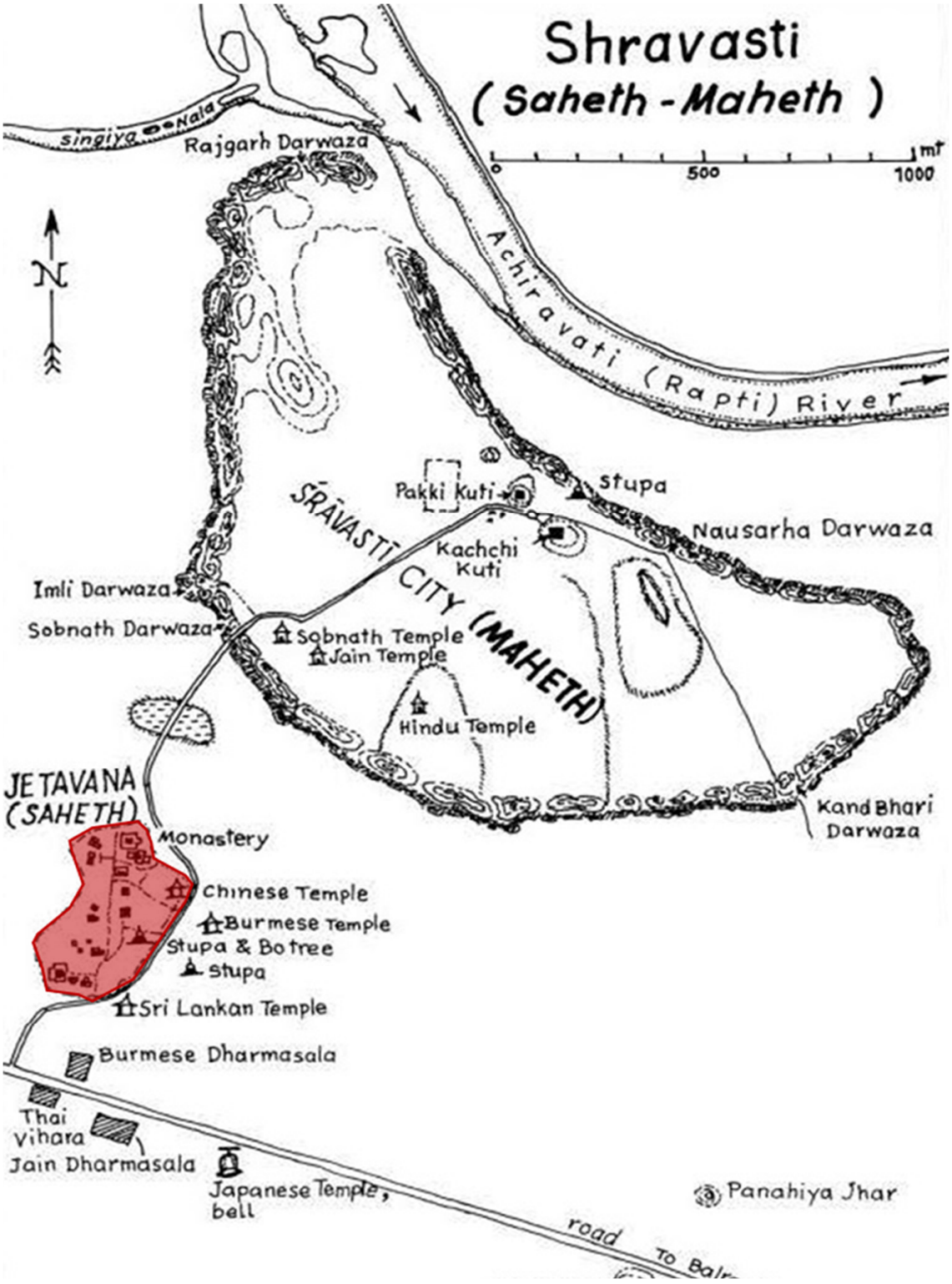


Figure 4-1: Site of Jetavana monastery in Sravasti city

4.2. Chronology of archaeological explorations and study

Kansai University Professor Yoshinori Aboshi and Professor Takahiro Takahashi conducted explorations and excavations spanning over nine seasons from 1991. The site was previously

discovered in 19th century by a team of British archaeologists led by Sir Alexander Cunningham. This was followed by an excavation conducted by Dr. K. K. Sinha in 1959. Not much attention was paid to the site there after until the exploration led by Kansai University.

The extant remains of monuments at Jetavana monastic site lie within an irregular enclosure. (Mitra 1971). With successive excavations these monuments and remnants were exposed apparently without a discernable organisational pattern. The earliest relics discovered contains a few images and structures from Kushan period.

Within the fortified city of Maheth lying at the north-east corner of Jetavana monastic site, two massive brick monuments can be sighted which are named as *Pakki-kuti* and *Kachhi-kuti*. The first one bears the history of erecting a stupa at the spot where the historical event of conversion of *Angulimala* occurred. The second monument is where the stupa of *Sudatta-Anathapindaka* once stood. The Buddhist link with *Kachhi-kuti* is evident in its structural conformity. There can be found two circular plinths, which might be remnants of early period stupa. The *Pakki-kuti,* on the other hand, did not bear any such strong connotation of religious association. The superstructure has similarity with old 'Hall of Law' than a stupa as mentioned by the Chinese pilgrim.

The excavations were carried out at the areas marked A-D by Kansai University (Fig. 4-2). Area A was located near Suraj Kund; Area B occupied the eastern segment to the; Area C falls to the south of Area B and Area D was located in the western direction of the southern quadrant of the site. Through the excavations six cultural periods can be revealed.

Outside the precinct of *Saheth-Maheth*, a group of ruins can be sighted at the southern part of the city wall which were believed to be stupas. They were named as *Panahian-jhar, Kharahuan-jhar* and *Ora-jhar.*

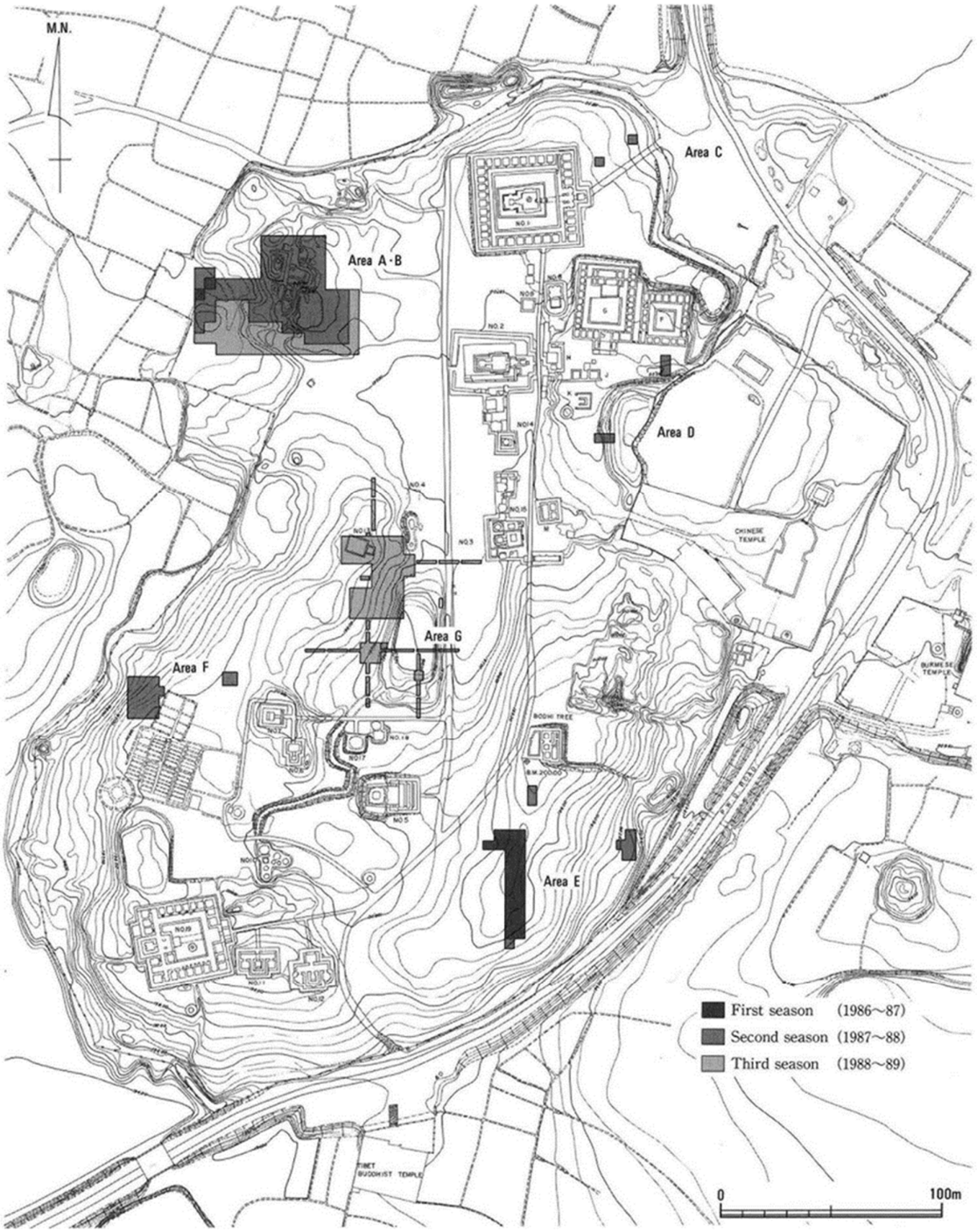


Figure 4-2: Archaeological site of Jetavana Monastery, best preserved (source: Archaeological Survey of India, Lucknow Circle)

4.3. Characteristics of natural and wider archaeological landscape

4.3.1. A paleochannel

The eastward spread of a large waterbody is in sharp contrast to the other tanks (near stupa 2 and at entry steps) in terms of shape and capacity, that is placed tightly to the stupas or monastery. Analysis of the CARTOSAT image reveals a palaeochannel from the nearby Betwa river to almost the north-eastern end of this large waterbody (Fig. 4-3). The water in this palaeochannel would have curved off and flowed northeast to culminate into the waterbody (average height of elevation 112m). It is possible that excess water from other waterbodies might be spilled over to this large waterbody at lower elevation. The Sanchi region therefore received water through this palaeochannel from the river Betwa at some time in the past, but a ground exploration by archaeologists and geologists is necessary to determine whether this flow was contemporaneous with activity at Sanchi. There are other similar explorations done to obtain hydrological indications for tracing irrigation channels (Shaw, 2005). The channel itself is not perfectly straight the slightly meandering shape (Figure 24) could be natural but even man-made canals sometimes assume shapes dictated by topographical contours.

Figure 4-3:A regional view of Jetavana and environs showing the river Rapti and the paleochannel. (Source: Author)

4.3.2. Natural topographic configurations

Sravasti is 109m from MSL as per Survey of India data. The terrain is flat in this region as it was close to the riverbed of ancient river *Achiravati*. The elevation varies in the range of 109m to 117m. The localised elevated grounds were leveraged in the placement of the monastic establishment (Fig. 4-4 and 4-5). The monastic site is naturally protected by the elevated earthen mounds with steep slopes descending to the surrounding agricultural and forested lands (Fig. 4-6 and 4-7). This flat terrain facilitates in the slower surface runoff. Thus, the lower terraces were leveraged for accumulating rainwater.

Figure 4-4: Undulating land profile at site (Source: site documentation by author)

Figure 4-5: the change of elevation towards lowest point of site (Source: site documentation by author)

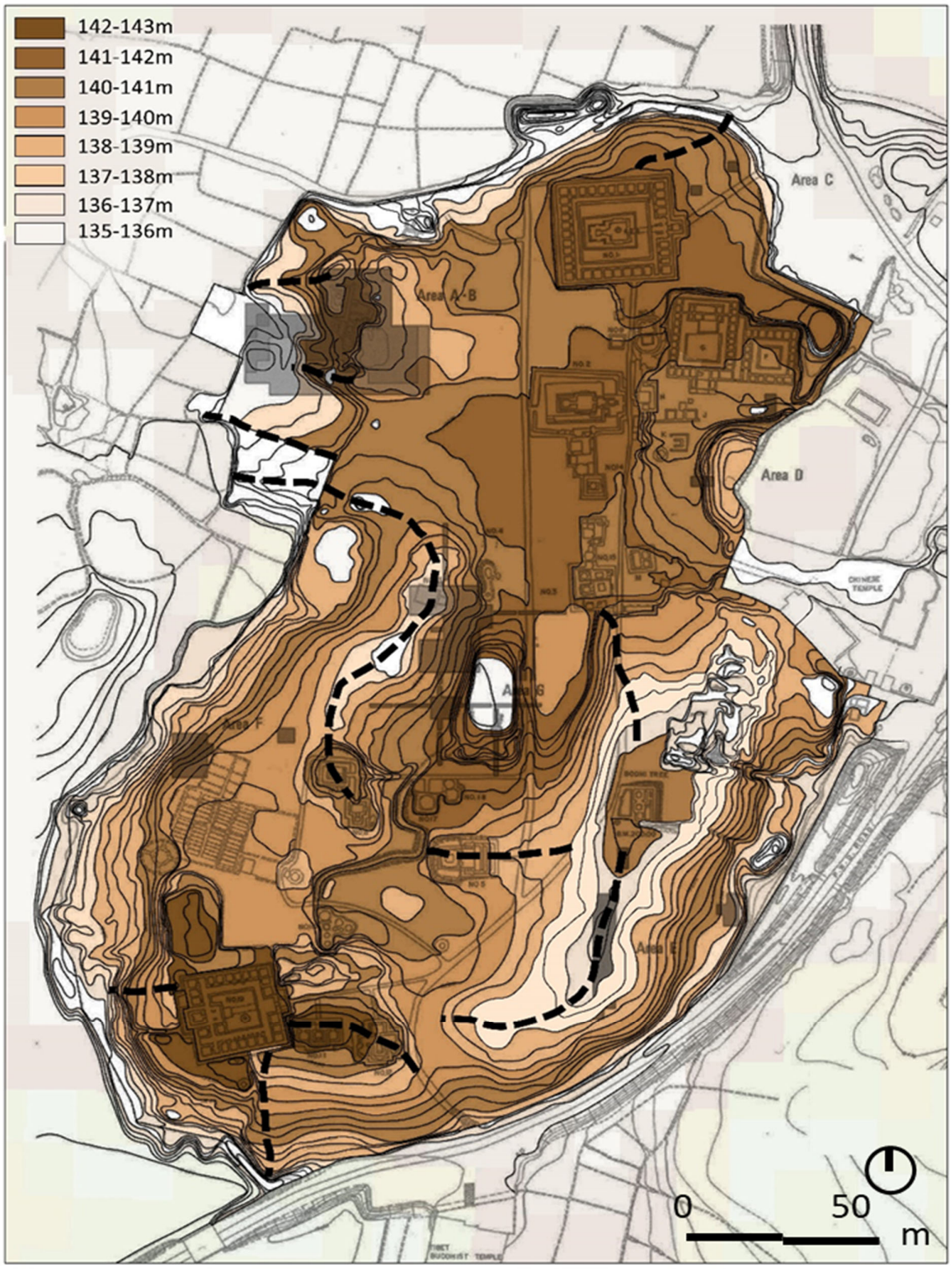


Figure 4-6: Elevation map of Jetavana archaeological site and surrounding. (Source: Author)

Figure 4-7: Slope analysis map of Jetavana archaeological site and surrounding. (Source: Author)

4.3.3. Hydrological regime and its elements

The geo-climatic location of Jetavana shapes the hydrological regime distinctly. It falls in the composite climatic zone of India where dry summer and monsoon are moderately distributed. The monument site in particular, is a comparatively high point and slopes toward wester direction to collect the rainwater discharge with two other earth berms in the vicinity. There are no distinct watersheds could be demarcated in this catchment (Fig. 4-8 and 4-9). Though there are no prominent ridges neither valleys (channels) it experiences sheet flow mostly perpendicular to the steep slopes. Waterbodies/ tanks are located strategically by the builder at lower or lowest point to arrest the storm water runoff (Fig. 4-10 and 4-11). The moat outside the monastic site prevents flooding inside from the riverbed of *Achiravati*.

Figure 4-8: Surface hydrology, drainage channel at site (Source: site documentation by author)

Figure 4-9: Surface run off as an outcome of undulating topography at site (Source: site documentation by author)

Figure 4-10: Drainage map of Jetavana archaeological site and surrounding. (Source: Author)

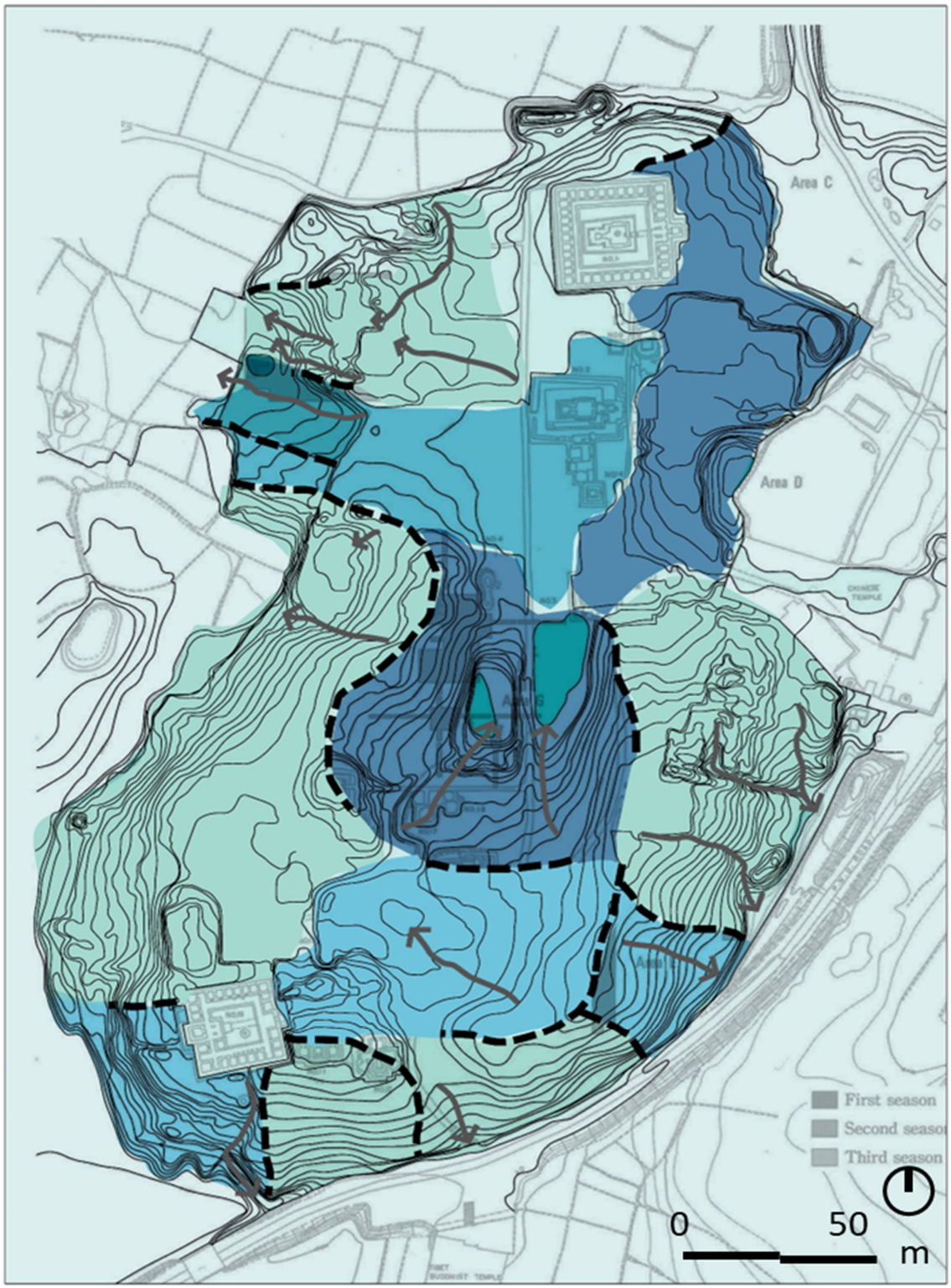


Figure 4-11: Watershed map of Jetavana archaeological site and surrounding. (Source: Author)

4.3.4. Vegetation and plant characteristics

The site is a forested grove. The middle portion is populated with big deciduous or semi-evergreen trees whereas the steep slopes are vegetated with scrub forest which are considered as ecologically sensitive zones within this forest landscape system (Fig. 4-12 and 4-13). Original trees might not be existing on the site. Although the Bodhi tree from ancient time is there on the site but what we see at present might be outgrowth or after growth from the date of excavation and a result of restoration attempt. There are mostly dry shrubs along the outward slopes in surrounding areas. Due to flat terrain, riverine flood deposit and ground water availability the natural vegetation growth is quite remarkable. Greener patches could be noticed along the drainage corridors and lowest discharge points within the catchment due to moist accumulation on ground (Fig. 4-14 and 4-15).

Figure 4-12: Dense forested area along buffer area of the site (Source: site documentation by author)

Figure 4-13: Seasonal scrub vegetation along moist drainage corridors at site (Source: site documentation by author)

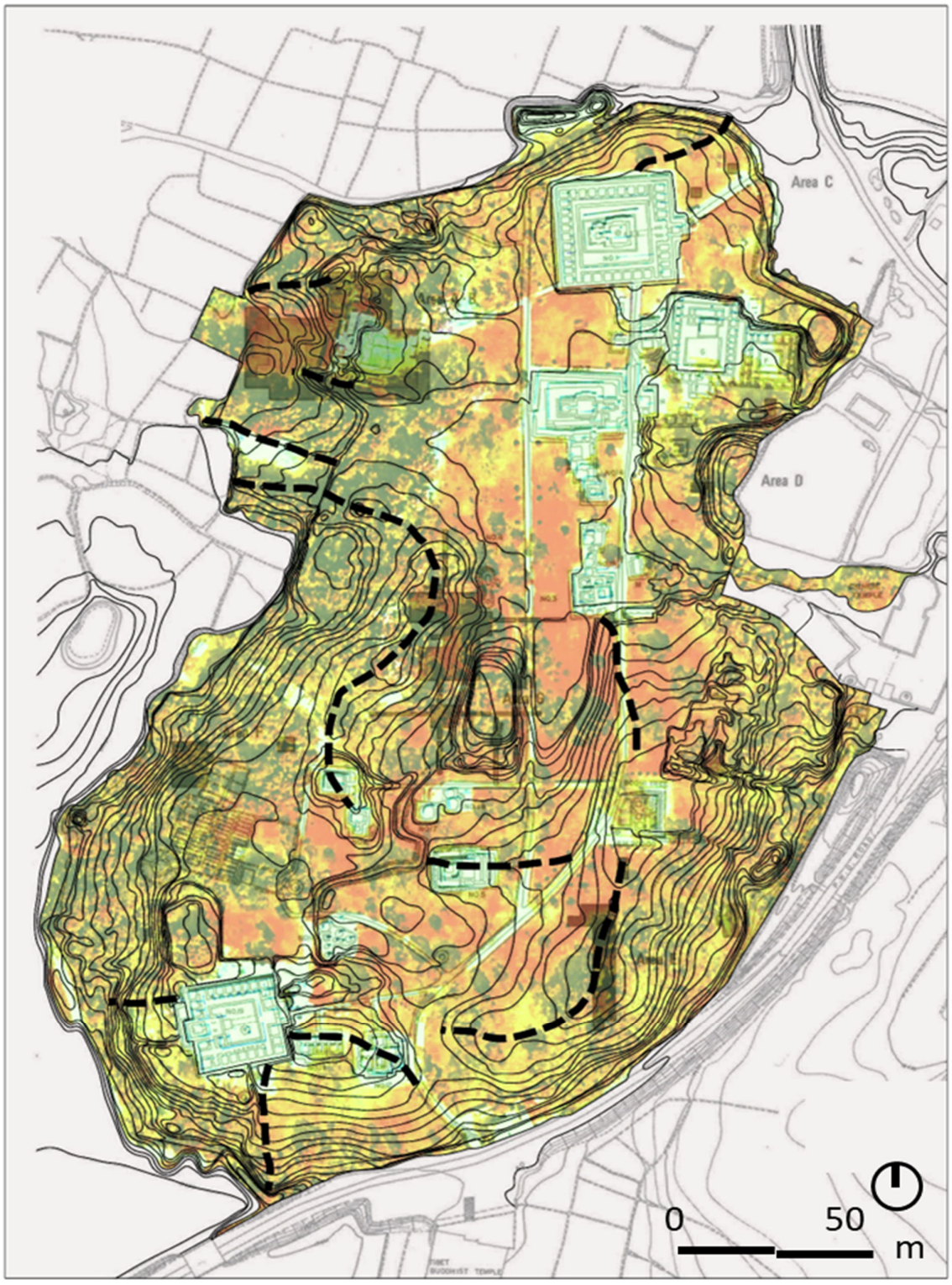


Figure 4-14: Existing vegetation map of Jetavana archaeological site and surrounding. (Source: Author)

Figure 4-15:Existing sensitive vegetation (on valley areas) map of Jetavana archaeological site and surrounding. (Source: Author)

4.3.5. Aspect and Exposure – visual layering and functional siting of built elements

Understanding the inter-relationship of the physiographic layers of Jetavana monastic site, this study focuses on finding the link between stupa with its landscape setting. Being surrounded by forests and groves the site was well protected from external visibilities. Within site the temples posited on higher elevations were visually connected with inward looking visual quality (Fig. 4-16 and 4-17). Monasteries, which are much bigger architectural blocks with more solid portions were located on southern and western slopes to ward off solar exposure (Fig. 4-18).

Figure 4-16: Solar exposure recorded on a sunny day at site along southern and northern part (Source: site documentation by author)

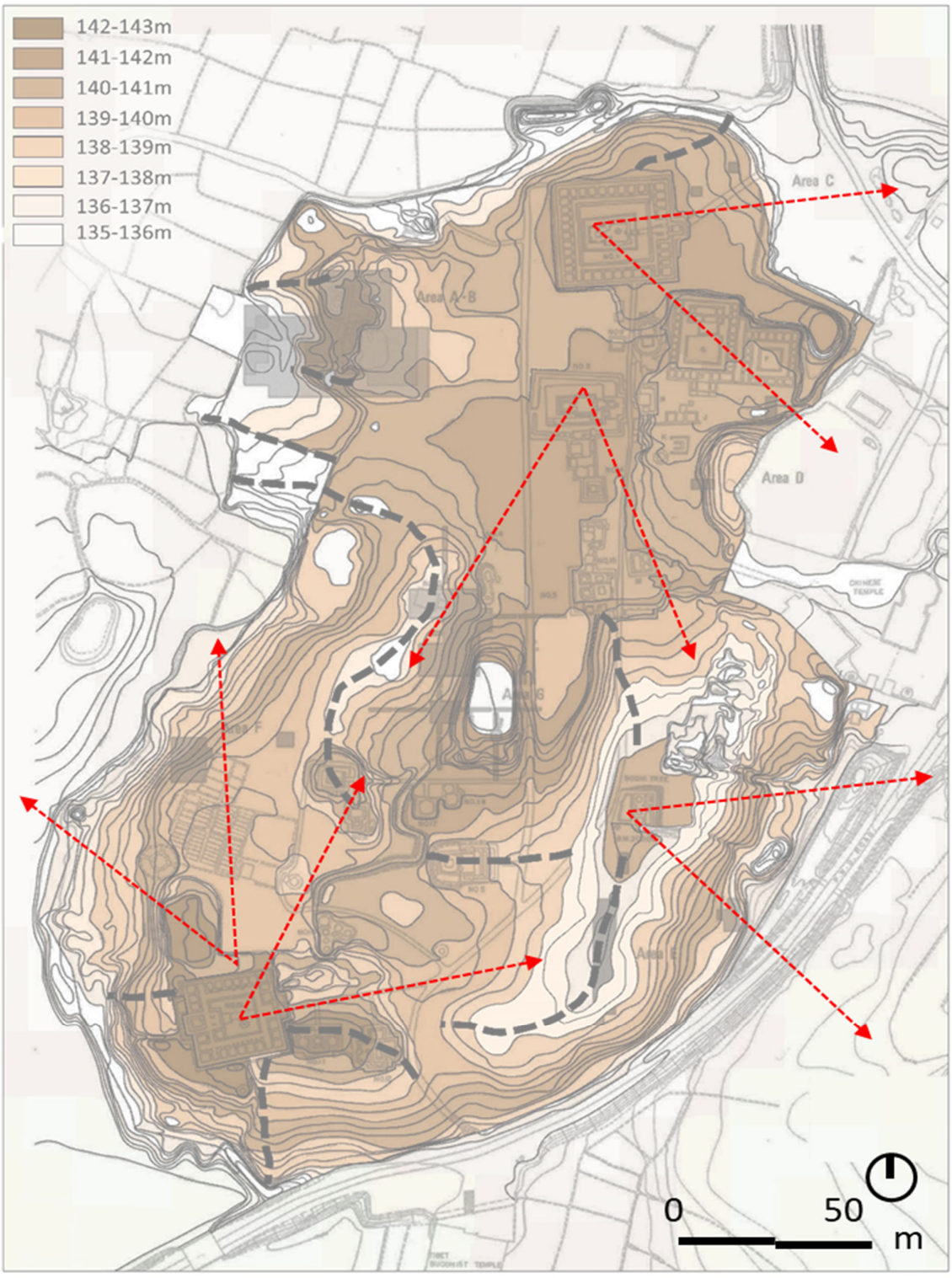


Figure 4-17: Visual connection map of Jetavana archaeological site and surrounding area (Source: Author)

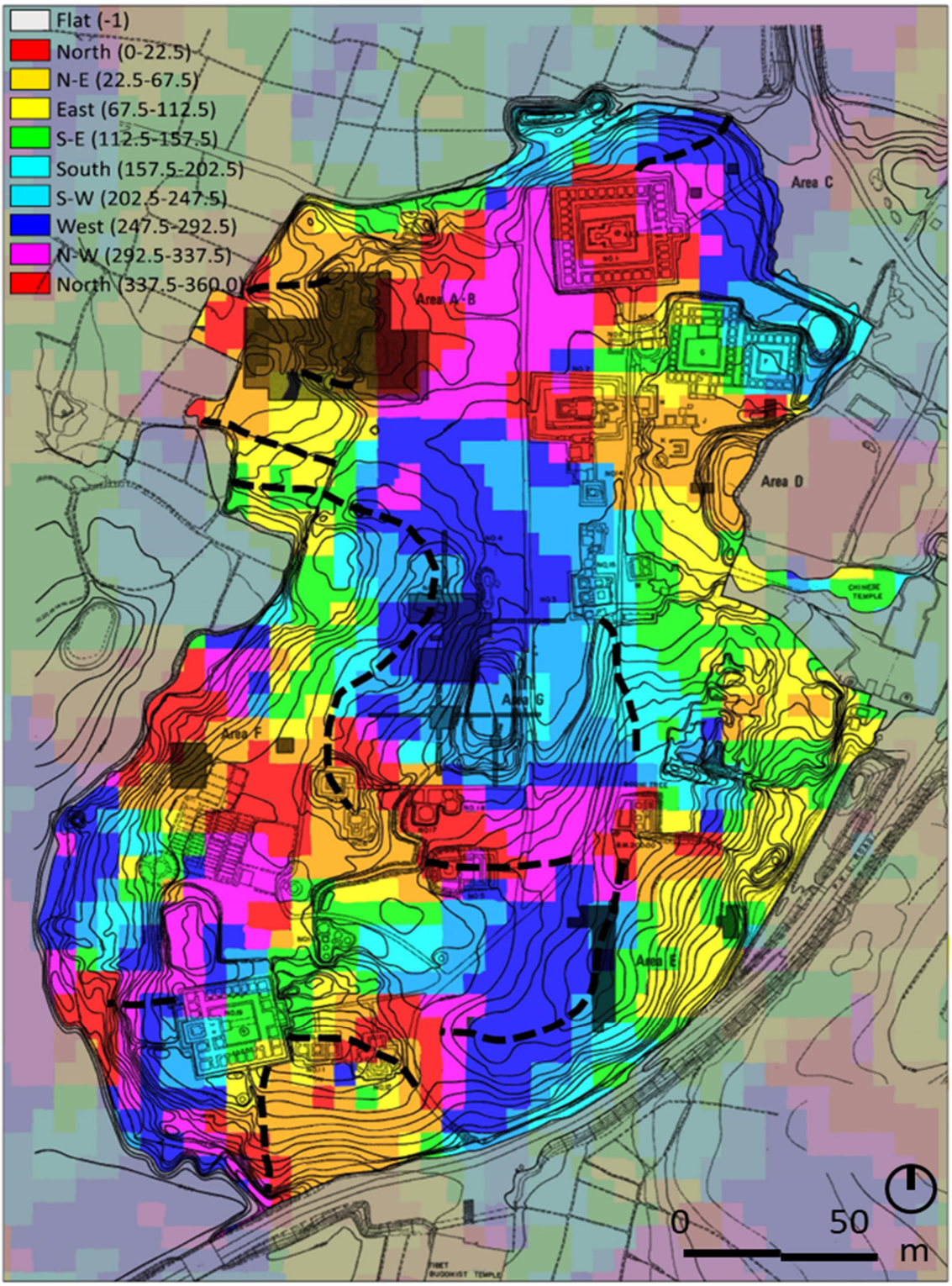


Figure 4-18:Solar aspect map of Jetavana archaeological site and surrounding. (Source: Author)

4.4. Scientific tools and micro-methodology for analysis

Remote sensing is one of the effective ways to collect information without any physical impact and/or damage to the site itself. Furthermore, it is convenient to study the various aspects of the study region of such a scale selected (Fig. 4-19). The satellite images allow the site to be studied holistically in relation to the surrounding context and allows one to describe connections and spatial correlation amongst various visible geomantic features. High resolution images show the finer details such as monument footprints or plinth areas, roads and pathway connections, whereas coarser/ low resolution images show the features of larger landscape setting such as drainage pattern or distribution of waterbodies and open spaces.

i. Digital elevation model

A Digital Elevation Model (DEM) image helps in capturing three-dimensional topographical data where variations in height is shown as a sequential band of colors. When a DEM is visualized on a computer screen, the height associated with each pixel can be examined using Geographic Information System (GIS) software. GIS also enables analysts to overlay images with spatial information from other sources. In this paper, for example, village and ASI boundaries, tanks, temples, and monasteries traced from the Google Earth image illustrated in Figures 1 and 4 have been overlaid on a DEM. Although there are many methods available to generate a DEM, the current research used two specific types:

(1) Space Stereoscopy, in this case CARTOSAT1 satellite is used to capture two images of the same location from two varied locations in space; and
(2) Interferometric SAR, whereby two images from a RADAR sensor are used (here, the Shuttle Radar Terrain Mission - SRTM).

ii. Other tools

The field studies described in this work were conducted with the aid of a Global Positioning System (GPS) device, to determine its precise geo-topographical location at any given point in time receiving the satellite signals. A GPS is useful in this context in two ways:

(1) to guide a researcher to specific features observed on remote sensing images or maps; and
(2) to record the latitude and longitude of any additional points of interest observed during field studies, for subsequent analysis in the context of other data in the researcher's GIS database.

iii. Process

The DEM data is downloaded for the study site from United States Geological Survey (USGS) for authenticated data. In ArcGIS, spatial analyst tools are used to categorise the contours and slope. Then the desired contour interval is mentioned in metre to generate the elevation map and slope analysis map.

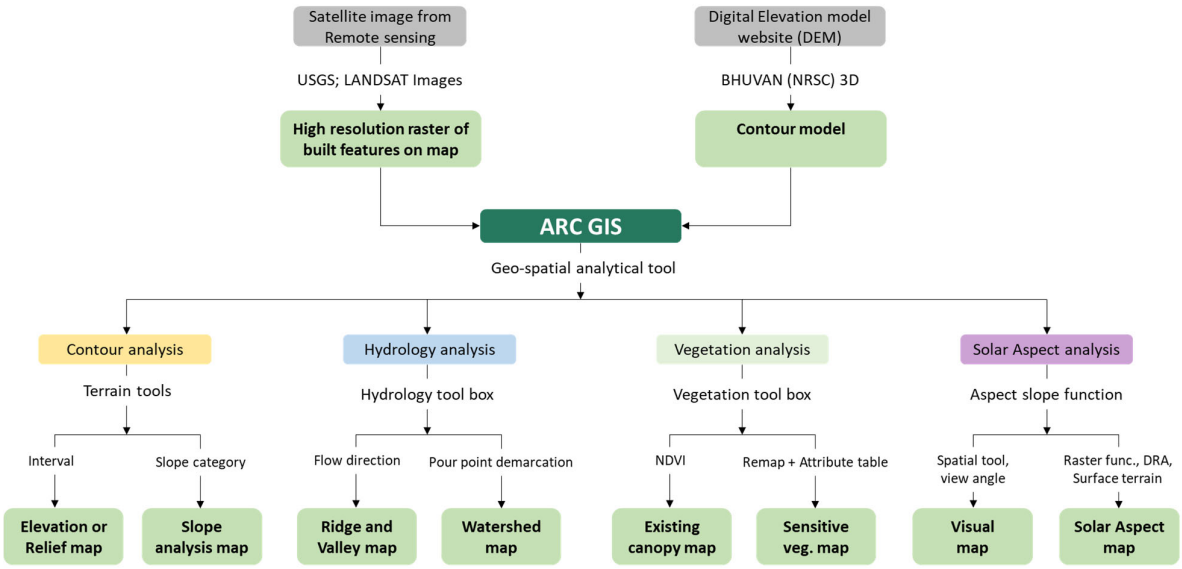


Figure 4-19: Micro-methodology diagram (Source: Author)

The Flow Direction tool in the Hydrology toolbox of ArcGIS is used to produce a flow direction raster using the digital elevation data. Each elevation raster cell's flow direction is determined by this tool. Then a flow accumulation raster is prepared. The Hydrology toolbox contains a tool called flow accumulation that is used to determine how many areas altogether contribute to flow at each cell in the flow direction.

A pour point is defined on the map. Once the pour point is acquired, the first step in making a watershed map is to get the area's relevant point where the final drainage is occurring. The watershed tool in the Hydrology toolbox is used to create a watershed raster. This tool creates a raster that identifies the area of each cell that contributes flow to the pour point.

On a similar note, the vegetation map is prepared using sentinel-2 data. The aspect map is generated using the DEM data on ArcGIS.

iv. A field study of the archaeological site

A field study was undertaken spreading over summer and pre-monsoon season in 2023, to validate the outcome of geo-spatial analysis with the ecological measures adapted by the builders of the site. It was appropriate to search for hints such as exposed drainage corridors, paleo channel, low lying areas or water dots inside the site boundary. As can be seen the north-eastern edges lie in proximity to a settlement. At the western side of high mounds with monastery 1 there lies a prominent sloping ground culminating into a large waterbody at lower elevation of 102m. The surrounding being agricultural land, was therefore most promising starting point to explore more such water dots in the same watershed to receive water from the high ground. Though this lower elevation area has not been excavated to check for any large tanks (or old structures) or natural water features. There is another noteworthy moat along the eastern boundary of the site. From the watershed analysis, it is evident that the surface runoff has been captured here and been converted into a drainage channel to prevent flooding at the monastic establishment (Figure 10). The flat terrain and average annual rainfall regime have

evoked the ecological measures imbibed in then planning methods. The southwestern part of the mound has a low-lying area, replenished with surface run off from higher elevation (Figure 8). A steep access slope reaches to this low-lying area from monastery and temple. The field visit was particularly helpful locating these natural features associated with the monuments and their symbiotic relationship.

These observations made on the site are the bonafide to the hypothesis of this study. The literature study, techno-critical analysis and interpretation of the monument site have unearthed the spatio-ecological planning wisdom followed during ancient period. Figure 30 clearly shows the scrub forest on the steep slopes are an indicative of faster run off rather than storage. The big trees are mostly on the top of the higher berms or at the lower elevation where the water or moisture could have been retained. This area has further potential for an archaeological survey to find/ establish the historical ecology of the place.

4.5. Composite analysis

The settlement activities at the Jetavana site were closely associated with the natural layers of landscape system. Each of the physiographic layers interacted closely with the positioning or siting of the monuments.

To develop a global acceptance, the study is interpreted on the purview of Ian Mcharg's (1969) principle to determine the site suitability. With composite analysis the natural layers of topography, hydrology and vegetation would show how this process resulted in the sustainable site planning of the establishment (Fig. 4-20).

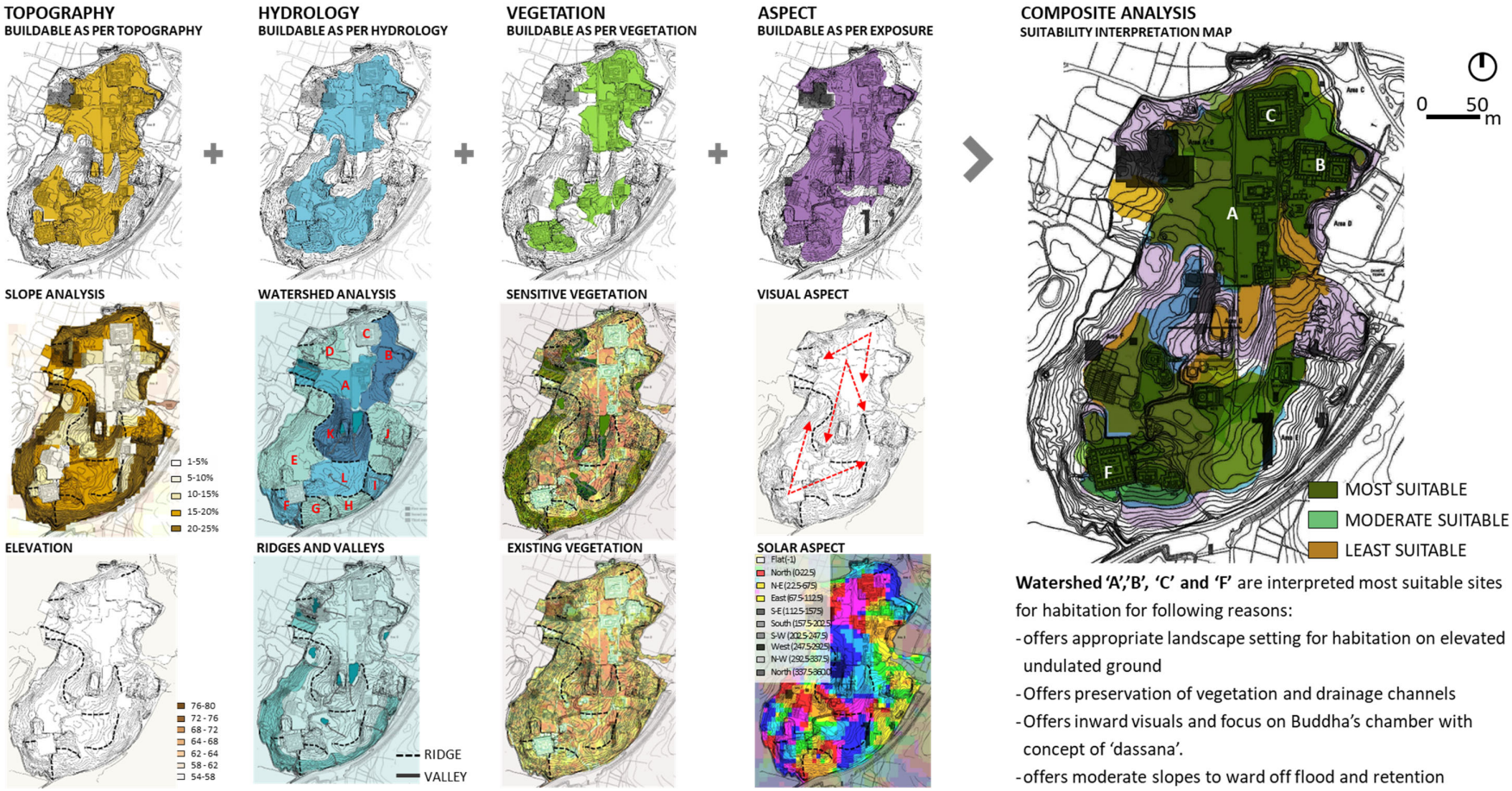


Figure 4-20: Composite analysis map of Jetavana archaeological site and surrounding for interpretation of site suitability. (Source: Author)

4.6. Functional relationship of spaces in spatio-environmental regime

The transitional location of Jetavana monastic site between forest land and fortified city at fluvial plain of Rapti River has set the cultural dialogue (Chakrabarti 1993: 81). The natural setting has influenced this interaction. The natural factors as well as cultural factors created a linkage between the monastic lives and the settlements also. The adaptive nature of the inhabitants toward the seasonal vegetation evolved a unique cultural pattern administered by the landscape. This process advocates the idea of living choices in harmony with nature. Thus, it is imperative to re-envision the cultural process in and ecological process hand in hand to interpret the sustenance process adapted in the settlement networks and the relationship with the monastery (Chakraborty 2010: 65).

The Buddhist cultural landscapes were shaped by the siting of the primary structures such as votive stupas, viharas, chaitya grihas, temples etc. (Sinha 2006). The investigation with landscape approach generates a perception of inter-relatedness between nature and anthropogenic activities. The pattern could be read in landscape in terms of orientations, alignment, spatial conformity as response to the contextual landscape. In fact, the relic stupas containing Buddha's remains, began to act as monumental landmarks in the pilgrimage networks shaping up the vast Buddhist cultural landscape in India (Sinha 2006: 173). These votive stupas developed prominence over the ages with the belief system that Buddha, himself is manifested within them (Schopen 1987:87). Furthermore, considering an additional layer of ecological interpretation for these monastic sites offers an intriguing insight toward environmental approach.

The interpretation of Buddhist settlement histories from the extant elements or landscape patterns demands further investigation in patronage activities in that region. The study of evolution in spatial patterns shows how the votive stupas, even in their extant form created a spatial focus of visual arrest in otherwise flat landscape. They were physical manifestation of local royal patronage. Constructing the stupa bases with brick masonry could be construed as an attempt to bringing stability by negotiating the challenge of unstable flood prone terrain. The alteration measures taken by the then builders prove the hypothesis of the study i.e. the monastic site planning was influenced by contextual ecological parameters. The understanding of social practices linked with local environment in and around Buddhist monastic sites provides a dynamic re-envisioning for the Buddhist monastic site planning approach. This nature influenced study approach helps perceiving the expanse of Buddhist understandings of the environment and planning as a timeless scholarship.

5. Environmental analysis of hilltop site – Sanchi monastery, Raisen, Madhya Pradesh

5.1. General outline of the site

Crowning at the hilltop of Sanchi, nearly 91metres in elevation, the imposing Buddhist edifices (Lat. 23º29'N and Long. 77º45'E) are recognised as UNESCO World heritage site with its well-preserved monuments. The site is unique in terms of its spatial extent spanning over a substantial period from the 3rd century BC to 12th century AD covering almost thirteen hundred years. The site is an exemplar to gauge the evolution, expansion and degeneration of Buddhist art and culture in India. The unmistakable prosperity and prominence of this Buddhist establishment was influenced by the rich mercantile population of the town in Vidisa. The proximity of the town, the strategic position at the confluence of two rivers, the Betwa and the Bes, as well as on two significant trade-routes stemmed in the flourishing exchange between Sanchi monks and laity in Vidisa. The site continued to receive attention subsequently in Kashtrapas, Gupta and Harshabardhana dynasties till 13th century AD. A lot of Brahmanical plaques could be found during this period in site inscriptions. It is not known why Buddhist activities in the region ended sometime after the fourteenth century. One probable reason could be the Buddhists deserted the place due to lack of subsistence resources or increasingly lost their independent identity surrendering to the uprising Brahmanism.

5.2. Chronology of archaeological explorations and study

The discovery of Sanchi site around two hundred years ago, has attracted multitude of intellectual attention. After its first discovery in 1818 by General Taylor who belonged to the Bengal Cavalry, it was re-examined in 1819 by Captain Edward Fell. In the following years the site had undergone multiple unplanned and haphazard excavations with the interest of treasure hunts (Shaw, 2007). The massive bout was brought to the site in 1822 with the excavation work conducted by Captain Marshall (Marshall, 1940). As a result, by the next exploration by J.D. Cunningham (1847), many of the major monuments had turned into complete wrecks (Fig. 5-1 and 5-2).

The first notable and sensitive excavations were conducted in 1851 by Alexander Cunningham and F.C. Maisey and shaped the primary focus of Bhilsa Topes in the same year (Shaw, 2007). These stemmed in the reclamation of relics and other archaeological antiquaries with inscription from the minor stupas (Stupa 2 and 3). The restoration work started in 1881 by Cole (Cole 1884) which continued in later phase under the leadership of John Marshall (1940). The excavation works carried out between 1912 and 1919 represent the most authentic field work till contemporary time. The framework for the current study is still based on the six-phase excavation sequence by Marshall's between 3rd c. BCE and 12th c. AD.

Figure 5-1: Sanchi and its landscape setting (Source: Author; prepared from Archaeological Survey of India maps and maps published in The Monuments in Sanchi by John Marshall, Alfred Foucher)

Marshall's excavations at several strategic locations at the site have enabled the discovery of many significant remains. In 1936, a large monastery was excavated at the second terrace with a courtyard centric layout, immediately at the western part to the main stupa. While in 1995-96, clearance of overgrown vegetation by Archaeological Survey of India (ASI) unearthed a cluster of small-scale votive stupas (Willis, 2000). Recent clearing work undertaken around the large stone platform resulted in the discovery of a stairway attached to a high plinth. Judging the similarities with other neighbouring structures (Shaw and Willis, 2000) this could have been the base of early monastery. A sizeable trench was discovered by the ASI, an excavation work conducted under S.B. Ota, in the topmost terrace above main stupa. Many paving stones were also revealed to the east of main stupa. Further several monastic structures belonging to seventh century were unearthed around the monastery cluster in the southern lower terrace of the archaeological site precinct.

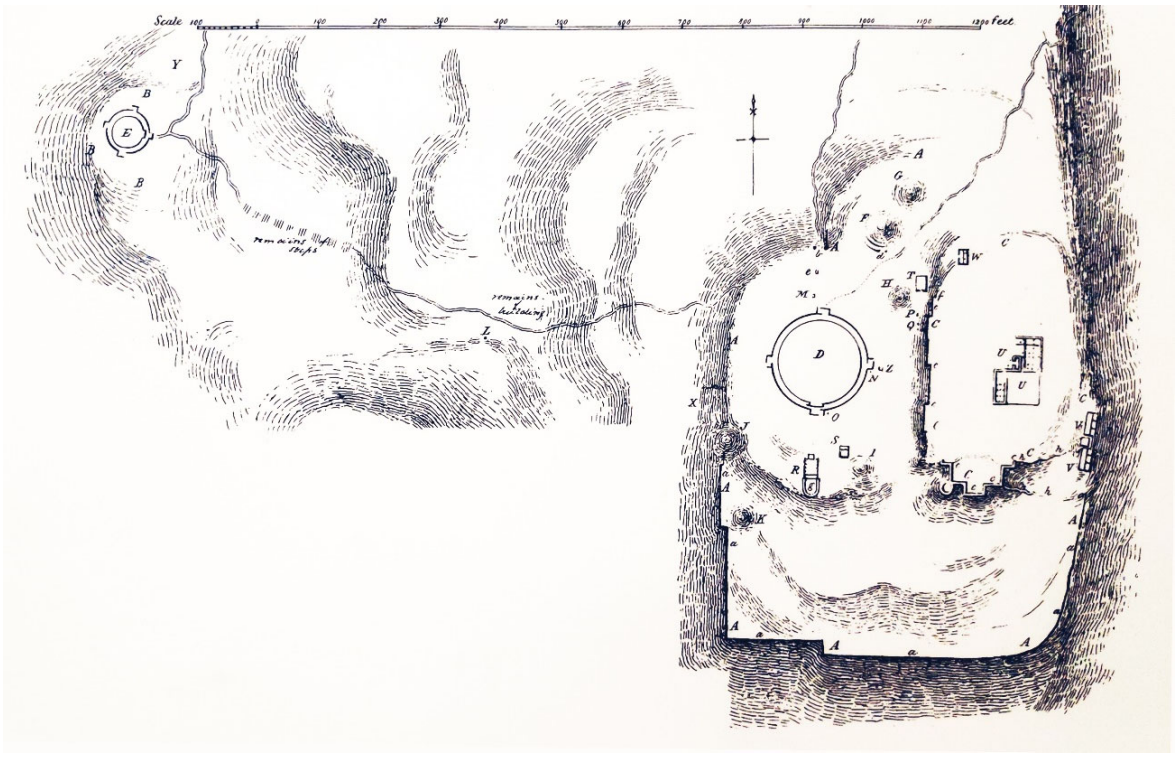


Figure 5-2: Excavation plan of Sanchi archaeological site showing the great stupa and other extant ruins. (Source: Archaeological survey of India Site Museum collection at Sanchi)

5.3. Characteristics of natural and wider archaeological landscape

As documented by Cunningham (1854), four other well-preserved sites were discovered and formed a part of scholarship of this region such as Sonari stupa (23°25′56″N 77°39′51″E), Satdhara stupa (23°29′13″N 77°39′5″E), Murel khurd stupa (23°25′53″N 77°50′31″E) and Andher stupa (23°24′40″N 77°54′26″E), all located within 15km reach of Sanchi approximately. Several reliquaries were retrieved from the above-mentioned stupa sites through the collaborative effort of Cunningham and Maisey. Few of them bear names of monks which correspond to the inscriptions found in Stupa 2 at Sanchi hilltop. This reflects the interlinkage of the five sites under the same Buddhist school of thought. The second phase of

propagation of Buddhism happened in the last quarter of second century BCE was mostly influenced by monastic institution (Willis, 2000). Though all the sites are under ASI protection, have not been explored scholastically since Cunningham's time (Fig. 5-3).

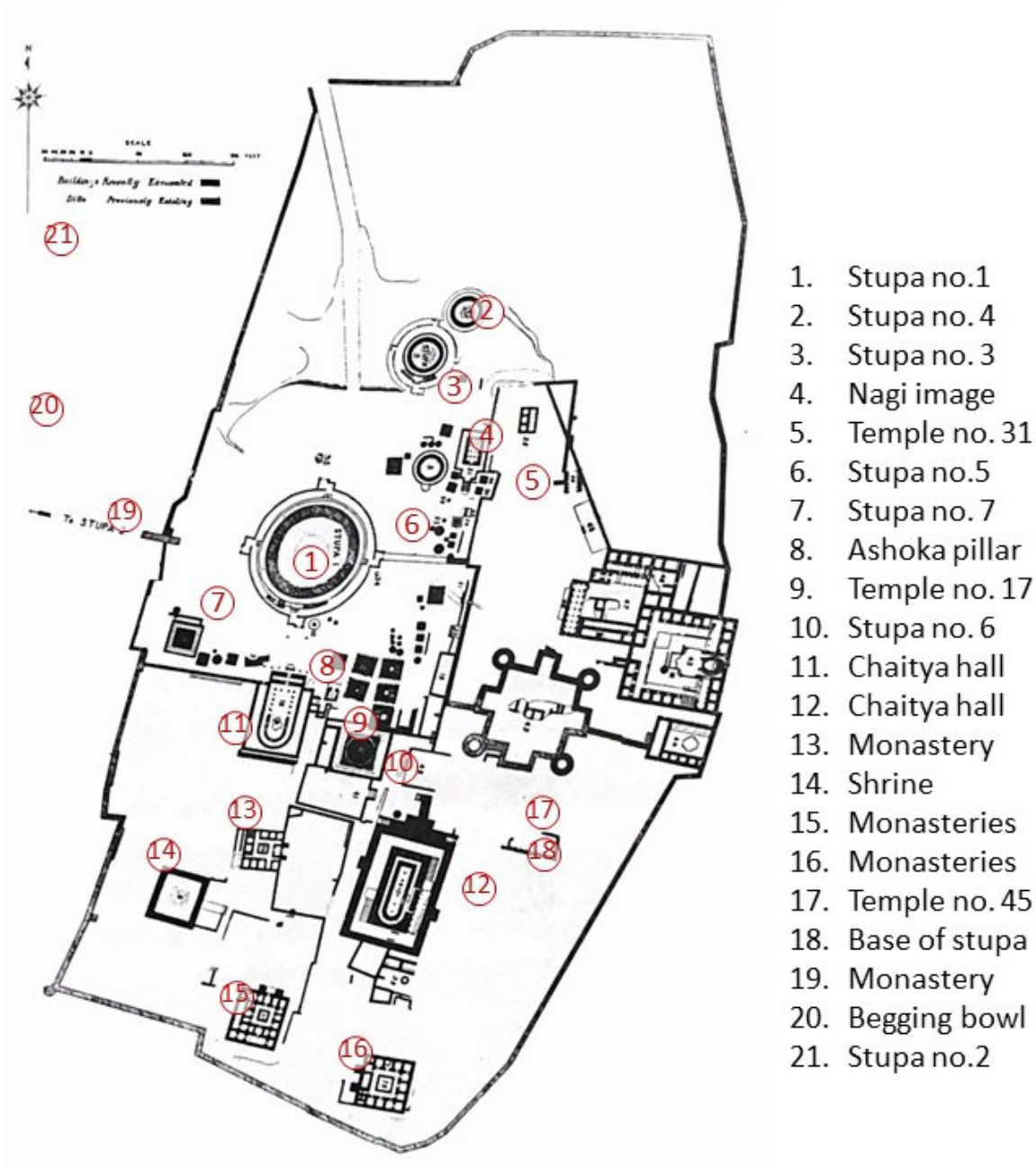


Figure 5-3: Excavated monuments of Sanchi (Source: Author; prepared from the maps published in The Monuments in Sanchi by John Marshall, Alfred Foucher)

The ancient urban centre of Vidisa holds a key position as archaeological site (Shaw, 2007). The mounds of this town are situated between Betwa and Bes Rivers. The city earlier known as 'Besnagar' is believed to have been shifted to its current location as represented by the contemporary town of Vidisa. It is approximately 1km to the south of earlier urban centre. The earlier town of Besnagar dates back to sixth or seventh century AD during the post-Gupta

period. However, there is evidence of habitation in the current location during earlier periods also (Fig. 5-4).

The earliest excavation was done in 1880 by Cunningham himself, where the main city mound is found to be encircled by a massive earthen embankment in the wester direction. His excavation works were mainly focused with sculptural remains at some smaller mounds overlying with evidence of multicultural occupation. These earthen mounds got re-excavated by H.H. Lake (1910) after several years with same interest of study but not carefully considered for extensive documentation. Currently the Sanchi monument site is preserved by Archaeological Survey of India (ASI) with all the excavated remnants and restored main stupa.

Figure 5-4: Satellite Image of Sanchi Monastic site (Google Earth Pro image dated September 01, 2022) showing the large monument remnants within the ASI boundary (Source: Prepared by author from Google Earth data)

5.3.1. Concise view of the wider archaeological landscape of Sanchi

The sequential excavation works in this region including Sanchi and other discovered archaeological sites have not been done with systematic order. Few random surveys had been conducted by ASI during 1976 and 1982. However, the outcome is not scientific and unsatisfactory to carry out further research based on those data. A preliminary orientation could be achieved at the most because the data entries are without map coordinates and single line information. Moreover, the sites range over sculptural remains to settlement mounds and associated surface elements such as ceramics or metal items. But the common absent parameter in all these observations is their landscape cum geographical extent or their spatial relationship to the prominent or discovered-published sites of archaeology in that area of interest. Since these data collected are not explicit neither taken methodically, they produce gap in understanding among explorations and their spatial inter-relationship. So, a quantitative spatial pattern in the wider archaeological landscape is yet due.

In addition to physical remains, historical witness accounts also suggest that Sanchi's archaeological spread was greater than present ASI understanding. The inability to corroborate the excavated remains with facts mentioned in accounts and the vast quantity and spread of antiquity in the region, has led investigators to believe that the site was much larger than the currently excavated archaeological remains.

Any age-old institution set at the outskirts of the city must draw resources from the local environment for its sustenance, water being one of the most important. A community may settle close to a water source, or conserve rainwater by constructing tanks, dams, and embankments, or draw water by diverting it from nearby stream flow. For instance, several dams, embankments, and large reservoirs were found during a large survey work conducted in the Sanchi and its surrounding areas (Shaw and Sutcliffe, 2003). Archaeological testimony indicates that these structures were contemporary with the Buddhist monastic sites nearby. Archaeological surveys have also identified three large reservoirs adjacent to the monasteries at the site of Sanchi. These man-made alterations to the natural landscape setting are the recognizable evidence of attempt for sustenance in harmony with nature. Satellite-based synoptic observation has revealed several landscape features near Sanchi (Beck, 2006, p.308).

5.3.2. A cluster of waterbodies

With the purpose of investigating a larger landscape with ecological perspective around Sanchi, Google earth images of the region have been used. When zoomed into Sanchi archaeological site (23°28'45.52"N and 77°44'22.68"E), images taken in different seasons spanning over nearly twenty years could be compared. A cautious investigation of these reveals a series of waterbodies surrounding Sanchi monastic site. Sanchi has quite a few scattered water bodies, but the ones clustered around the monuments form a pattern. This suggests that the waterbodies are associated with the site and their pattern may help trace its sustainable hydrologic dynamic in this dry region of central India.

Figure 5-5 shows the waterbodies surrounding the excavated site. It also shows boundaries of neighbouring settlements and marks the probable extent of archaeological remains at Sanchi. This extent should be considered approximate based on environmental features (acting as natural threshold or barrier). Definite boundaries of the site, such as walls or fortification, manifest themselves on satellite images as physical demarcation. But such boundaries built by ASI to preserve and protect the monumental heritage raise a question on interpretation of the response to landscape setting of the site. There is a detectable encircling boundary feature around the monuments of Sanchi. However low-lying areas at lower elevation are dotted with few isolated waterbodies and man-made tanks. Therefore, the cluster of tanks seems to indicate the spatial spread of the monastic establishment rather than a definite boundary. Tanks in the vicinity of the monastery and stupa 2 were explicitly mentioned in the exploration documents. The existence of these tanks (man-made features) in the vicinity of the monuments are suggestive of the builder's attempt to provide a sustainable stewardship with natural resources. They could have been created to excavate stone necessary for building the monastery as well as serve as rainwater reservoirs.

Figure 5-5: Waterbodies/ tanks around Sanchi monuments and area (Source: Prepared by author from Google Earth data)

The present study has made two observations that suggest a careful ecological planning was involved in locating the tanks around Sanchi monastic site. First, one can extend to several tanks and low-lying water collection areas are identified regarding the geometry in the layout of four tanks along the natural boundary of foothill of the plateau or at intermediate lower elevations abutting steep slopes (Fig. 5-5). The location and layout of these tanks show sensitive intervention: they are mostly organic in shape as might have evolved due to the rocky strata. Such precision would have been unnecessary if these tanks were excavated solely for the purpose of mining rocks. Second, there are indications to suggest that few of the tanks could be river-fed.

5.3.3. A paleochannel

The eastward spread of a large waterbody is in sharp contrast to the other tanks (near stupa 2 and at entry steps) in terms of shape and capacity, that is placed tightly to the stupas or monastery. Analysis of the CARTOSAT image reveals a palaeochannel from the nearby Betwa river to almost the north-eastern end of this large waterbody (Fig. 5-6). The water in this palaeochannel would have curved off and flowed northeast to culminate into the waterbody (average height of elevation 412m). It is possible that excess water from other waterbodies might be spilled over to this large waterbody at lower elevation. The Sanchi region therefore received water through this palaeochannel from the river Betwa at some time in the past, but a ground exploration by archaeologists and geologists is necessary to determine whether this flow was contemporaneous with activity at Sanchi. There are other similar explorations done to obtain hydrological indications for tracing irrigation channels (Shaw, 2005). The channel itself is not perfectly straight the slightly meandering shape (Figure 4) could be natural but even man-made canals sometimes assume shapes dictated by topographical contours.

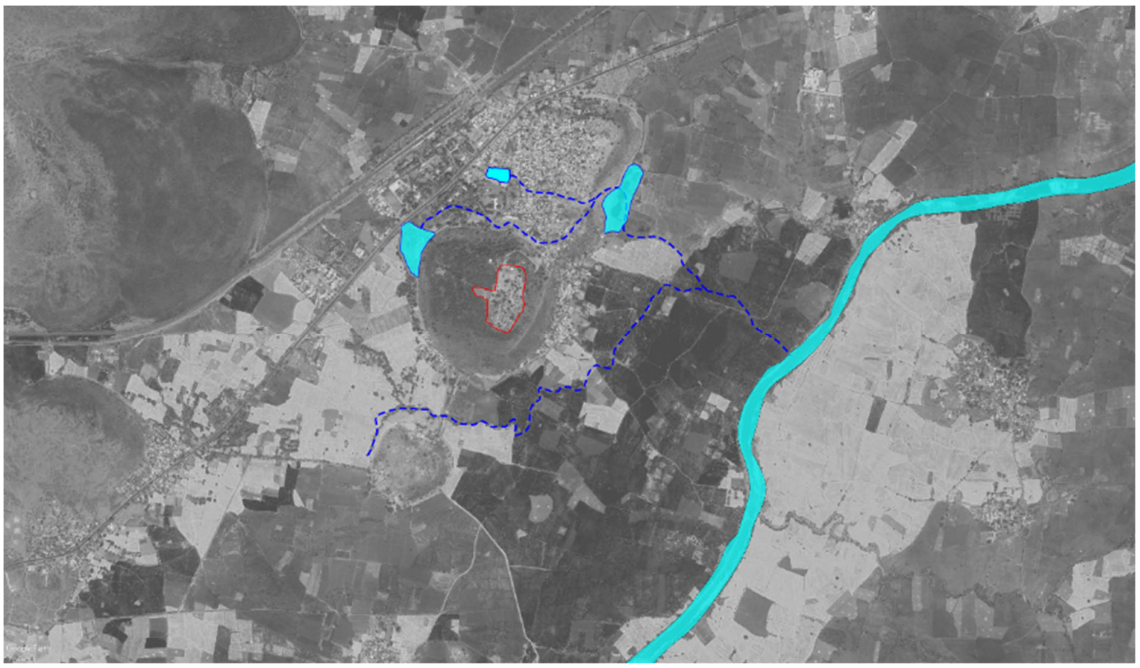


Figure 5-6: A regional view of Sanchi and environs showing the river Betwa and the paleochannel. (Source: Author)

5.3.4. The monasteries and cluster of votive stupas

The terrain containing waterbodies are obviously at lower elevation, whereas the areas with monuments flanked by these waterbodies are placed at higher elevation. The topography within this area is distinct with high plateaus and flat agricultural lands surrounding them. These flat lands might have more concealed archaeological remains. However, the excavated and preserved monuments e.g. the stupas, temples, monasteries and plinths of other structures were distinctly placed at higher elevation. The mound in the middle is largest and have the most concentration of significant monuments. Stupa 1 is the largest preserved structure amongst them. This primary votive stupa is placed at the highest elevation which is also the connotation of Buddhist ideology. Seeing the stupa was believed to be experiencing the Buddha himself. So, the placement was pivotal in order to be seen from surrounding yet protected from undesired accessibility by steep slopes. As Buddha's relic is posited on high ground the monasteries were placed around it but at lower elevation limiting the exposure of the monastic lives. So, the philosophical construct was well reflected in their understanding of natural setting. Thus, the site planning had evolved as a unique response to landscape and its environment.

5.4. Characteristics of natural and wider landscape settings

5.4.1. Natural topographic configurations

The site of Sanchi is situated at 434m avg. MSL as per Survey of India data. The terrain is unique in this region. The elevation varies in the range of 412m to 500m. The plateaus are quite distinctly visible from far distance as they are snuggled with flat agricultural lands (Fig. 5-7 and 5-8). This unique scenario was leveraged in the placement of the monastic

establishment. The plateau is naturally protected by the steep slopes descending to the agricultural lands below. This steep terrain facilitates in the faster surface runoff. Thus, the flat terraces were leveraged for activities or housing the structures.

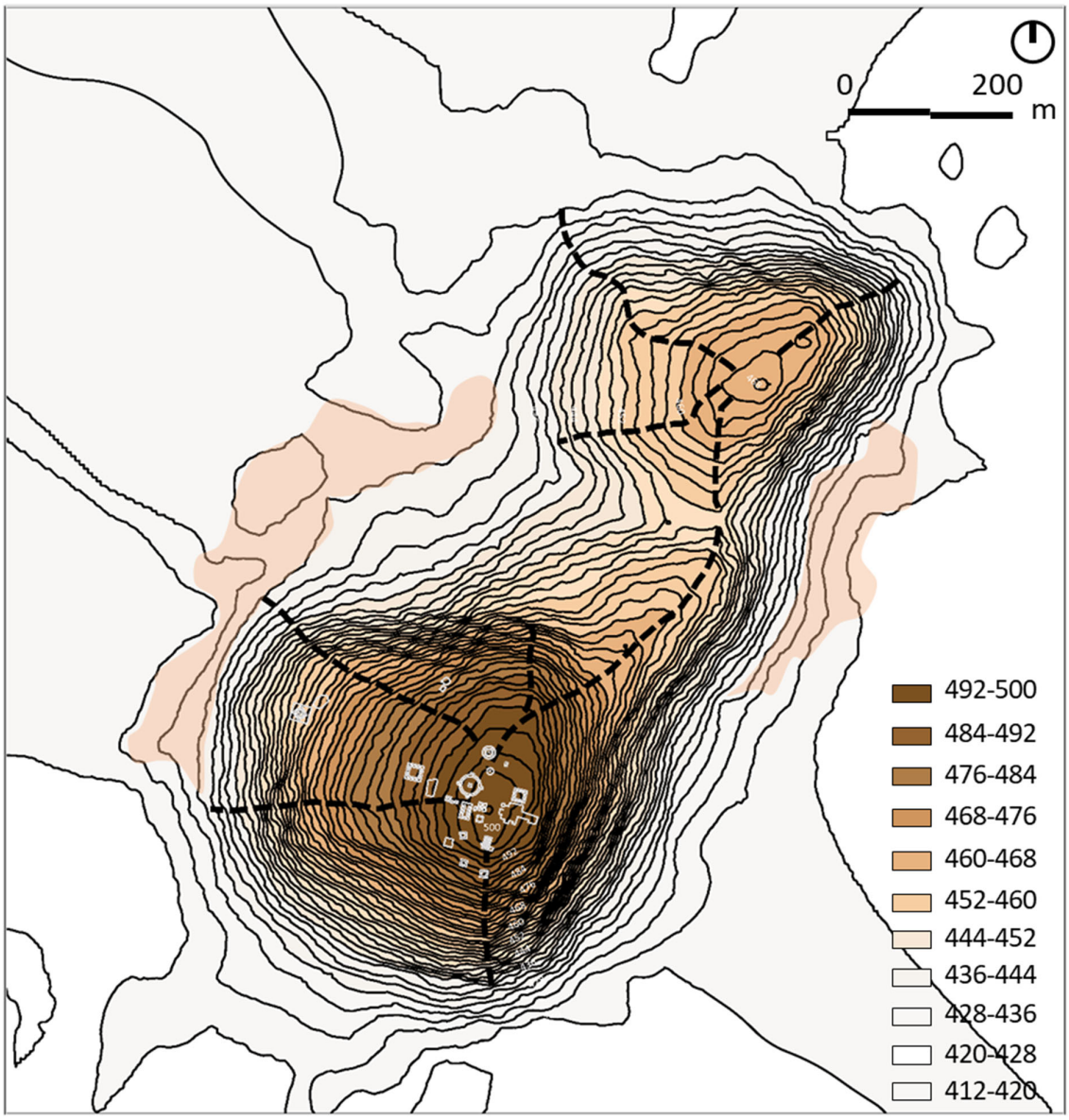


Figure 5-7: Elevation map of Sanchi archaeological site and surrounding. (Source: Author)

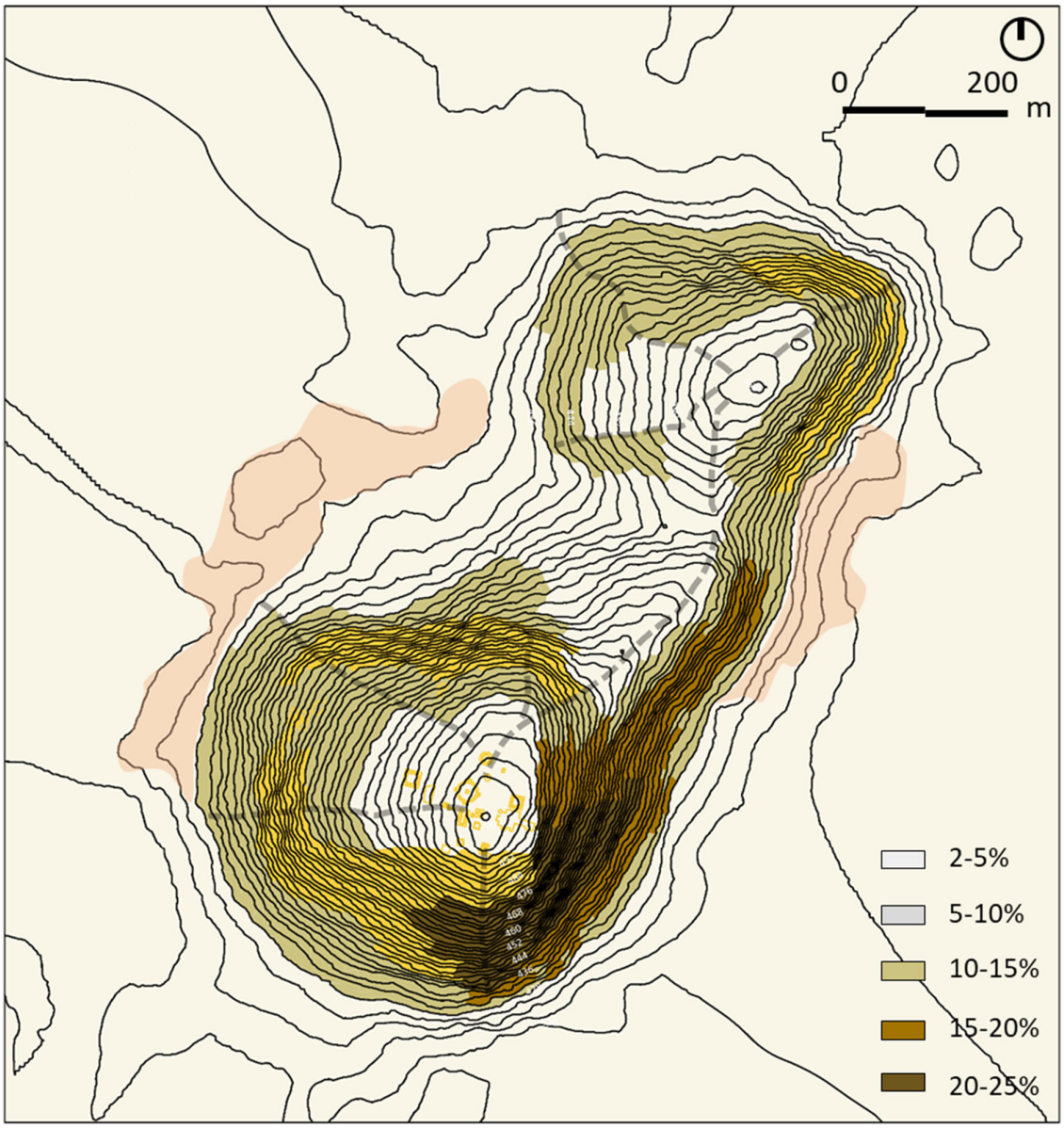


Figure 5-8: Slope analysis map of Sanchi archaeological site and surrounding. (Source: Author)

Figure 5-9: Rocky terrain at Sanchi monastic landscape setting (Source: Site documentation by author)

5.4.2. Hydrological regime and its elements

The geo-climatic location of Sanchi shapes the hydrological regime distinctly. Prolonged summer and less annual rainfall have rendered the Sanchi region warm and dry. The monument site in particular, is a high point and act as watershed divide with two other mounds in the vicinity. Six distinct watersheds could be discovered in this catchment (Fig. 5-9 and 5-10). Though there are no prominent ridges neither valleys (channels) it experiences sheet flow mostly perpendicular to the steep slopes. Waterbodies/ tanks are located strategically by the builder at lower or lowest point to arrest the storm water runoff.

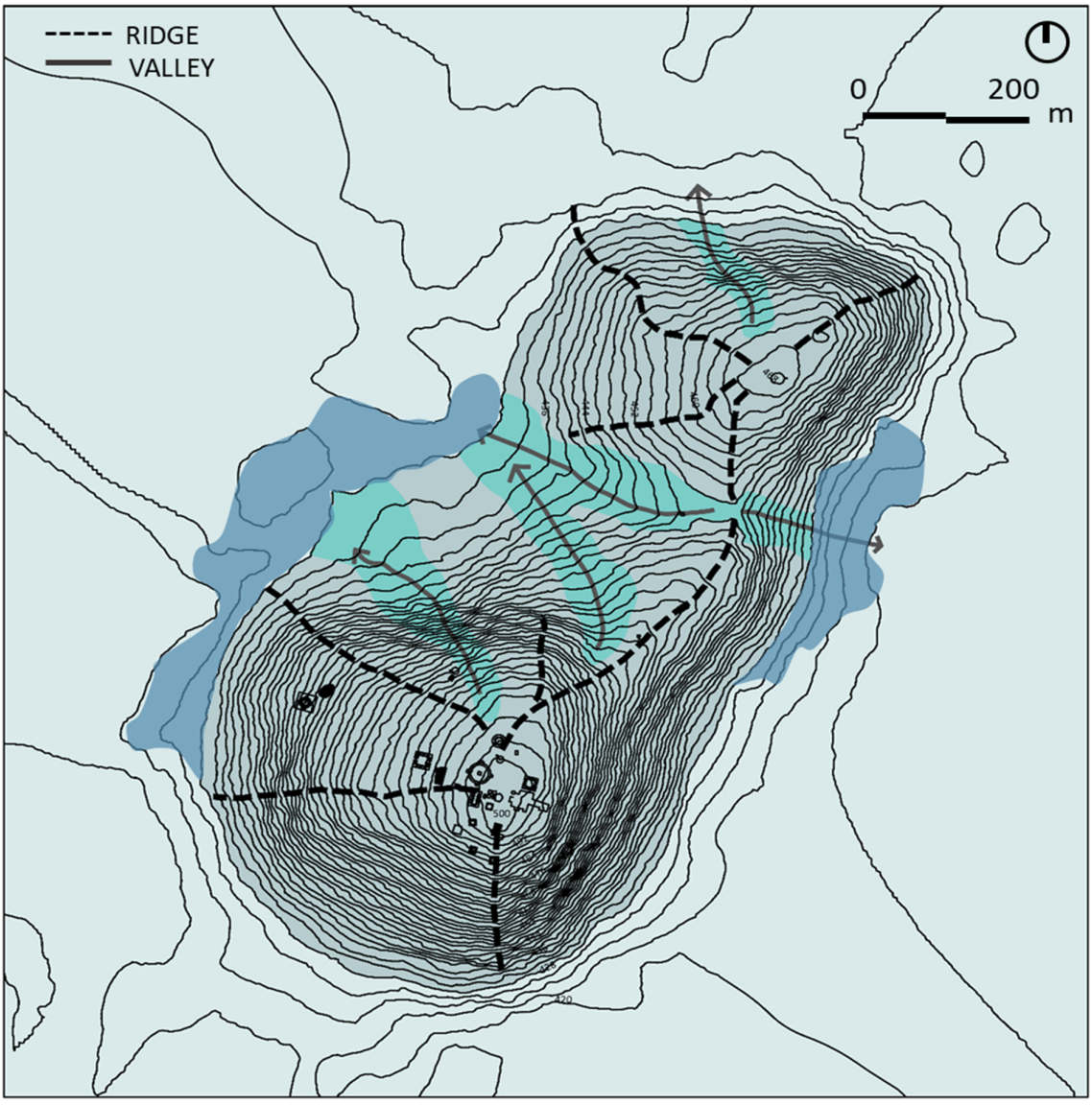


Figure 5-10: Drainage map of Sanchi archaeological site and surrounding. (Source: Author)

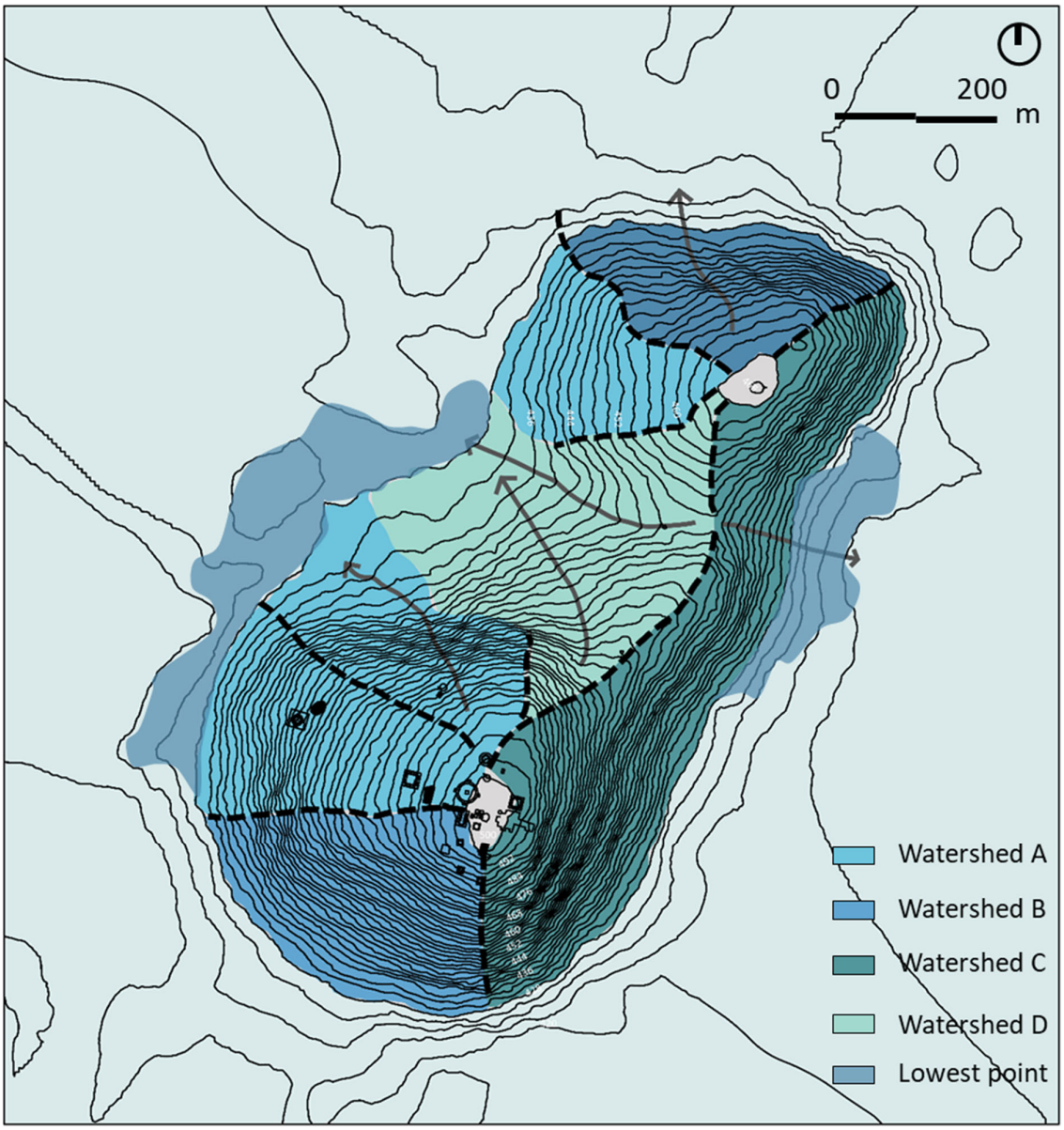


Figure 5-11: Watershed map of Sanchi archaeological site and surrounding. (Source: Author)

Figure 5-12: Regional Landscape drainage pattern at Sanchi (Source: Site documentation by author)

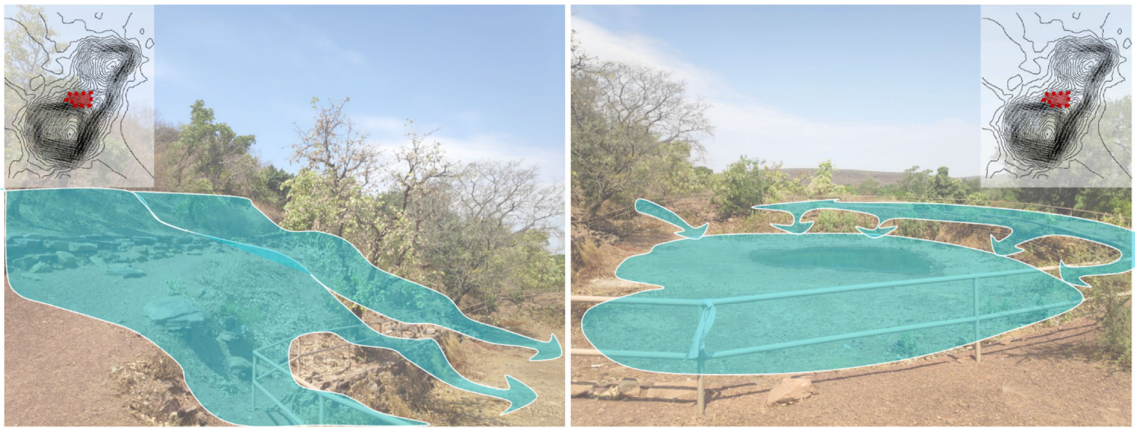


Figure 5-13: Surface drainage direction towards localised low points (Source: Site documentation by author)

Figure 5-14: Man made tanks from ancient time at Sanchi surrounding (Source: Site documentation by author)

Figure 5-15: Terraced flow of surface runoff to manmade rainwater collection tanks (Source: Site documentation by author)

5.4.3. Vegetation and plant characteristic

The mound is vegetated with scrub forest along the steep slope areas which are considered as ecologically sensitive zones within this Sanchi landscape system (Fig. 5-16, 5-17 and 5-18). Original trees might not be existing on the site. What we see at present might be outgrowth or after growth from the date of excavation and a result of restoration attempt. There are mostly thorny dry shrubs along the pathways in downward areas. Few big trees can be found atop the mound near the main stupas. Due to rocky terrain and less ground water availability the natural vegetation growth is stunted. Greener patches could be noticed along the drainage corridors within the catchment due to moist accumulation on ground.

Figure 5-16: Existing vegetation map of Sanchi archaeological site and surrounding. (Source: Author)

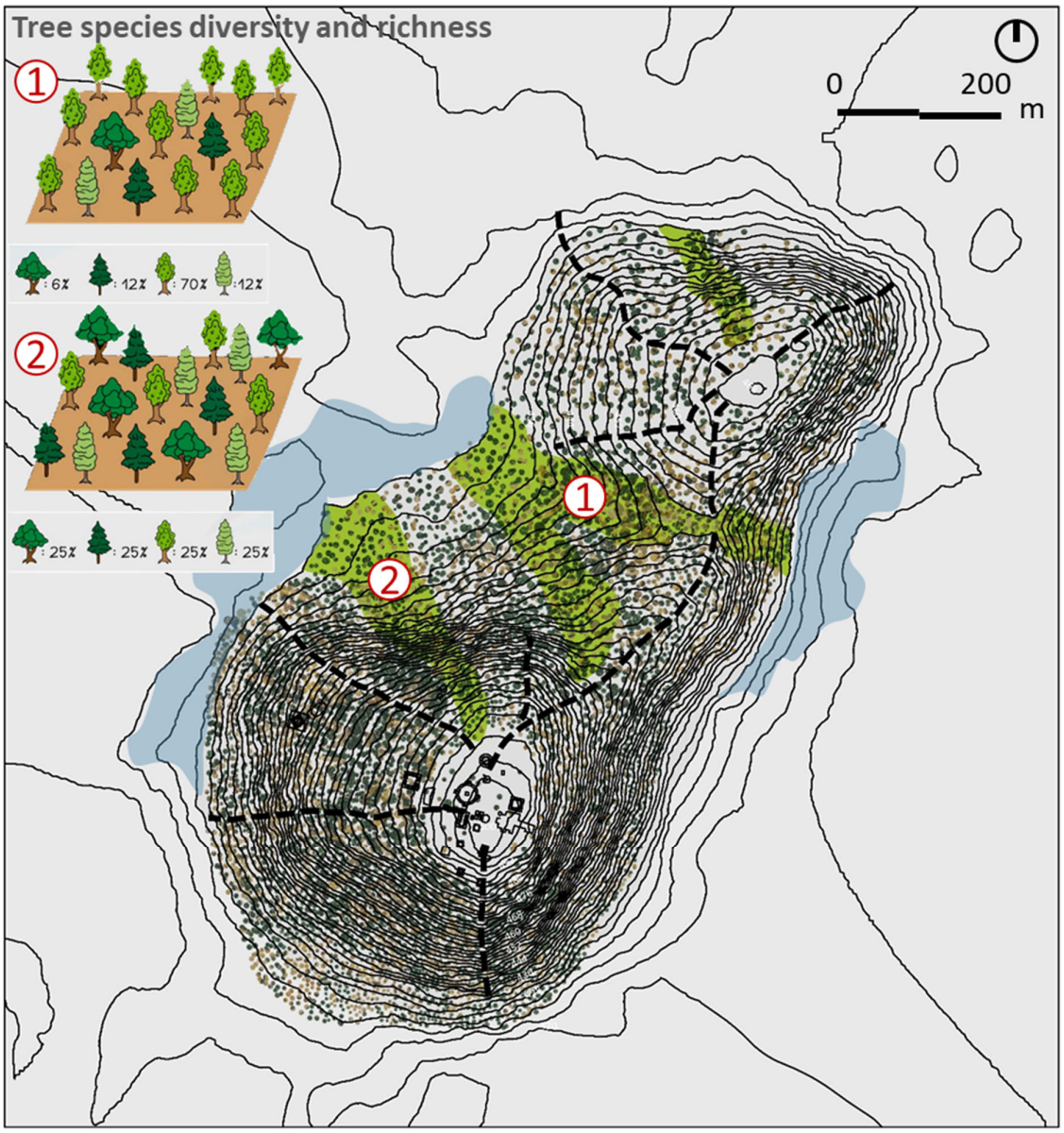


Figure 5-17: Existing sensitive vegetation (on valley areas) map of Sanchi archaeological site and surrounding. (Source: Author)

Figure 5-18: Vegetation pattern of seasonal and scrub forest at hilly terrain of Sanchi (Source: Site documentation by author)

5.4.4. Aspect and Exposure – visual layering and functional siting of built elements

The solar exposure to the Sanchi site is mapped through the aspect map from the south point of view (Figure 5-19 and 5-20). This resulted in several slope direction categories ranging from flat plains (-1º) to south ward slopes (112.5º – 247.5º) ending at northern slopes (292.5º – 360º). The DEM map for the study site is used to generate the aspect map. The solar exposure is fairly distributed throughout the site at the lower mound due to the uniform slope directions. The lower elevations (412m – 430m) plains are well exposed to western and south-western sun.

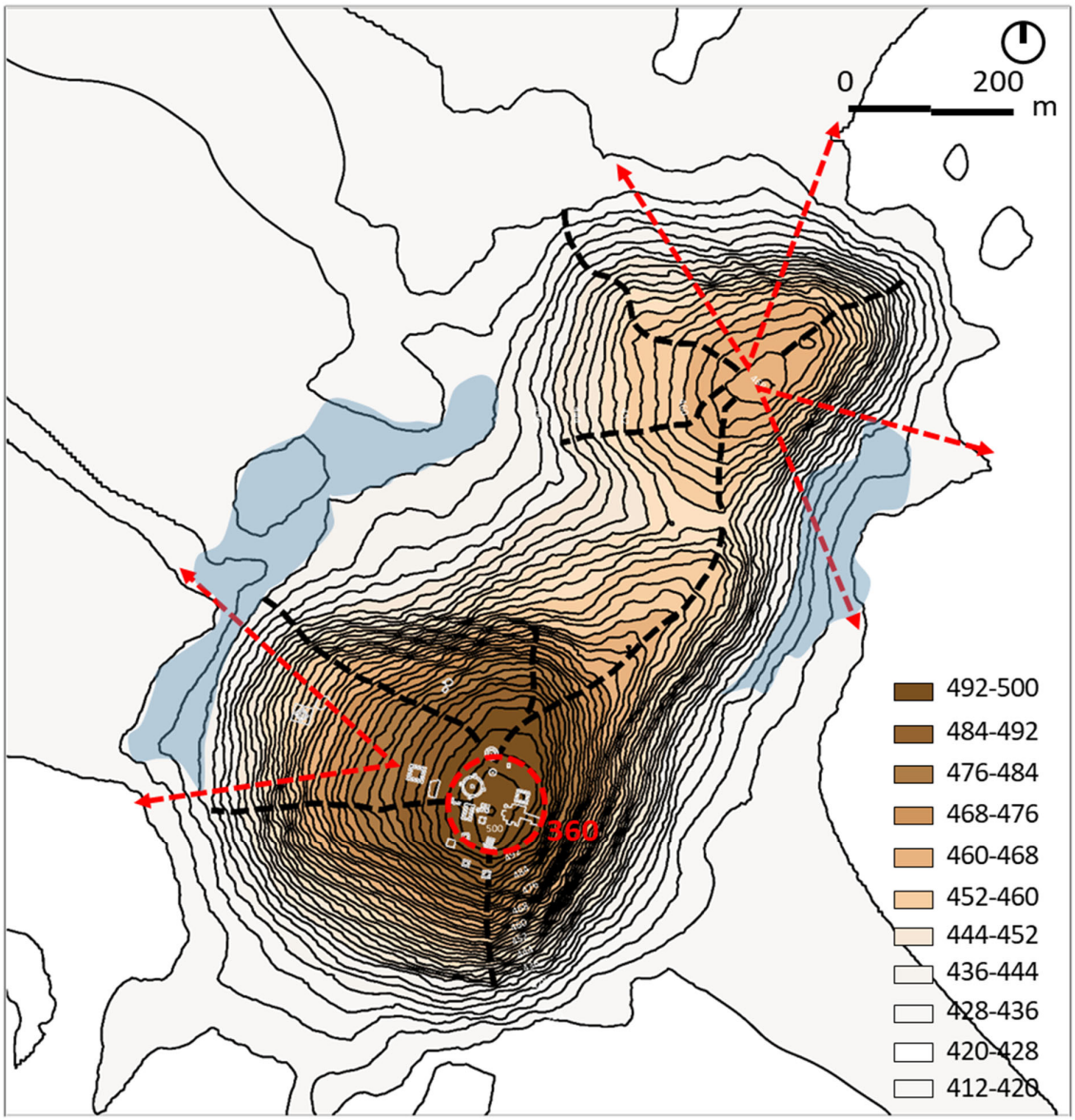


Figure 5-19: Visual connection map of Sanchi archaeological site and surrounding area (Source: Author)

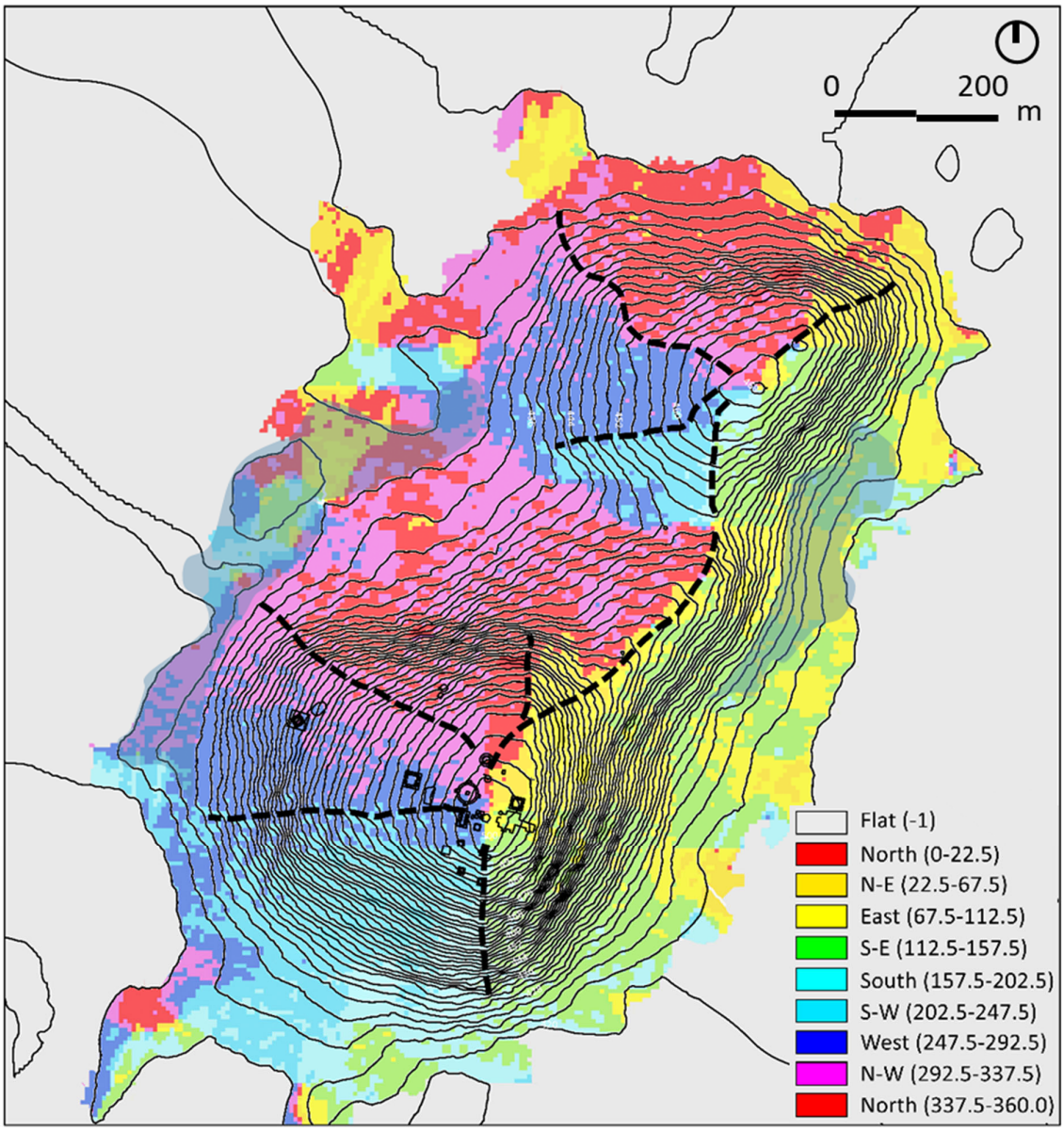


Figure 5-20: Solar aspect map of Sanchi archaeological site and surrounding. (Source: Author)

Figure 5-21: Treatment of panorama and visual frames (Source: Site documentation by author)

5.5. Scientific tools and micro-methodology for analysis

Remote sensing is one of the effective ways to collect information without any physical impact and/or damage to the site itself. Furthermore, it is convenient to study the various aspects of the study region of such a scale selected (Fig. 5-22). The satellite images allow the site to be studied holistically in relation to the surrounding context and allows one to describe connections and spatial correlation amongst various visible geomantic features. High resolution images show the finer details such as monument footprints or plinth areas, roads and pathway connections, whereas coarser/ low resolution images show the features of larger landscape setting such as drainage pattern or distribution of waterbodies and open spaces.

v. Digital elevation model

A Digital Elevation Model (DEM) image helps in capturing three-dimensional topographical data where variations in height is shown as a sequential band of colors. When a DEM is visualized on a computer screen, the height associated with each pixel can be examined using Geographic Information System (GIS) software. GIS also enables analysts to overlay images with spatial information from other sources. In this paper, for example, village and ASI boundaries, tanks, temples, and monasteries traced from the Google Earth image illustrated in Figures 1 and 4 have been overlaid on a DEM. Although there are many methods available to generate a DEM, the current research used two specific types:

(1) Space Stereoscopy, in this case CARTOSAT1 satellite is used to capture two images of the same location from two varied locations in space; and

(2) Interferometric SAR, whereby two images from a RADAR sensor are used (here, the Shuttle Radar Terrain Mission - SRTM).

vi. Other tools

(1) to guide a researcher to specific features observed on remote sensing images or maps; and
(2) to record the latitude and longitude of any additional points of interest observed during field studies, for subsequent analysis in the context of other data in the researcher's GIS database.

vii. Process

The DEM data is downloaded for the study site from United States Geological Survey (USGS) for authenticated data. In ArcGIS, spatial analyst tools are used to categorise the contours and slope. Then the desired contour interval is mentioned in metre to generate the elevation map and slope analysis map.

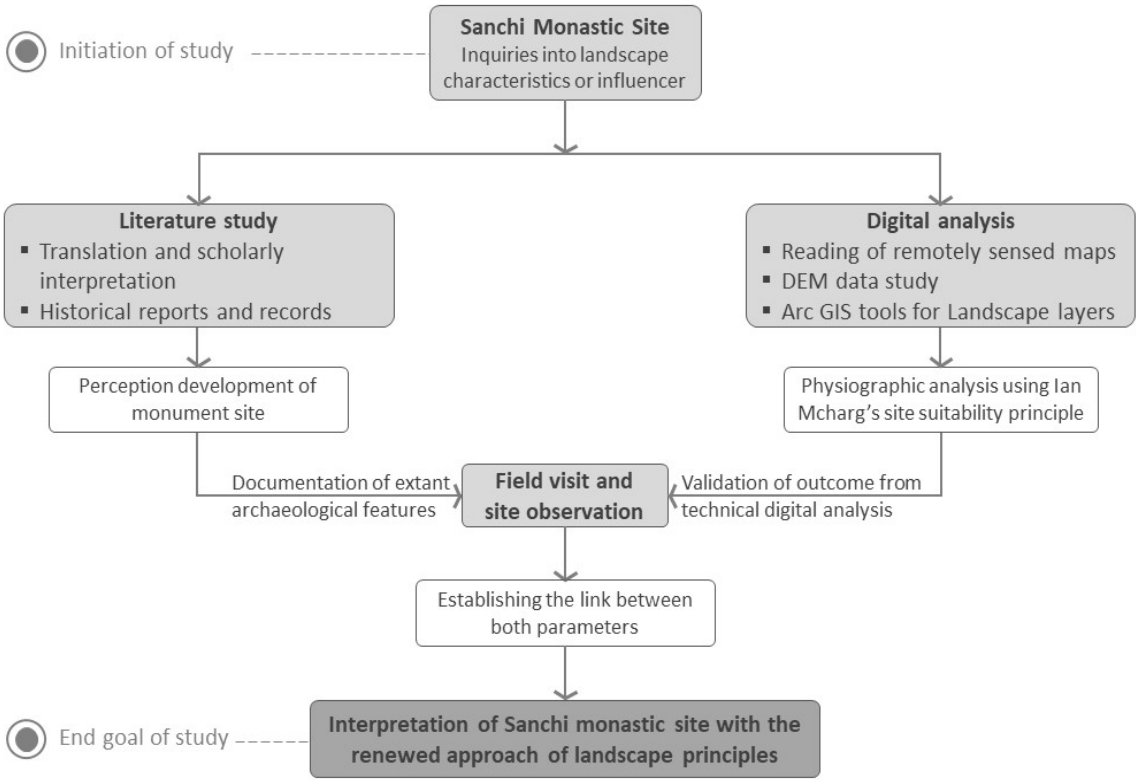


Figure 5-22: Micro-methodology diagram (Source: Author)

The Flow Direction tool in the Hydrology toolbox of ArcGIS is used to produce a flow direction raster using the digital elevation data. Each elevation raster cell's flow direction is determined by this tool. Then a flow accumulation raster is prepared. The Hydrology toolbox contains a tool called flow accumulation that is used to determine how many areas altogether contribute to flow at each cell in the flow direction.

A pour point is defined on the map. Once the pour point is acquired, the first step in making a watershed map is to get the area's relevant point where the final drainage is occurring. The watershed tool in the Hydrology toolbox is used to create a watershed raster. This tool creates a raster that identifies the area of each cell that contributes flow to the pour point.

On a similar note, the vegetation map is prepared using sentinel-2 data. The aspect map is generated using the DEM data on ArcGIS.

viii. A field study of the archaeological site

A field study was undertaken spreading over summer and pre-monsoon season in 2022, to validate the outcome of geo-spatial analysis with the ecological measures adapted by the builders of the site. It was appropriate to search for hints such as exposed drainage corridors, paleo channel, low lying areas or water dots along the periphery of the high ground or plateau rather than in the middle. As can be seen the north-eastern and south-western edges lie in proximity to a settlement (Figure 4). Between these two high mounds there lies a prominent drainage channel culminating into a large waterbody at lower elevation of 412m. The

surrounding being agricultural land, was therefore most promising starting point to explore more such water dots in the same watershed to receive water from the high ground. Though this lower elevation area has not been excavated to check for any large tanks (or old structures) or natural water features. There is another noteworthy waterbody at the northeast corner of the mound right at the beginning of the steps reaching the monuments. From the watershed analysis, it is evident that the surface runoff has been captured here and been converted into a tank for the use of the monastic establishment (Figure 10). The rocky terrain and lesser annual rainfall regime have evoked the ecological measures imbibed in then planning methods. The southwestern part of the mound has a low-lying area, currently *Jambudweep* park is replenished with surface run off from higher elevation (Figure 8). A steep access route reaches to this waterbody from the Stupa 1; elevation level in between 492m to 500m. So as the monastery at intermediate elevation is marked with a prominent irregular shaped tank. It's placement at the foothill of stupa 1 is a proof of their wisdom in ecological planning itself. The field visit was particularly helpful locating these natural features associated with the monuments and their symbiotic relationship. Stupa 2, an isolated votive stupa at lower elevation is also marked with a small water tank at its foothill. It is probably being built for ritualistic functions for the monks and devotees.

These observations made on the site are the bonafide to the hypothesis of this study. The literature study, techno-critical analysis and interpretation of the monument site have unearthed the spatio-ecological planning wisdom followed during ancient period. Figure 13 clearly shows the scrub forest on the steep slopes are an indicative of faster run off rather than storage. The big trees are mostly on the top of the plateau or at the lower elevation where the water or moisture could have been retained. This area has further potential for an archaeological survey to find/ establish the historical ecology of the place.

5.6. Composite analysis

The settlement activities on the Sanchi mound were closely associated with the natural layers of landscape system. Each of the physiographic layers interacted closely with the positioning or siting of the monuments.

To develop a global acceptance, the study is interpreted on the purview of Ian Mcharg's (1969) principle to determine the site suitability. With composite analysis the natural layers of topography, hydrology and vegetation would show how this process resulted in the sustainable site planning of the establishment (Fig. 5-23).

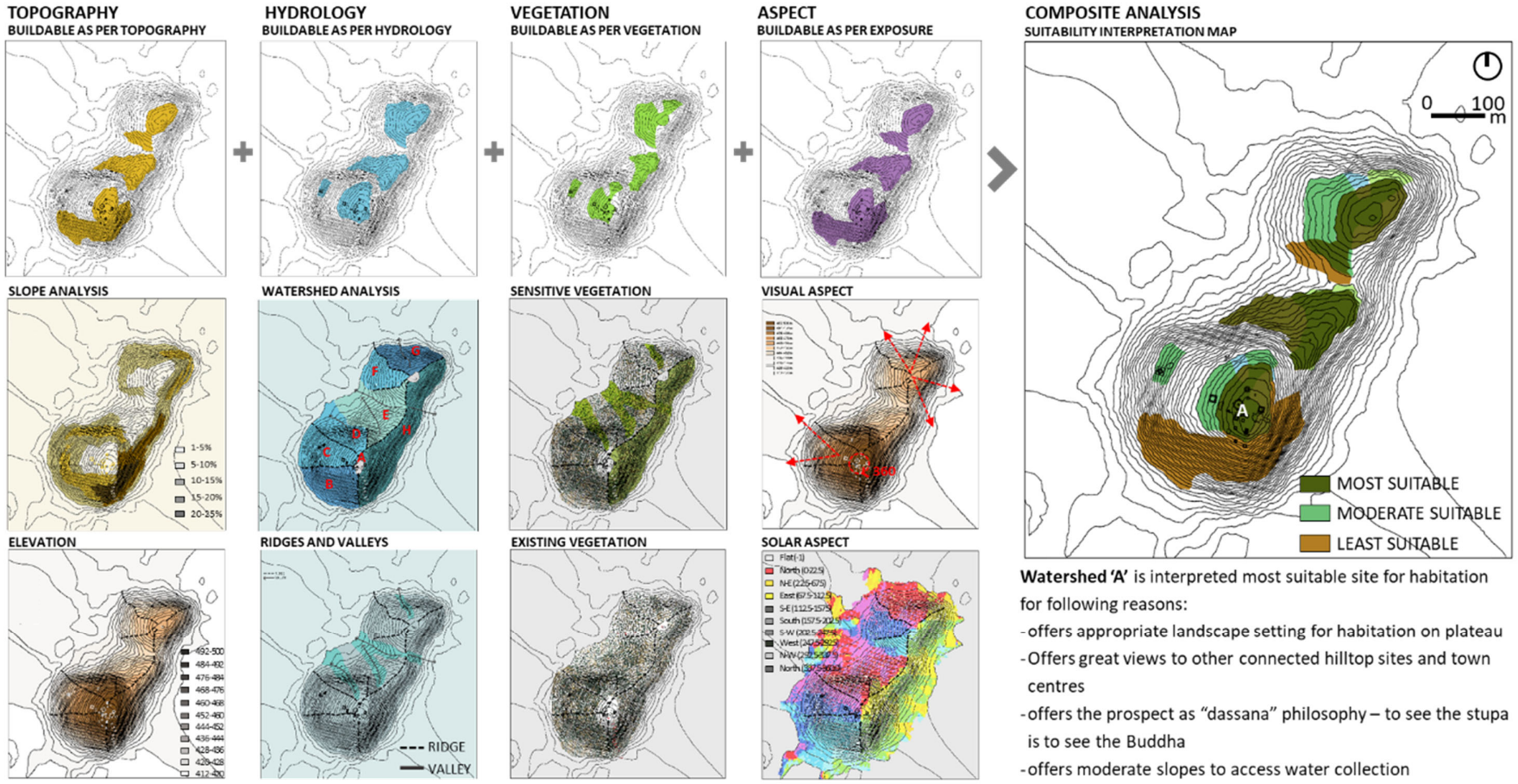


Figure 5-23: Composite analysis map of Sanchi archaeological site and surrounding for interpretation of site suitability. (Source: Author)

The slope analysis and elevation map analysis resulted in finding the buildable areas in the monument sites. The highest elevation point is a plateau and almost flat with 1-2% slope. This slope category is recommended for activities suitable for habitation. For the monastic activity it served their purpose of siting the stupa and other activities sprung around it e.g., the monasteries, temples and other associated functions. It can be seen that the top portion is the most suitable area that has been leveraged to put maximum activities (Figure 16). The steep slope areas are absolutely left out for natural systems to remain undisturbed.

Similarly, the hydrology and watershed analysis results in identifying suitable areas to have habitation friendly activity areas. Furthermore, it indicates the possibilities of water accumulation or low-lying areas within or around the site. Figure 46 shows the location of the tanks or waterbodies which proves this hypothesis of stewardship with natural resources. The then builders strategically identified and posited the tanks at lower elevation or near natural drainage corridor to collect the storm water run-off and ensured the sustainability of monastic lives there.

Natural vegetation is another guiding element to establish the settlement. Natural pattern of vegetation is an indicator of natural system running on the site and natural habitats for flora and fauna. The monument site has a distinct vegetation pattern. The top plateau is barely vegetated with large trees. So, the denuded areas were chosen to house the large monuments. The steep slopes around it are filled with scrub forest and thorny vegetation. Large trees are not present in these slope areas.

This study has identified several geographic and landscape features with archaeological interest in the immediate environs of Sanchi, using satellite images and field visits:

d. Hydrological pattern

A pattern of water bodies surrounds Sanchi hilltop site, possibly indicating the site's extent and spread in north-southeast direction. The valley and storm water drainage channels remain unaffected with the development of stupas, monasteries and associated structures. This provides further evidence for the belief that archaeological extant at Sanchi are spread over a significantly larger region than the area excavated, owned and protected by the ASI. It also shows their keen understanding of natural phenomena and stewardship with them. The waterbodies/ man-made tanks are positioned at the lower terraces to collect the rainwater and storm water runoff. It is imperative that these locations- near the monastery, arrival at north-west and near the stupa at lower terrace on the southern slope accommodated the need of inhabitants or visitors for ritualistic and sustenance purposes.

e. Vegetation pattern

The vegetation patterns indicate that along the steep slopes no major establishment has been developed. Along the line of Stupa 1 and monastery at lower terrace on western slope there might have been traces of garden or groves near the tank. The native vegetation has thrived till date by the intrinsic virtue of drought tolerance, local geology and the site planning wisdom of the then designers. Similarly, on the northern slope of the main row of stupas and monasteries

a possible extension of later periods indicates there might have been more establishments with the traces of trees planted in coordination with extant plinths.

f. Archaeological pattern

The principal mound reveals a shape that suggests possible hidden remains of many large structures. This could be a monastery architecturally identical to Vikramasila and Somapura Mahavihara, as it resembles the latter two in size, shape and orientation. It is speculated that this could be the judicious site planning that adjudged the topographical suitability to layout the bigger structures like monasteries and temples. This suggests that such buried brick structures could exist all at the flatter sites and/ or gentle slopes near natural waterbodies or tanks.

Following Ian Mcharg's principle (Mcharg 1969) these maps are overlapped with each other to emerge out the most suitable buildable areas. There are three categories of suitability maps viz. category I- most suitable, category II- moderately suitable and category III- least suitable in order of the decreasing suitability for the siting of the building or development activities (Figure 16).

The colour coded spaces overlapped with monuments, tanks or other man-made elements interpret their suitability of siting. This directly proves the hypothesis of the study of working with natural resources and have a sustainable landscape planning. the interpretation is as follows,

Category I- the most suitable siting:

The top plateau is the most suitable area for siting habitation or any other man-made structures. Topographically it has the highest prospect to have a panoramic view of the surrounding landscape yet protected from any infiltration or invasion due to high elevation. Furthermore, seeing the stupa from distance was believed as seeing the Buddha himself in the Buddhist literature. So, it fulfils the natural and philosophical need of the site planning.

Category II- the moderately suitable siting:

The other slope areas in the side are steep and do not have the virtue of siting man-made elements without negotiating much on natural terrain and ecological systems. So, these steep slope areas are left as it is for nature to grow. An ancient wisdom which could be used for timeless sustainable planning.

Category III- the least suitable siting:

These are the spaces not suitable for building activities. These are mostly the steep slope areas, drainage corridors at lower elevations between mounds and densely vegetated areas. The drainage corridors are ecologically sensitive areas. To preserve them is the best act within landscape. So the then builders didn't disturb the natural watershed.

5.7. Functional relationship of spaces in spatio-environmental regime

The area around the hilltop of Sanchi has several types of natural and man-made features: tanks or ponds, settlements, agricultural plain and unexcavated lands. The extant monuments and other archaeological remains are part of wider and complex landscape setting. So, it is imperative to capture an overall perception in the context of larger environmental regime. Remote sensing is an efficient tool of providing such comprehensive sights, with the additional ability to "read" the site with a landscape approach.

However, the study had its limiting factors. This multiperiod site following Buddha's Mahaparinirvana without any clear hint of transition. Therefore, the study is restricted to analysis of the archaeological extant remnants till date. The site was heavily impacted by natural phenomena for several centuries causing substantial alterations without leaving any physical evidence of original planting design. Thus, historical ecology of the site mostly remain a matter of further investigation inquired through archaeological and phyto-ecological hints and evidence. The most compelling issue this study faced is language barrier as many primary documents are scripted in ancient Pali, this study is dependent on secondary literatures such as translated interpretations.

The Sanchi region has much scope for further exploration through remote sensing and GIS analysis. The site at proximity e.g. Udaygiri has much scope for further revelation through technological tools and landscape interpretations. A GPR survey with emerging technologies, a wider array of climatic and environmental data could be gathered and integrated with ASI and other historical maps to be spatially analyzed. Such a database would allow the Buddhist sites to be re-evaluated considering landscape creating an asset for subsequent study on the similar set of studies.

6. Environmental analysis of riverine floodplain site – Bharatpur monastery, Bardhaman, West Bengal

6.1. General outline of the site

Eastern India is dotted with many Buddhist archaeological monastic sites. Bengal became the last sojourn for Buddhism before spreading across South-Eastern Asia while it was declining in other parts of India. However, this expansion of Buddhism from its origin of Gangetic plain brought regional influence in its planning regime. The siting of the monasteries was a direct response to their landscape setting of agrarian riverine plains in Bengal. They were shaped up by the temporal landscape patterns due to frequent flooding. The adaptation of monastic system with natural and ecological processes integrated the social, religious and political margins in the region. It also took a departure from its isolated habitation approach and established a reciprocal dynamic with laity settlements through spiritual exchange.

The recent archaeological explorations in Radha region of West Bengal such as Raktamrittika Mahavihara, a Buddhist establishment of Karnasuvarna, Bharatpur monastery near Damodar valley, Nandagiri Vihara in Varendra region underscores a new arena of research in spatial discipline. The site planning principles in these monasteries interacted closely with the flood prone natural setting of the landscape showing factors of conduciveness and constraints in this region.

Positioned at an elevated mound, the Bharatpur stupa is an imposing Buddhist archaeological mark on the ground (23º24'N; 87º27'E). The site is not well-preserved currently. The site had been developed and inhabited till 1200 CE bearing the history of Buddhist monastic culture and its expansion in eastern India. The proximity of an urban center (Vardhamana Bhukti), the strategic location at the floodplain of river trade route resulted in the substantial exchange between monastery monks and the laity in the town and rural networks. Hence this study attempts to interpret the Bharatpur site in the light of natural and landscape setting. These sites were impacted and shaped by local settlements, and water-resource elements or sites dominated by other religious activities (Shaw 2007: 110).

6.2. Chronology of archaeological explorations and study

The discovery of Bharatpur site around 50 years ago, has attracted multitude of scholarly attention. The site was first discovered by the joint excavation of Archaeological survey of India, Eastern Circle and Burdwan University from 1971-72 to 1974-75. The stratigraphic findings place the stupa back to c.9th century CE (A. Ghosh 1989: 16). In the following years the largest remaining stupa site in West Bengal was not explored to its full potential. The geographical setting of the Burdwan district shaped the prominent monument. It falls in a transitional zone between Chhotanagpur plateau remnants at the west (Majumdar 2020: 59) and Ganga-Brahmaputra deltaic plain at east merging with the major floodplain of Damodar River (Ghosh and Majumdar 1991: p.7).

The spread of Buddhism into this region of West Bengal was also influenced by the settlement units, which existed through the pre-establishment period of the monastery (Chakraborty 2010:

65). However, these settlements were closely linked due to dependency of irrigation system, flood mitigation, hinterland linkages to high uplands, agricultural practices and of course trading exchanges. A relationship with natural context in this region resulted in a uniquely shaped cultural landscape. This approach is adapted in the present study to visualize the Bharatpur archaeological monastic site adjudged against landscape qualities (Bernard and Wendy 1999: 22). These brought a new physical planning tradition in active participation with settlement and natural systems (Bunnag 1991: 159). The local patronage came in aid for spiritual exchange and political corroboration (Shaw and Sutcliffe 2001: 55).

6.3. Characteristics of natural and wider archaeological landscape

The excavations carried out in this region and other discovered archaeological sites in proximity need further exploration in systematic order. The existing surveys outcome is not substantial enough to carry out further evidence-based research. A preliminary perception could be developed from the literary sources. Four strands could be situated in this plateau region of West Bengal impacting the cultural landscape of Buddhism spanning in 600 CE – 1200 CE. The zones of the Buddhist establishments were located in the interflow of the river channels and the Chhotanagpur plateau foothills. The sub-regions of these zones influenced the material and cultural environment of the Buddhist monastic establishments. In this paper the observations regarding the spatial traits varying with the diversity of landscape characteristics of Bharatpur site shall be discussed (among the four zones), the conducive and constraining factors of the natural setting of this transitional place geography.

The archaeological and epigraphic elements help us situate the Buddhist monasteries within the network of fluvial planes of Radha region and settlements in that region. The proximity of river (as trade route) and overland travel route passing through the sub-regional boundaries exposed the monastic sites to the continuous flow of ideas. The geographical and archaeological study of the four zones of Varendra, northern and southern part of Radha suggests the reflection of pragmatic consciousness in choice of location of the Buddhist monasteries of western Bengal (Fig. 6-1) (Panja 2003: 497).

The mentioning of Bharatpur monastery in Dudhpani Rock Inscription dating back to the 8th century CE, discovered at Hazaribagh (Kielhom 1894: 343) place the monastery within the fluvial planes of Radha region in West Bengal. The monastery was situated at a transitional zone of river as trade route and highland trail as pilgrim route at its hinterland. The geographical and archaeological study of the site reflects on its pragmatic consciousness in spatial planning. The study focuses on the Bharatpur Monastic site in Burdwan district of West Bengal to find the integration process with settlement and the everchanging landscape.

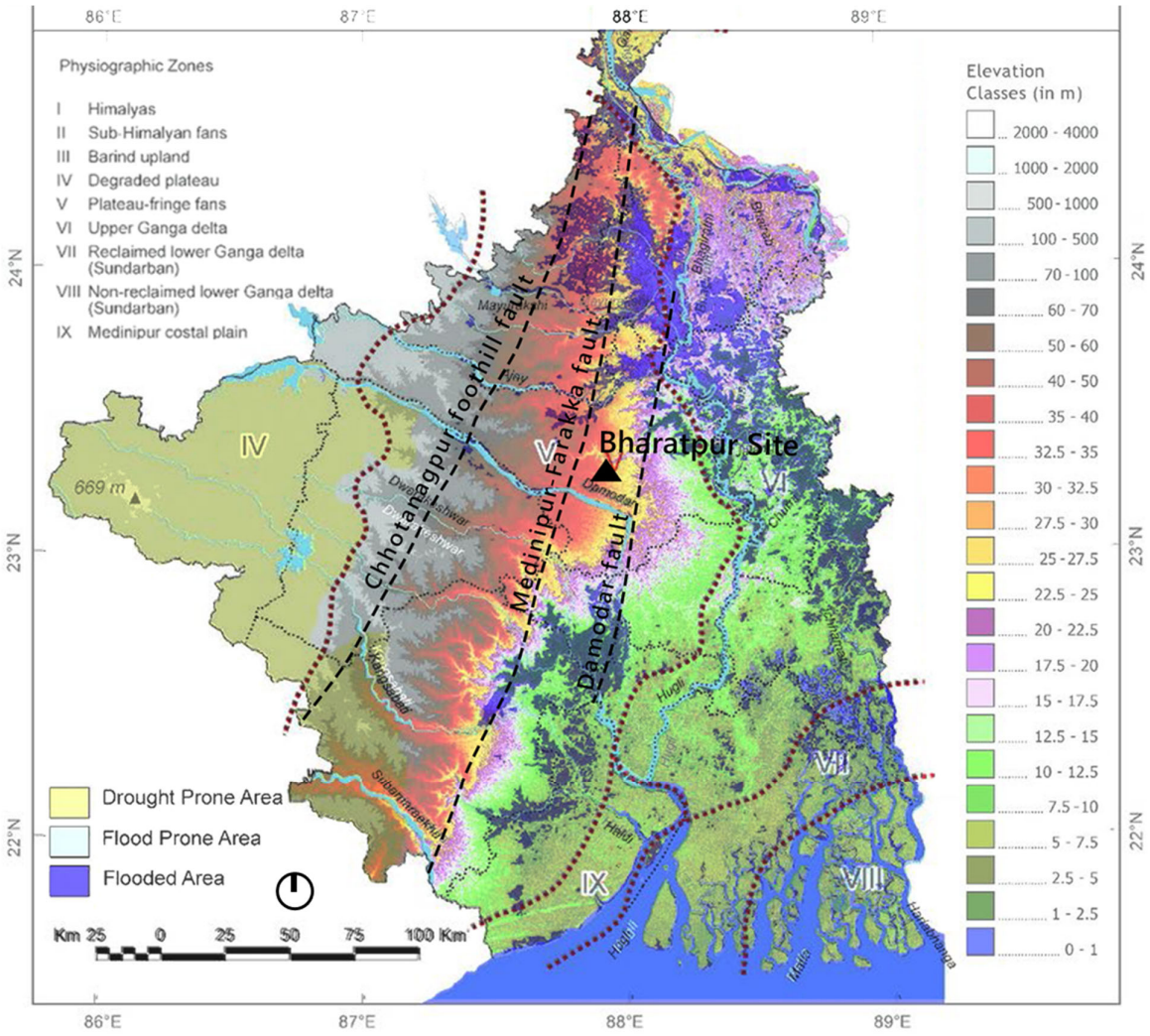


Figure 6-1: Bharatpur monastic site location on Physiographic divisions of West Bengal. (Prepared by author from Survey of India and Shuttle radar data; Bandyopadhyay, 2014).

The location of Bharatpur site was strategic to the natural landscape setting of this region. It was in a transitional zone between plateau highland and floodplain of Damodar valley; the river acting as major trade route. The highland was considered as source of minerals and raw materials; thus a manufacturer site and downhill are a consumer site where the stupa and settlements were established. The stupa acted as an anchor for this exchange (Fig. 6-2).

The trading exchange was developed in Bharatpur based on easy accessibility to the natural resources and a demand at the consumer site downhill. The establishment of monastery in such a network is required to be interpreted against the cultural and environmental setting of riverine Bengal landscape.

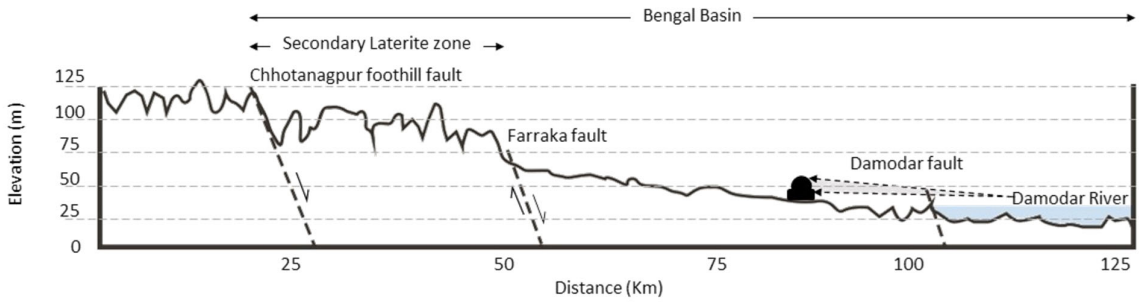


Figure 6-2: Interpreted tentative location of the monastery along West East cross profile of Bengal Radha region (Source: Prepared by author based on ASTER DEM 2011 data; Majumdar, 2019)

Figure 6-3: The wider landscape hydrological connect (Source: Author)

6.3.1. Natural topographic configurations

Being at the flood plain of a river the MSL is very low avg. 73m as per Survey of India data. The terrain is unique in this riverine flood plain (Fig. 6-4 and 6-5). The stupa atop the mound is distinctly visible taking advantage of the prospect of the landscape. But largely the landscape is flat which facilitates the agrarian activities within the fluvial plain. The mound is naturally protected from flooding due to its comparatively higher elevation. The flat areas are ecologically sensitive and hence being kept undisturbed or adapted with environmentally subsistence livelihood strategies. This showcases the idea of harmonious living with nature.

Figure 6-4: Interpretive regional topographic response to monastic site planning (Source: Site documentation by author)

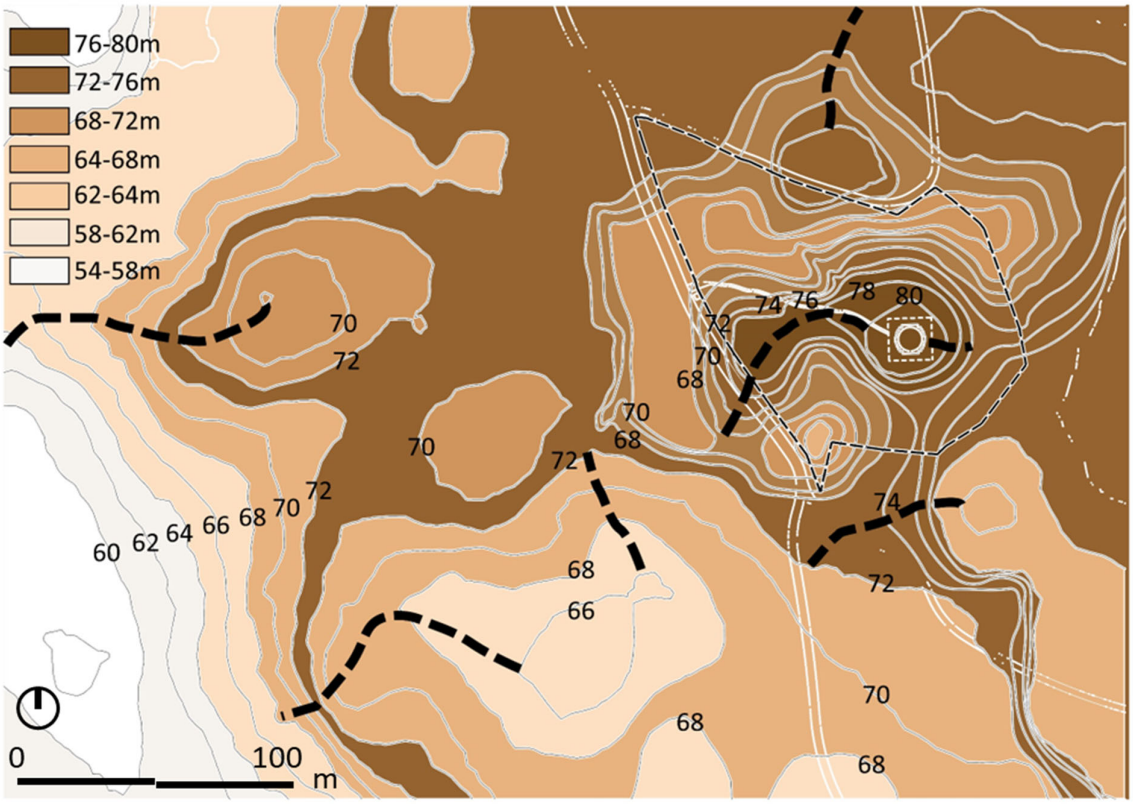


Figure 6-5: Elevation map of Bharatpur archaeological site and surrounding. (Source: Author)

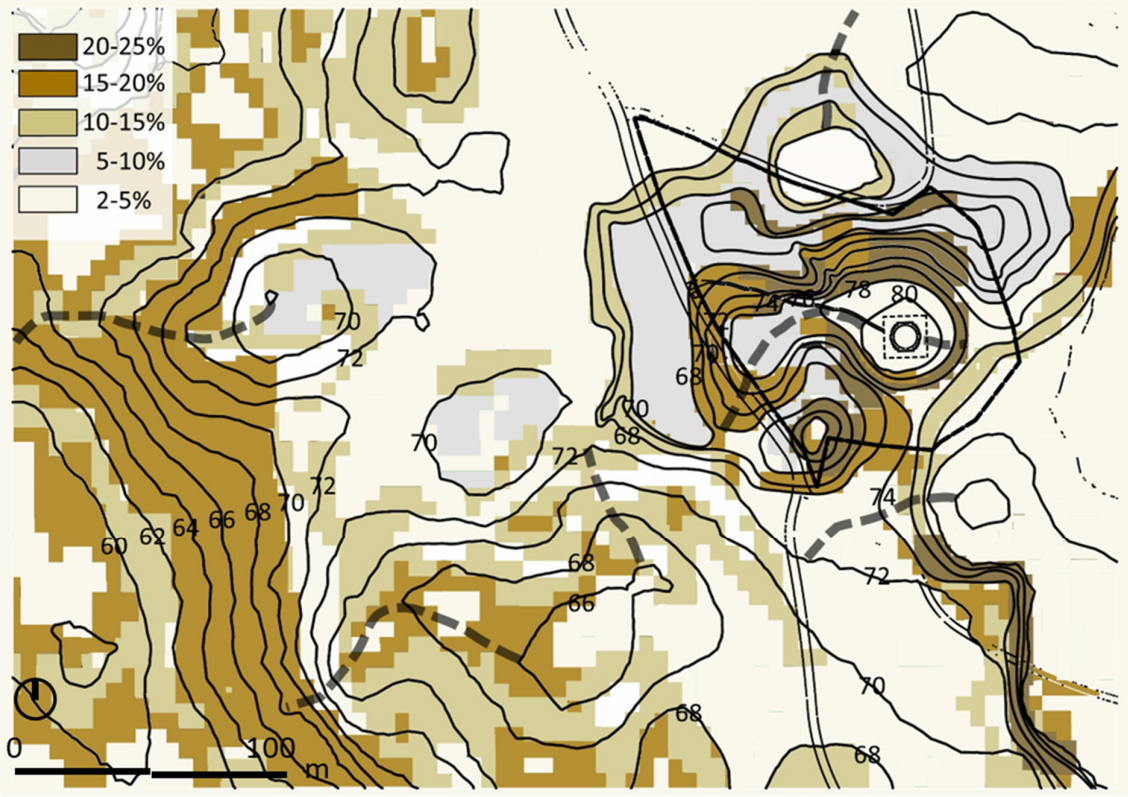


Figure 6-6: Slope analysis map of Bharatpur archaeological site and surrounding. (Source: Author)

6.3.2. Hydrological regime and its elements

The geo-climatic location of this site impacts the hydrological regime immensely. The watershed of this riparian land is dominated by major rivers and their tributaries e.g. Bhagirathi, Ajay, Damodar, Kasai, Barakar, Dwarakeswar. The older floodplains occur at highland whereas the well-drained newer floodplain is formed at downstream of the Chhotanagpur plateau. The monastic site of Bharatpur in located in this transitional zone (Fig. 6-7, 6-8 and 6-9). The upstream channel of Damodar River is narrow hence it floods the surrounding. Bharatpur site took the advantage of locating itself on an elevated mound to stay unaffected from the hydrological phenomena. There is no prominent ridge or valley in the flat agrarian plain. Thus, the flooding activities leaves temporary water dots while receding back to the river channel. This natural setting probed into an adaptive living practice being closely linked with natural events, the religious anchor and the settlement network (Sen and Wahid 2017: 2).

Figure 6-7: Surface drainage pattern at flat fluvial plain of Bharatpur (Source: Site documentation by author)

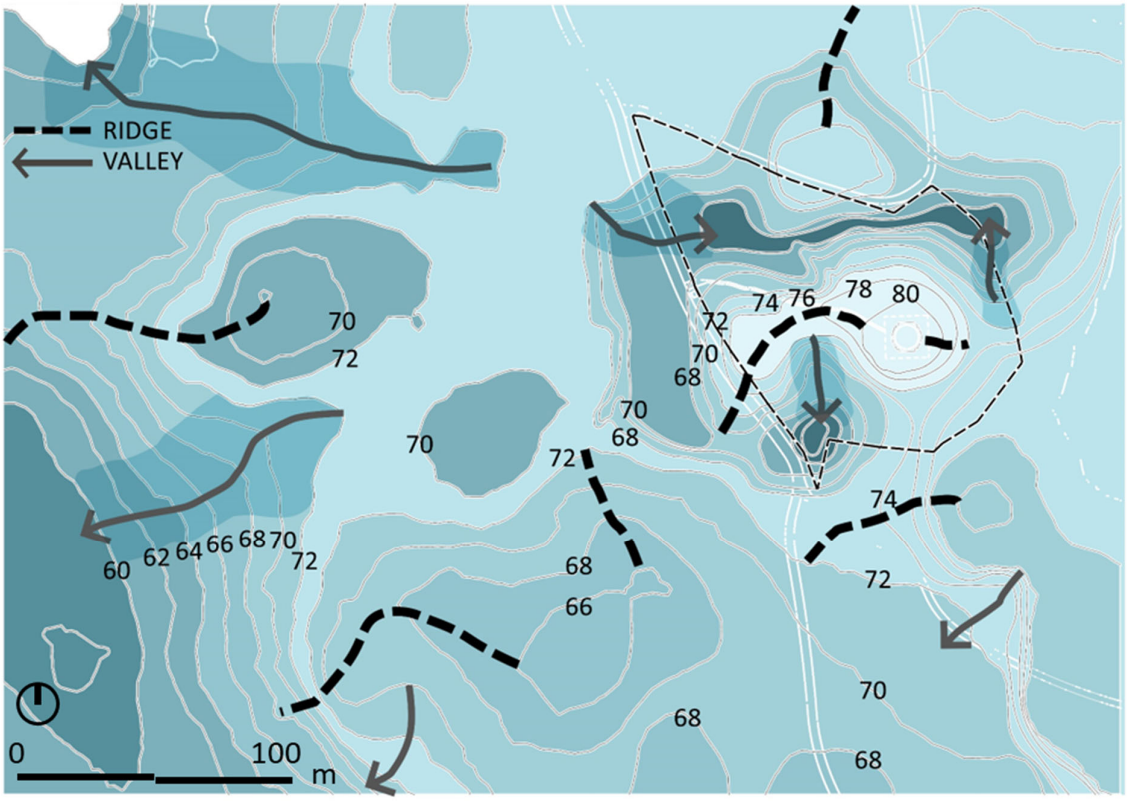


Figure 6-8: Drainage map of Sanchi archaeological site and surrounding. (Source: Author)

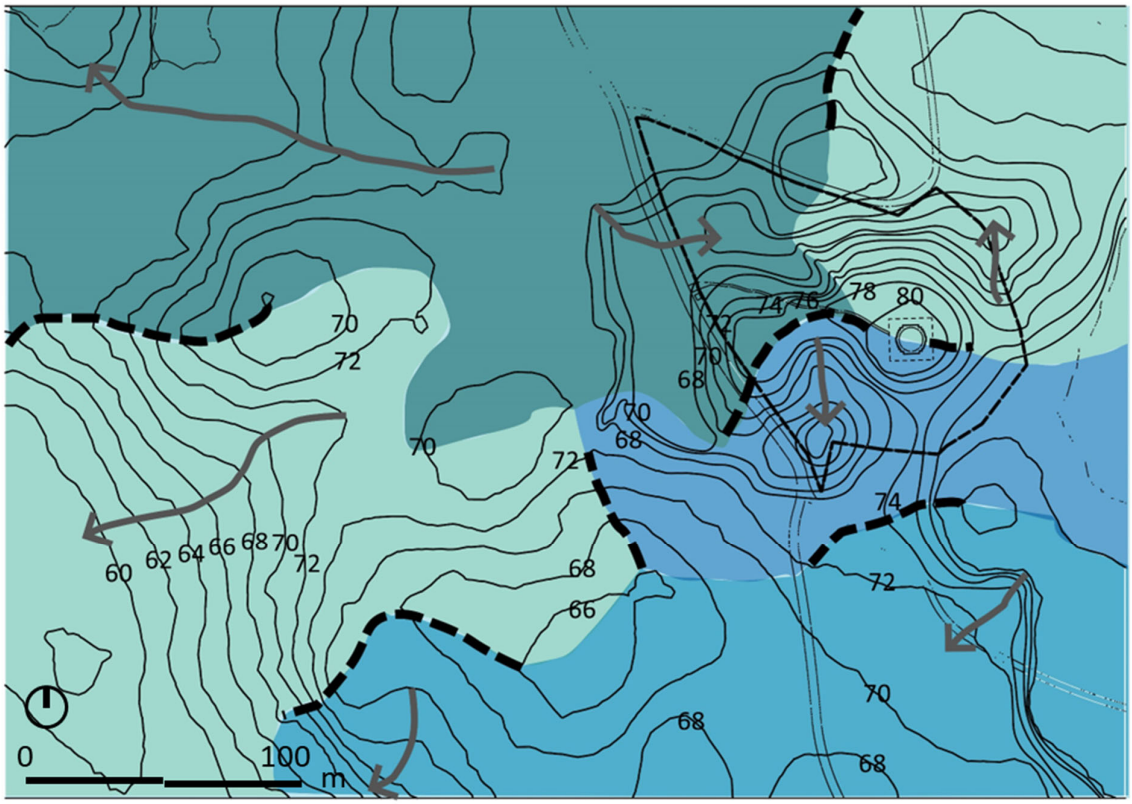


Figure 6-9: Watershed map of Sanchi archaeological site and surrounding. (Source: Author)

6.3.3. Vegetation and plant characteristics

The Bharatpur site is abundant with greenery especially with the given context of plentitude of water and fertile fluvial soil. Within ASI boundary the major tree growths could be found at the lower elevation where these is a probability of moisture retention, essential for plant growth (Fig. 6-10, 6-11 and 6-12). But the stupa base is clear of big trees or traces of it. This might be a conscious decision of the then builders to maintain visual clarity of the stupa from the trade route of river.

Figure 6-10: Evergreen vegetation pattern with fluvial influence around the site (Source: Site documentation by author

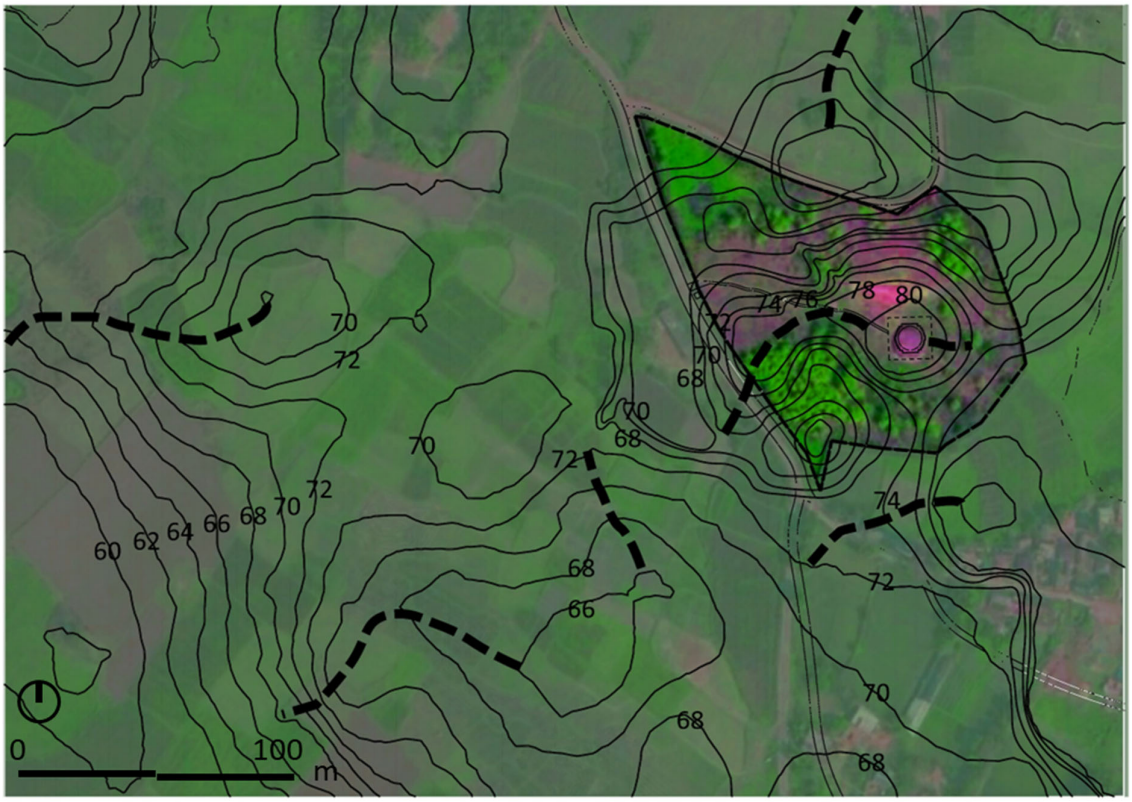


Figure 6-11: Existing vegetation map of Sanchi archaeological site and surrounding. (Source: Author)

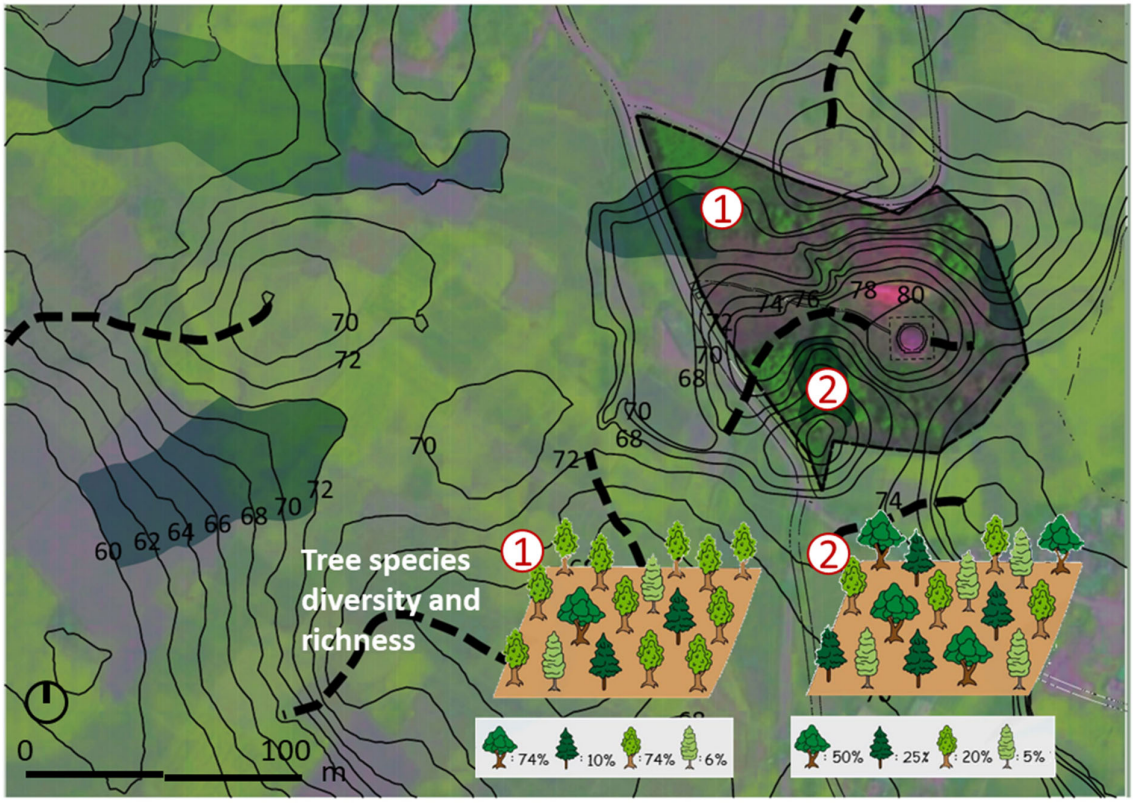


Figure 6-12: Existing sensitive vegetation (on valley areas) map of Sanchi archaeological site and surrounding. (Source: Author)

6.3.4. Visual structure – Aspect and Exposure – visual layering and functional siting of built elements

Understanding the inter-relationship of the physiographic layers of Bharatpur monastic site, this study focuses on finding the link between stupa with its landscape setting (Chakrabarti and Nag 2015: 116). After the climatic and anthropogenic adversities only the 13m square platform could be found as extant remain. The terrain slopes down towards Damodar River from high ground of 214 ft to 172 ft near river channel, which is also a microcosmic image of the regional land characteristics (Fig. 6-13 and 6-14). The square base is an indication of housing a hemispherical dome keeping similarity with Buddhist stupas from other locations. This created a major point of visual arrest from the river trade route creating a stark contrast against flat horizon at backdrop.

Figure 6-13: Leveraging the flat horizon to create visual contrast; inward versus outward views (Source: Site documentation by author

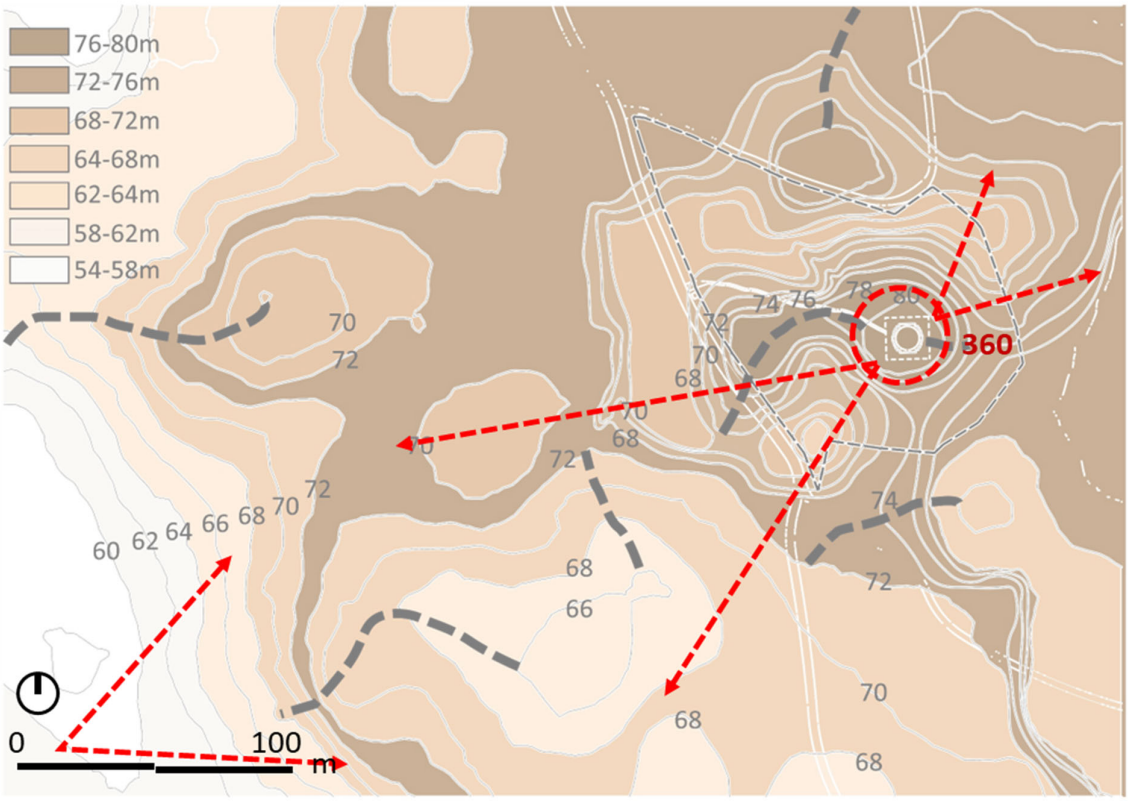


Figure 6-14: Visual connection map of Sanchi archaeological site and surrounding area (Source: Author)

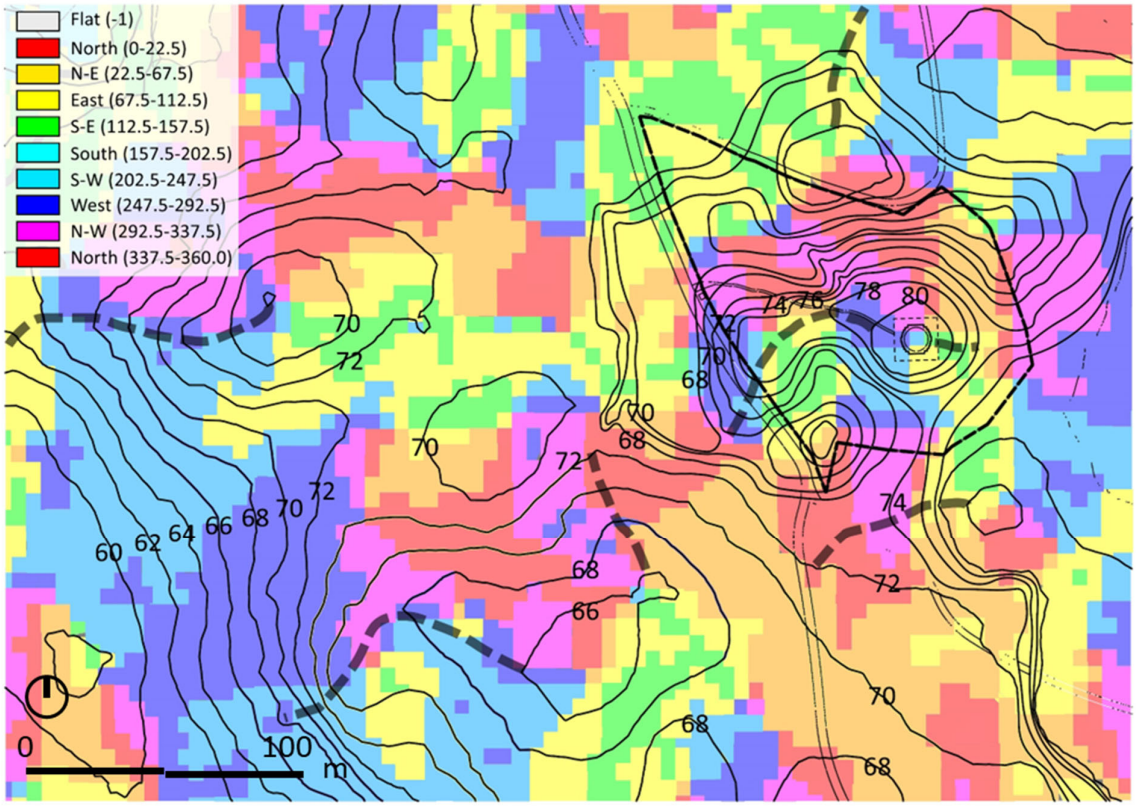


Figure 6-15: Solar aspect map of Sanchi archaeological site and surrounding. (Source: Author)

6.4. Scientific tools and micro-methodology for analysis

The contemporary study of archaeological sites integrates the monument and the surrounding landscape to bring a comprehensive perception of site, setting and settlement networks. Landscape setting has influenced the socio-religious conformity of the Buddhist monastic site with a complex dynamic of physiographic factors such as terrain, hydrology and vegetation etc. (Fig. 6-15). The extant landscape of Buddhist archaeological monastic sites would be very different from their period of original existence (Panja 2003: 505). The Bharatpur monastic site reveals the structural brick stupa base on a high mound but the settlement deposits are yet to be excavated which are still buried under current landscape formation (Panja 2003: 498). The spatial organization was determined through the interaction with local natural and ecological processes. The epigraphic narrations from Buddha images also depicted the spiritual reverence towards natural elements (Fogelin 2015: 29). Siting the monasteries as landmark visual contrast by the local patronage manifested the Buddhist philosophy of "seeing the Buddha" (dassana) at monastic sites thus forming a unique pattern in landscape (Schopen 1997: 100; Trainor 1997: 174). The relationship between monasteries and settlements created various pattern with their natural and cultural characteristics of the landscape.

The present study takes a leap beyond the stereotyped notions of Buddhist monastic sites analyzed from art-historical and monument centric point of view. To re-envision the site under study a landscape approach is introduced as method of investigation (Fig. 6-16). However, the challenge lies in interpreting the landscape of original establishment from the extant remains

as only available media. The textual resources from various Buddhist doctrines are leveraged to establish environmental linkages in their site planning process. As the original design is beyond discovery, this interpretation is further substantiated by secondary study materials e.g. translated literatures, inscriptions or chronicles of agrarian activities with urban centers in proximity during that period.

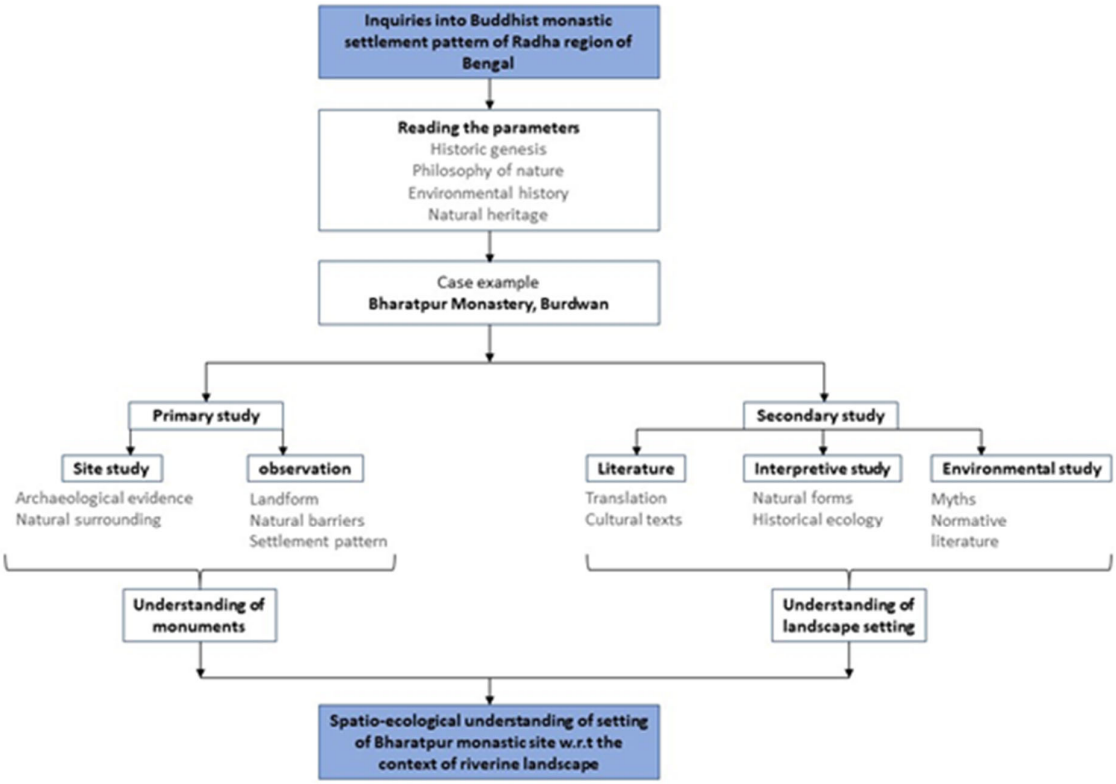
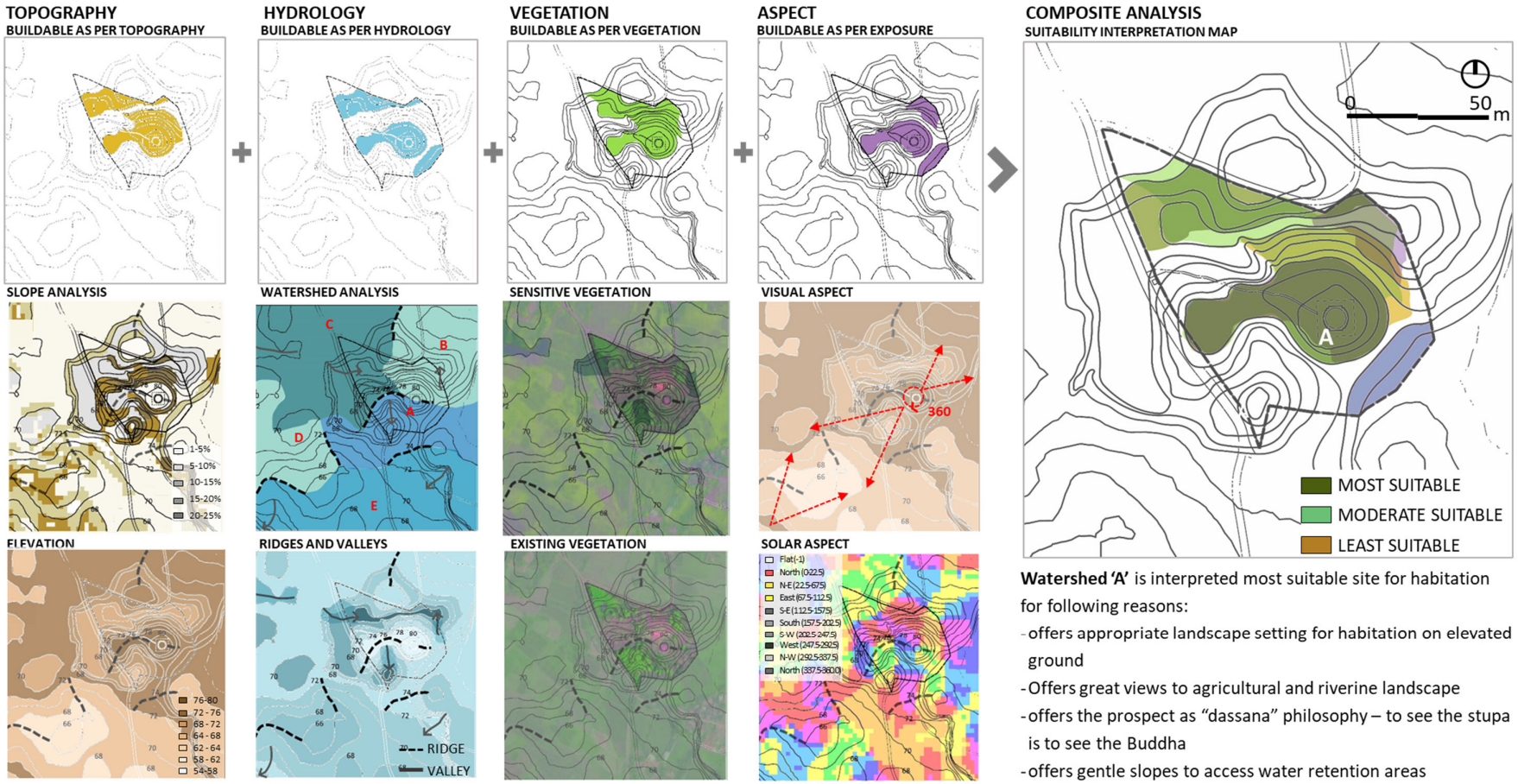


Figure 6-16: Methodology of investigation (Source: Author)

6.5. Composite analysis

Monastic sites though were in isolated locations, but they established a co-dependent relationship with the laity. Bharatpur monastic site was no exception. The settlement deposits found (Microlithic layer) in Birbhanpur, a nearby settlement site matched the archaeological findings from Neolithic-Chalcolithic layer of Bharatpur site. This grouping of monastery and settlements for adaptation and sustenance was shaped by the environmental factors and natural resources within the context. The copperplate inscription of Vallalasena from Naihati (Majumdar 2020: 61) dated back to 6th century CE confirmed the presence of the administrative urban center of Vardhamana Bhukti in this transitional region. Two early historic sites were found on the left and right banks of Damodar valley which also yielded proof of Buddhist settlements from this period. The reason of the scant spread of the archaeological proofs could be due to natural phenomenon like floods or human activities. Thus, the interpretation of monastic sites in the light of landscape construct remains dependent on textual and epigraphic references (Fig. 6-17).



Watershed 'A' is interpreted most suitable site for habitation for following reasons:

- offers appropriate landscape setting for habitation on elevated ground
- Offers great views to agricultural and riverine landscape
- offers the prospect as "dassana" philosophy – to see the stupa is to see the Buddha
- offers gentle slopes to access water retention areas

Figure 6-17: Composite analysis map of Bharatpur archaeological site and surrounding for interpretation of site suitability. (Source: Author)

The Bharatpur site was strategically established at the meeting point of Chhotanagpur plateau and Ganges delta by the local patronage (Figure 3). The Damodar River acting as a route of trading exchange contributed to the socio-political development in the region. The highland plateau was source of minerals and construction raw materials required for urbanization of the agrarian fluvial plain downhill. Furthermore, the Dudhpani rock inscription hinted the trading exchange from Tamralipta to this region (Kielhom 1894: 343).

The political landscape of this region was also influenced by the religious setting. The spreading of Buddhism through monastic establishment also attracted local patronage to aid and facilitate a socio-religious validation as source of power. The development of administrative center of Vardhamana Bhukti is a testimonial to the abovementioned theory. This dynamic metrics of local prowess, agriculture friendly riparian plains, natural river networks used as trade route was leveraged by the local community to establish rural settlements around the stupa site. Hence it is vital to comprehend the strategic significance of the Bharatpur stupa location in the advent of Buddhist cultural landscape in West Bengal. The geographical and chronological development pattern in the surrounding landscape context of Bharatpur has strengthened the hypothesis of this study.

The settlement network interacted with a reciprocal dynamic within the micro-landscape system rather than contesting the natural forces of frequent flooding (Balee and Erickson 2006: 15). By analyzing the Buddhist spatial planning with this perspective, demands a re-envisioning of the landscape and environmental understanding developed by the then builders.

Bharatpur monastic site was frequently flooded due to shift of river courses on the wide flat landscape. Thus, the flooding was a major natural force to shape the settlement pattern within the temporal landscape. Thus, lesser habitational deposit was found in its archaeological layers lying in the flood plain near the monastic site. However, the contrasting scenario could be witnessed at high elevation hinterland. Due to permanent nature of the landscape and less flooding activities major settlement imprints could be traced out in the archaeological exploration. The settlements in Bharatpur monastic site are characterized by some recognizable pattern in their spatial organization.

Four such categories of spatial characteristics could be found as follows (Table 6-1),

6.5.1. Nucleated

The stupa was surrounded by the settlements in proximity (Fig. 6-18 I). These sites were established on higher elevations of the floodplains where flooding is not frequent (Goswami 1948). These areas are discovered with isolated habitational deposits and extant forms (plinths) of monasteries and other built forms.

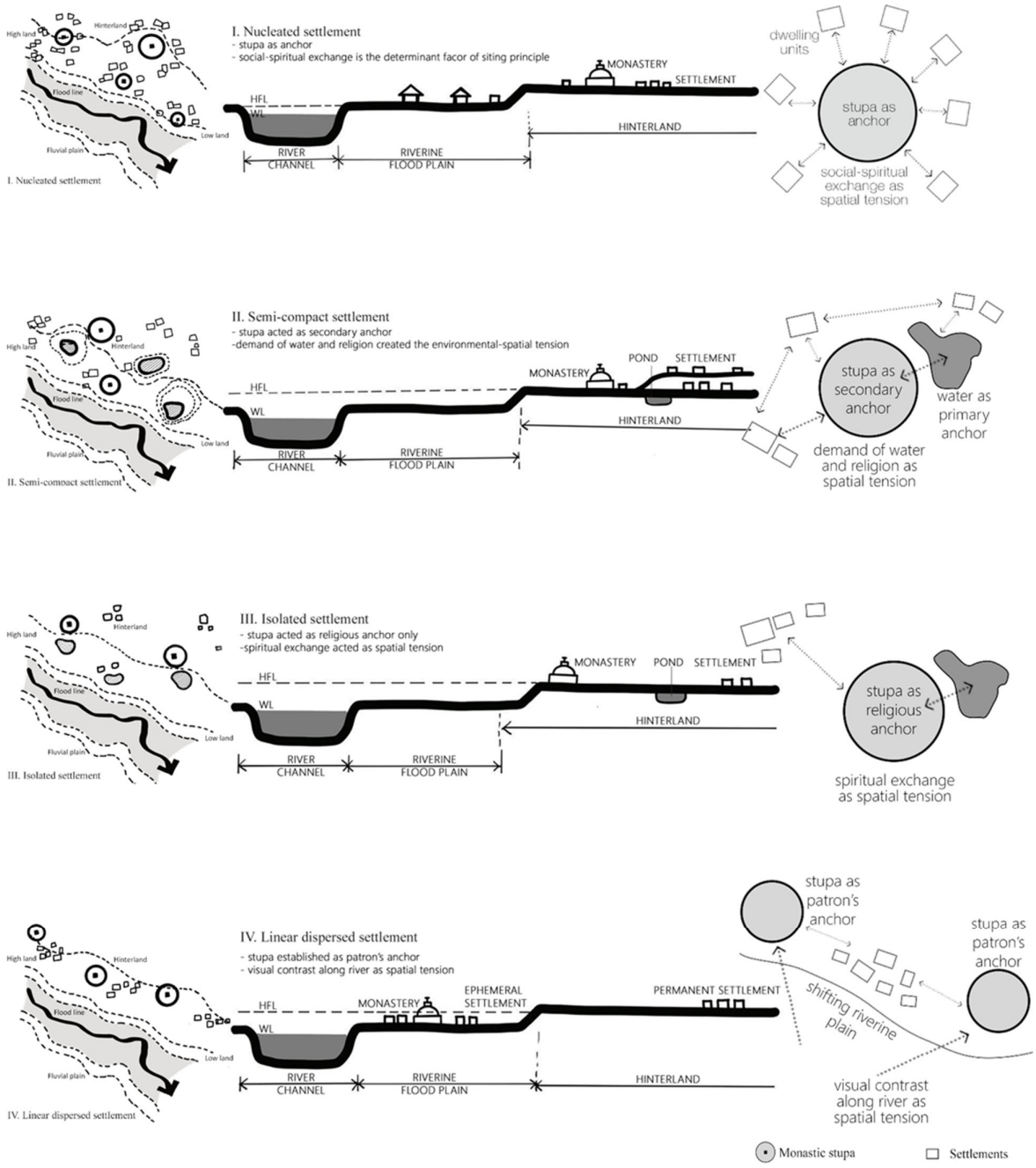


Figure 6-18: Relationship between monastic sites and settlement (Source: Author)

6.5.2. Semi-compact

These types of settlement could be found near rivers or man-made tanks at the excavated sites of hinterland (Fig. 6-18 II). The settlement dots were located at distant yet reachable places.

6.5.3. Isolated

This is the most common type of settlement found in the larger landscape context. The habitation deposits are very rare and far from the stupa brick mounds (Fig. 6-18 III). But these

brick mounds were situated near tanks or village ponds. By reading the spatial organization they appear only to be linked to the monastic site for occasional performance of religious rituals.

6.5.4. Linear and dispersed

These settlements could be discovered at riverine flood plains. These are mostly scattered along the river channel (Fig. 6-18 IV). The structural mounds were placed in between them creating a visual contrast against flat landscape horizon.

Table 6-1: Spatial inter-relationship amongst monastery, settlements and landscape (Source: Author)

Sl.no.	**Landscape context**	**Archaeological determinants**	**Spatial categories**
1	Hinterland of river channel	Closely located monastic remains and material deposits of household items	Nucleated
2	Close to riverine plain and/ or reservoir	Structural mounds or plinths of monastery surrounded by clusters of dwelling material remains	Semi-compact
3	Within villages dotted with ponds	Distant dwelling remnants from monastery remains	Isolated
4	Linear fluvial course of river	Material deposits in lower ground spread along river course with stupas at high grounds in between as discernable landmark	Dispersed

The spatial organization of these settlements were immensely governed by the natural flooding activities or demand of water for livelihood or ritualistic purposes. They used to get washed away due to frequent flooding. Hence the archaeological deposits are found in lesser quantum at Bharatpur site.

The riverine linear and dispersed settlements along the course used to get washed away leaving no or very less proof of occupation attributing to the temporality of the landscape. The “safe” zones have more concentration of semi-compact and nucleated habitation. The brick mounds, considered to be remnants of the stupa from that early time is the only structure that survived the whims of river.

These monastic complexes or sites around them had been developed over a period of time and culture (Panja 2003: 17). The varied spatial categories of settlement establish the fact that the Buddhist cultural landscape of this region was an outcome of the co-dependent dynamic between monastic lives and laity. Multiple sustenance strategies within flood prone region advocated the stewardship with natural resources to shape the monastic sites in an everchanging river plain site. By introduction into the riparian lowlands near major trade routes and urban centers, Buddhism influenced the regional landscape pattern of the Bharatpur region. The local

patronage came gradually to the aid in establishing monasteries in this region as signature of permanence and power (Chattopadhyaya 1990: 56). While the builder attempted to promote this as a medium of permanency, the recipient welcomed the new structure as a spiritual anchor (Panja 2003: 15).

The spread of Buddhism in this region reshaped the landscape into a harmonious living setting imbibed with the environmental ethics and ecologically responsive planning regime.

The probing into interpretation of Buddhist monastic sites in the light of landscape approach has unearthed the repository of sustainable planning methods in historic cultural landscape of India. The influence could be captured upon the contemporary landscape design which evolved upon the traditional knowledge systems and historical practices (Singh 2016: 24).

The law of nature in Buddhist doctrines signifies the mutual interaction between man and nature which is further elucidated in Cakkavattisihanada Sutta (Silva 2013). Nature is considered as an ever-changing phenomenon in Buddhist philosophy. The monastic site planning discussed above is an outcome of the manifestation of this philosophy into the natural landscape setting of cultural landscape.

a. The site suitability

The 'genius loci' of the monastic sites benefited the monastic lives as well as the laity. The thoughtful siting in transitional zones of high elevation lands in the riparian network ensured the prominence in the landscape. Mineral traces found in river valley sites and catchment of hinterlands also prove the exchange of construction material resources from manufacturing sites and monasteries at consumer sites developing a unique cultural landscape. Furthermore, it acted as a pivotal pause points in the trading routes.

b. Nature-culture integration

With the advent of adaptive practice, there was a need to sustain the monastic sites within vulnerable ecological system. Thus, a paradigm shift occurred to establish an exchange between the monasteries and the existing settlement networks. The habitational deposit near the upland monasteries depicts the story of this new cultural practice that resulted in a co-dependent and environment friendly subsistence strategies with available natural resources.

c. Influence of landscape

The primary focus of the study is to find the influence of natural systems on monastic sites planning and its variable relationship pattern with the settlements. The flat agrarian flood plains were dotted with landmark structures with the help of local patronage – a learning for contemporary practice to form a visual contrast within the landscape setting. The settlement networks also set in the floodplain in varied extent adapting and respecting the vulnerable landscape setting.

6.6. Functional relationship of spaces in spatio-environmental regime

The transitional location of Bharatpur stupa between mineral rich plateau highland and fluvial agrarian plain low land has set the cultural dialogue (Chakrabarti 1993: 81). The natural setting has influenced this interaction. The natural factors as well as cultural factors created a linkage between the monastic lives and the settlements also. The adaptive nature of the inhabitants toward the frequent flooding evolved a unique cultural pattern administered by the landscape. This process advocates the idea of living choices in harmony with nature. Thus, it is imperative to re-envision the cultural process in and ecological process hand in hand to interpret the sustenance process adapted in the settlement networks and the relationship with the monastery (Chakraborty 2010: 65).

The Buddhist cultural landscapes were shaped by the siting of the primary structures such as votive stupas, viharas, chaitya grihas etc. (Sinha 2006). The investigation with landscape approach generates a perception of inter-relatedness between nature and anthropogenic activities. The pattern could be read in landscape in terms of orientations, alignment, spatial conformity as response to the contextual landscape. In fact, the relic stupas containing Buddha's remains, began to act as monumental landmarks in the pilgrimage networks shaping up the vast Buddhist cultural landscape in India (Sinha 2006: 173). These votive stupas developed prominence over the ages with the belief system that Buddha, himself is manifested within them (Schopen 1987:87). Furthermore, considering an additional layer of ecological interpretation for these monastic sites offers an intriguing insight toward environmental approach.

The interpretation of Buddhist settlement histories from the extant elements or landscape patterns demands further investigation in patronage activities in that region. The study of evolution in spatial patterns shows how the votive stupas, even in their extant form created a spatial focus of visual arrest in otherwise flat landscape. They were physical manifestation of local royal patronage. Constructing the stupa bases with brick masonry could be construed as an attempt to bringing stability by negotiating the challenge of unstable flood prone terrain. The alteration measures taken by the then builders prove the hypothesis of the study i.e. the monastic site planning was influenced by contextual ecological parameters. The understanding of social practices linked with local environment in and around Buddhist monastic sites provides a dynamic re-envisioning for the Buddhist monastic site planning approach. This nature influenced study approach helps perceiving the expanse of Buddhist understandings of the environment and planning as a timeless scholarship.

7. Comprehensive understanding and Buddhist environmental ethics

7.1. Comparative analysis of the three study sites

7.1.1. Philosophical form

The three monastic sites of Jetavana, Sanchi and Bharatpur embraced the Buddhist normative principles in their design and planning scheme. The positioning of Relic stupa or Buddha's chamber of stay at the most significant highest elevation of site reflects the idea of 'seeing the Buddha', which is mentioned in chapter 2 also.

All the three sites are examples of how the doctrinal directives are inherently imbibed in their formal development scheme. The philosophical notion is linked with the spatial and environmental forms also. The topography is the main feature here to manifest their idea of '*dassana*'.

7.1.2. Spatial form

The architectural composition when investigated over the landscape layers of the three sites from varied natural settings the spatial forms are very well appropriated. The simulated approach shows the suitability positioning of various architectural elements. In Jetavana the chamber of Buddha is at the core of central attention and other structures such as temples, monasteries, prayer hall and most importantly the *Bodhi* tree forms a spatial tension with organic setting at undulating elevated mounds. The similar spatial organisation as per the land and natural setting can be seen at Sanchi and Bharatpur; it adapts to the contextual landscapes.

7.1.3. Environmental form

The landscape setting of forest, hilltop and riverine flood plain have their specific environmental challenges. The analysis of the sites following site suitability principle proves the objective of the current research. This generates the environmental forms of the three unique study sites.

But a common design pattern emerges by positioning the stupa or Buddha's chamber at the highest elevation to protect as well as heighten their significance. The hilltop site of Sanchi is one of the best examples of that landscape approach. The wider landscape connect can be seen happening at Bharatpur site where the land was frequently flooded. The strong relationship with laity and agricultural practice evolved a unique relationship between monastic institution and wider landscape setting.

These virtues or landscape qualities are interpreted in detail in chapter 8, which formed the Buddhist cultural landscape of early Indian Buddhist period and presented here in table 7-1.

Table 7-1: Comprehensive comparative inference of study site analysis – cultural landscape values (Source: Author)

Parameters / Sites	A. Historical value	B. Cultural value	C. Ecological value	D. Technological value	D. Learning value
Category 01: Forest sites **Jetavana, Uttar pradesh** Climate: Composite*	-Established by tradesman Anatha pindaka in 6th c BCE -Buddha spent his 19 out of 45 vassavas in this forest grove monastery -The purchase history with gold coins is legendary	-Patronage of Prasenajit and Anathapindaka -Purchase history inscribed on medallion at Bharhut stupa railings -Jataka stories associated with forests could be interpreted as inspiration	-Understanding hill ecology - Leveraging topographic features to set monastery with difficult access -Run-off water collected at foothills to sustain arid climate and dry landscape	-Sustenance strategy by positioning built units at elevated land -Natural low lands converted into water retention tanks -Flood control with earthen rampart walls	-Hydrologic landscape planning in abundance of water for utilitarian purposes not aesthetics -Forest ecology understanding -Optimised use of resources in monasteries
Category 02: Hill sites **Sanchi, Madhyapradesh** Climate: Composite*	-Established by Emperor Ashoka in 3rd c BCE -A narrative of Mahayana pantheon -Witness of Greco-Buddhist exchange in art history	-Patronage of Maurya, Shunga and Satavahana dynasty -Brahmi and Indo-Greek inscriptions found mentioning about donation	-A hill-top site in a semi-dry region with less monsoon mingles with hill-ecology impacted by slope, soil type -Material resourced from site for building activity	-Sustenance strategy by positioning at upland -Hydrologic engineering with natural techniques -Water harvesting strategy for monastic lives and rituals	-Irrigation pattern within the settlement network around -Sustainable agricultural practice
Category 03: River plain **Bharatpur, West Bengal** Climate: Warm humid*	-Excavated from 1971-72 to 1974-75 jointly by ASI and Bardhaman University. -600-900 AD site -Eastward expansion of Buddhism	-Mentioning in Dudhpani Rock Inscription dt. to the 8th century -Located on a trade route between chotanagpur plateau and Damodar valey	-Hydrological setting – fluvial plains of Damodar River -Transitional zone between the older flood plain above the younger flood plain of the river towards east	-Sustenance strategy by positioning at upland -Natural controlling of flood -Water harvesting strategy for monastic lives and rituals	-Relationship with settlement network and laity -Evolution of contextually responsive habitation pattern -Optimised use of landscape resources between builder and consumer zone

7.2. Environment and ecology in Buddhist philosophy

7.2.1. Place of Nature in early Buddhist monasticism and their impacts in spatial planning

According to Coomaraswamy (1934, p.12), nature was perceived and manifested in art form as symbol. For this study the analysis is focused on one of the case examples – Sanchi and other references are cited in order to cover the sphere of the study. Natural forms were depicted on the main stupa (Stupa I) at Sanchi, an early Buddhist monastic site which dates back to c.100 BCE to 50 CE. Early Indian Buddhist stupas can be regarded as visionary spaces sited within natural context. The utopia of the space was achieved through its site planning; carefully positioned built elements and open spaces around them in structured, organized manner (Brown, 2008, pp. 63-64). The monuments especially the relic stupas, votive stupas and the monasteries were highly decorated with visual starkness imparting a notion as follows,

Table 7-2: Notion of decoration in monastic art (source: author)

Sl.no.	Notions of art	Characteristics
1	Perfected	compared to the natural landscape surrounding/ context
2	Protected	the conscious selection of sites within natural setting with negotiated accessibility
3	Isolated spiritual space	at the outskirts of urban centres "not too far, not too close" to the settlements, where monks could have their ritualistic spaces without disturbance from the visitors

Natural elements both plants and animals were used in carving relief works to create this idealised space. On many occasion the mythological animals or plants were also carved in the art works. In the Bharhut stupa these could be noticed.

The thought process of the artists or designers/ builders of the early monastic sites (unknown now and no documentation preserved) could be interpreted in the following three interrelated arguments

i. The attempts taken to either mimic or create patterns from the nature surrounding the site at immediate vicinity. Stone works replicated the wooden construction elements e.g., balustrades and railings. This has enabled the space to be a new kind and with an idealised notion

ii. The stone relief works were inspired from living beings and also conceptualised as living forms of nature reproduced on the main monuments as a complimentary idea to the notion of living Buddha (in the relic stupa)

iii. These abstracted patterns derived from nature has helped to create an out worldly spiritual space where "Dhamma" has its austere presence

Mahayana Buddhist philosophy developed around the theme of interdependence, mutual relationship and the ultimate identity of all beings in the Buddha-nature. A major source for this view was the *Avatamsaka Sutra* generally called the Wreath or Garland Sutra. Its main

principle can be summarized in the phrase: All is One; One is all (Fung, 1953). On that note the notion of decorative art and patterns evolved from living natural forms influence the early Buddhist monastic spatial design. Patterns act as spatial or memorial map providing 'ordered visual clues' (Brown 2008) curating the imagery of the space. E.H. Gombrich (1979, p.151), in his formative work "The Sense of Order: A Study in the Psychology of Decorative Art, argued the influence of pattern making in spatial design and the psyche created thereby. He writes,

"What I have called the sense of order may be said to serve first and foremost to orient ourselves in space and time to find our way in relation to the thing we seek or avoid".

It also provides a sense of kinesthetics within the spatio-temporal journey (Pandya 2005). The patterns of monastic spaces were used to impart a similar emotive quotient. Especially the floral patterns on the early Buddhist stupas could be traced back to their Mahayana school of thought, where the basis for greater recognition of the spiritual value of Nature was established.

The contribution of pattern could be followed up in two ways in a space – bringing certain order to the environment (for this study it refers to the monastic sites with certain boundary limits) and perfecting the forms which is otherwise varied in scale and size within the natural environment. The decorative patterns were formed by repeating the forms found in nature in a particular rhythm and sequence. This formal manner of patterning creates an order of journey. Our psyche is intrigued with the intent to explore. Any break with the introduction of a new form disrupts the patterns followed or embarks into a new patterning. The perception of endless repetition is built upon by the glance on the pattern rather than detailed study or prolonged visual exposure. Probably the floral patterns on the stupas are developed with this idea. To create a repetitive sequence of perfected nature without an ending but in a contained space. The very concept of Mahayana Buddhism could be linked to this. All the matters on earth are considered as individual phenomena which are interdependent and all the phenomena are contained in other phenomena (Fung 1953, pp. 339-359).

The patterns carved on stupas and walls of significant structures within monastic site were chiefly borrowed from natural elements – flowers dominated them most amongst other forms such as leaves, fruits, animal forms. They were sometimes used with an exaggerated perfection with plenitude and quantum. The exaggeration was created even through their attributes of size, scale, symmetry and complexity which influence and impacts the spatial quality, especially within a ritualistic space. Circumambulatory path, the prayer halls, the ceremonial approach to the stupa (perceived as living Buddha) were highly decorated and ordained with the natural forms to evoke the feeling of assumed path of enlightenment or nearing the Pure land.

This finds another link with the Buddhist cosmological configuration. The abundance of artworks corresponds to the human and landscape setting of the site. There is apparently a sympathetic perception with the cosmological connect (Coomaraswamy, 1993, p.181). The selection of materials is also an important factor to render this feeling into the spatial microcosm. A departure from the conventional use of wood to stone construction has proliferated the cosmic abundance within monastic sites. The stone allowed the abundance to occur profusely within the site setting. Sanchi and Bharhut stupas are major examples to prove

the hypothesis. The decorations and relief works were exceptional in terms of their clarity, content, variety and skillful perfection with respect to the time period in context. With Mauryan crafts and stone works brought a new paradigm of construction as well as new material for artistic expression, the Buddhist stupa was able to reproduce and represent the idea of cosmic abundance and the powerful Buddha-Nature in Mahayana ideology.

Now there is a limit to call the functional construction elements in early stupas as decorative or ornamental. The fences, railings and gateways were used to be decorative. There are many ways to categorize material as decorative or not. But to have a specialized selection of abstracted art forms for decoration few exclusions are needed to be done. Reliefs depicting direct Buddha images or narrative scenes from various historical events of Buddha's life and teachings are not included as art form in this study. The Buddhist symbols and icons with direct doctrinal influence or implication e.g. *chakra, the stupa,* the anthropomorphic mythical forms *and tri-ratna* are the focus of the study.

The Sanchi gateways are decorated with illustrious narratives from Buddha's life as well as natural forms in a pattern. The Buddhist symbolic narratives or contents underline the visual importance as well as balance for the decorative natural patterns. Now the argument does arise whether the natural patterns are merely decorative in nature or they were consciously curated and strategic placement of them might have rendered the space in a new light. The Sanchi Stupa 1 eastern gateway shows the balance between decorative and narrative symbols.

The patterns depicted on the stone relief work were inspired from natural living forms and so were perceived as living in the artwork too. The plant patterns are shown as growing from the water along with branches, stems or flowers or buds sprung up. Many scholars have explored and expressed their ideas on the natural patterns. Coomaraswamy repeatedly mentioned about water cosmology for early Indian art and symbols embedded in it. That is why it is explicitly significant compared to their counterpart ideas from west. Similar exemplary works could be found with the pillar cult by John Irwin, Doris Srinivasan has talked about pregnant males in Buddhist artworks and F.D.K. Bosch has worked extensively on the lotus forms in "The Golden Germ".

Coomaraswamy's groundbreaking work on early Indian art shows the evolution of decorative patterns has its roots in early religions. The significance could be found out through various religious texts (Coomaraswamy, 1993, p.103). The plant patterns in early Buddhist artworks are considered to be the 'Tree of life', represented in multiple forms as a part of Water cosmology. This is interlinked to a series of other art forms; conch, vase, flowers, *makara, yaksa* and many other worldly and mythical living forms. In his argument he proposed that all life forms are originated from waters. The *'rasa'* or essence of life is contained in waters. The life forms had always been shown originating directly from waters or vessels of water in various forms (from the mouth of an aquatic life form such as *makara* or naval of a *yaksa* or *yaksi* or a conch). What absent is any art form or pattern which symbolizes earth as source or providing sustenance to life (Coomaraswamy, 1993, p.98). The interesting part is the natural forms are never replicated in formal manner by the then artists. The characteristics were depicted or expressed with more varieties; what made the then artists inspired is unknown to

us in present day due to lack of documentation or preservation of it. Furthermore, it is interesting to notice that the transformation of nature into the art happened through the representation of functions of those natural forms that their physical attributes. Life forms originating from water (or water vessels), the branching of vines and supporting the leaves or floral outgrowth; all these are processes experienced in nature. In this way the art form on stupas reminds the superiority or presence of Buddha-Nature in the minds of the monks or the visitors of such ritualistic spaces.

John Irwin has thrown light on the Mauryan pillars. His article series written between 1970s and 80s published in Burlington magazine, presented an account of reconsideration on the origin, succession and value or meaning of those pillars within Buddhist monastic sites. His argument was quite aligned with Coomaraswamy's interpretation of water symbology. The pillars were revered as a manifestation of the concept that they are a medium of connection between the water below the ground or earth as larger landscape construct and sky or heaven above. This finds a place in Buddhist cosmological construct and Buddhist mandala elating the philosophy of pure land sutra. The placement of such pillars was also guided by the geomancy of the site as the pillars were considered passing through the center of the world- the axis mundi. Pillar worship was a part of worldwide cult ritual. The pillars used to be decorated with Life forms inspired from nature and also interchangeable forms from mythical sources. Tree or plant dominated the artwork in here too which resonates the interpretation insighted by Coomaraswamy. The tree of life in Coomaraswamy's rendition relates with John Irwin's pillar worshipping ritual.

Doris Srinivasan talked extensively on the figurative or representative translation of divine elements influenced the creation of anthropomorphic entities or imageries in early Indian art forms. Her study "Many Heads, Arms and Eyes: Origin, Meaning and Form of Multiplicity in Indian Art" (1997) explains the process based on Vedic or Upanishadic sources. She elucidated on the yaksas and yaksis and how they represent themselves as potential source of life (Srinivasan, 1988 p.210). this can be seen on Sanchi and Bharhut stupa and torana stone reliefs, plant patterns are emitting out of the navel or mouth of the yaksas. The body of the yaksas are mostly constituted of belly (often perceived as vessel or womb), a representation of container or originator of life. The plant pattern takes the centrality here too.

F.D.K Bosch speaks about the importance of plant imagery in his book the Golden Germ, particularly focusing on lotus (1960). The analogy with lotus is same with Coomaraswamy's tree of life. The stress on lotus forms as originator of life in Indian religion and art is evident from the scholar's work.

Based on the above-mentioned scholastic findings many common discussion points emerge out.

i. The omnipresence of plant imageries on the early Buddhist stupas is pointed out by all the scholars. This could be there due to the representation or symbolism of the Tree of Life in its varied manifestations.

ii. The plant forms or patterns emerge out directly from the water or set of vessels symbolic of water container as growth medium so that it could be perceived as

growing and alive. The vines, leaves and flowers are in particular used in exaggerated manner to create the illusion of growth in their pattern.

The utopian nature of the space inside the monastic establishment could be tested or inquired more to establish the argument with stronger logic embedded in the Buddhist literatures or discourses by the historic Buddha. The interpretation could be made upon the fact that the intricate patterns of natural elements in various forms exact or abstracted represent a spatial microcosm of a perfected space- an idea of perfected nature within a natural setting. These patterns were sometimes made exaggerated or replicated from mythological sources to create a notion that nature is present within the monastic spaces in highly controlled and ordered manner evoking the new feeling of the realm. The perfected space is also an intellectual manifestation of *'Dhamma'*. With this point of view the *'Dhamma'* represents the teachings of Buddha and his doctrines in full potential and rigid manner. The selection of material also plays a vital role reinforcing this idea. Stone being more robust construction material creates a feeling of awe or nature's predominance over human activities.

The stupa being considered as a living manifestation of Buddha after his '*mahaparinirvana'*, the monastic site imparted two qualities to their spatial organization and completed the holistic functionality

i. Ritualistic space - a secluded space set amidst natural landscape setting away from the mundane life chores focussed on venerating the relic stupa and mostly occupied by monks

ii. Social space – associated with the religious or ritualistic core, the aramas or viharas – the monastic gardens acted as a place for spiritual as well as social exchange between the settlements nearby and the spiritual leaders in the monastery

The influence of nature or natural forms in shaping up the experience and thoughts within the monastic site was manifold. In early Buddhist thought process the essence of natural surrounding was acknowledged in the meditative rituals and solitary lives of the monks, nuns and devotees from lay communities. In one of the teachings the Buddha drew simile of a bull elephant's behaviour inside a forest to validate the significance of the natural setting in this case a forest),

"Herein agreeth mind with mind, of sage

And elephant whose tusks are like a plough pole,

Since both alike love forest solitude."

-Udana and Itivuttaka

The Buddha often, along with his disciples, congregated in groves or gardens, provided by sympathetic royal patrons or devotees from laity. There is a repetitive appearance of Anathapindika's grove at Jetavana in early Buddhist literatures. It is the Buddha's counsel, which led the monks to find such places for seclusion and meditation (Dhammika, 2005).

Hence, the Buddhist stupas or monastic sites represent a new set of naturalised space. It also provides a deeper insight to interpret the manifestation/ transformation of Buddhist thoughts into spatial terms.

The wealth of natural imagery, as well as information based in human culture, indicates the close relation of Buddhist teachers and the people in ancient times within agricultural and village settings.

The similes and parables relate to animal and plant life as well as natural elements and relationships within the world. The illuminating character of the sun and moon, the relations of wave and water, and the relation of river and ocean are among some of the most widely employed figures. The blessing of the Dharma is compared to the breaking forth of green at the onset of summer (Hare 1944):

"Fair are the flowering tops of woodland trees

In the first summer month of summer's heat:

Fair is the noble Dharma that he taught,

For yondmost blessing, leading to the cool"

In response to the growing global environmental crisis, scholars have begun to interrogate religious traditions as a possible resource for the development of an environmental ethic. Different points of view regarding environmental ethics and religion, or what we refer to more generally as "religion and ecology," have emerged. At one end of the spectrum, apologists see the world's religions as a key resource in addressing the environmental crisis; at the other end, critics point to religion as redounding to the crisis. In his controversial 1967 article on Christianity and the environment, Lynn White commends Buddhism for its holistic, egalitarian worldview and its environmentally friendly style of life in contrast to the Biblical worldview and mainstream Christianity, that White sees as promoting human dominance over nature and, hence, contributing to the environmental crisis. Challenging White's reductive view, James Gustafson points out that Western theisms encompass at least five attitudes toward the environment—despotic, dominion over, stewardship of, subordination to, and participation in. "Despotism" exemplifies an idolatrous, Baconian, mechanistic, radically utilitarian stance. "Dominion over" extrapolates an attitude from Genesis 1:26, in which God grants human dominion over nature. Gustafson finds that Judaism and Christianity prefer the third attitude, "steward- ship," as a way of understanding nature. "Subordination" the opposite end of the spectrum from despotism, approximates the attitude of Albert Schweitzer's, "Only by serving every kind of life do I enter the service of the Creative Will whence all life emanates." Gustafson finds that the attitude "participation in" harmonizes the most with his own theocentric perspective, in which all human beings participate in the patterns and processes of life in the world grounded in the ultimate power of the divine.4 Eco-theology and eco-ethics, moreover, have emerged as major genres of constructive reflection among Christian theologians and ethicists.5

Buddhists and scholars of Buddhism in Asia and the West have promoted White's positive evaluation of Buddhism's eco-friendly worldview, but recent scholarship has both nuanced and

challenged what has been characterized as Buddhist "eco-apologetics." In this essay I purpose to assess and to evaluate a selection of contributions to the field of Buddhism and ecology.6 Far from being inclusive of the broad range of scholarship in this area in both Asian and European languages, my analysis will highlight what I construe as five sometimes overlapping positions regarding Buddhism and the environment. I have labeled this five-fold taxonomy as follows: eco-apologists, eco-critics, eco-constructivists, eco-ethicists, and eco-contextualists 7 I regard these categories as suggestive rather than definitive and intend them primarily for heuristic purposes and not as Weberian ideal types. The first position holds that Buddhist environmentalism extends naturally from the Buddhist worldview; the second that the Buddhist worldview does not harmonize with an environmental ethic. The third position maintains that one can construct a Buddhist environmental ethic, though not co-terminus with the Buddhist worldview, from Buddhist texts and doctrinal tenets; the fourth, that one should evaluate a viable Buddhist environmental ethic in terms of Buddhist ethics rather than inferred from the Buddhist worldview. The fifth position holds that the most effective Buddhist environmental ethic takes its definition in terms of particular contexts and situations.

7.2.2. Interpretation of five-fold eco-ethics in Buddhism

Religious environmentalism is perceived as one of the traditional means to find solutions to many climatic phenomena in contemporary time. This is seen as probable resource for the development of environmental ethic. Buddhism was no exception. The world religious view emerged in this regard with the notion of "religion and ecology". Buddhist attitude to natural resources is appreciated due to its holistic, egalitarian worldview and environmentally friendly monastic ritualistic practice (White 1967). White's essay "The Historical Roots of Our Ecological Crisis" created a renewed perception on religious ecology contributing to the current day environmental crises (White, 1967).

White's positive evaluation on eco-friendly world view has been promoted by Buddhist scholars worldwide. The current study reads deep into the scholarship of Buddhist environmental ethics and interprets the five-fold taxonomic classifications of Buddhism and its relationship with environment. These are eco-apologist, eco-critics, eco-constructivists, eco-ethicists and eco-contextualists (Fig. 7-1).

a. Eco-Apologists

Allan Hunt Badiner in his book 'Dharma Gaia: A Harvest of Essays in Buddhism and Ecology' (Badiner, 1990) mentioned that

"The fruit of Buddhism—mindful living cultivates a view of human beings, nature, and their relationship that is fundamentally ecological. Awareness opens our perception to the interdependence and fragility of all life, and our indebtedness to countless beings, living and dead, past and present, near and far. If we have any real identity at all in Buddhism, it is the ecology itself—a massive interdependent, self-causing dynamic energy-event against a back- drop of ceaseless change."

The position of Buddhism on the ground of ecology and environmentalism is mostly considered in normative way. The three most famous anthologies in this field justify the position with inexplicable reading and interpretation; namely *Dharma Gaia: A Harvest of Essays in Buddhism and Ecology Buddhism and Ecology* and *Dharma Rain: Sources of Buddhist Environmentalism*. They referred Buddhist texts starting from *Maharatnakuta sutta* to many Tibetan literatures. Mahayana texts from early Indian Buddhism such as *Avatamsaka sutta* is one of the most cited literature which is valued for its ecological significance. This text puts emphasis on the repetitive relationship amongst all the members of universe or cosmos. It is sometimes referred as 'cosmic ecology' (Cook, 1989). In the book "The jewel Net of Indra, in Nature in Asian Traditions of Thought, the following mention can be found,

"Each individual is at once the cause for the whole and is caused by the whole, and what is called existence is a vast body made up of an infinity of individuals all sustaining each other and defining each other."

Since the majority of literary sources in this matter are referred from contemporary interpretations rather than the primary sources, the Eco-apologist position is associated with 'Engaged Buddhism' (Mcfarlane, 1989).

Another facet of this theory could be found in Theravada regime of Buddhist school of thought. *Agganna sutta* and *Cakkavattisihanada sutta* offers a purview for the interdependence of nature (and environment at large) and humankind. It proposes to link the natural degeneration and degradation of nature with its human counterpart (Silva, 2000). In addition to that, a lesson on understanding of karma and rebirth is preached through *Jataka* stories written in Pali texts. This enables the Buddhist monks and laity followers to adopt a empathetic attitude toward lower life forms and animals. One example can be cited from *Mahakashyapa*, where it can be seen the natural scenery is appreciated for its aesthetic value but with a 'detached sense' by one of the disciples of historic Buddha (Theragatha vv. 1070-71), (Silva, 2000).

"Fair uplands rain-refreshed, and resonant / With crested creatures' cries antiphonal / Lone heights where silent Rishis oft resort / Those are the hills wherein my soul delights."

Eco-apologist purview creates a perception of moral behavioural code for environmental sensitivity. It provides a spiritual dimension to all environmental crises (Kaza, 1993). Eco-apologist perspective appeal to simple lifestyle of Buddhist monks and laity. They prohibit cutting of trees, non-consumption of meat of wild animals and contaminating water following the Vinaya rules. The practice of hygiene related to water has been discussed in the next segment of this chapter dealing with ethnobotanic practices. To strengthen this environmental value of forests and trees, the association of Buddha's major life events starting from birth, enlightenment, first sermon and *Maha Parinirvana* are associated with various indigenous trees. Furthermore, it was propagated by the historic Buddha that forest is one of the best places for monks to lead an ascetic life and practice the religion of Buddhism. That is why forest has been considered as one of the sacred (temporary) dwelling place for the wandering sect of Buddhist monks.

Apart from normative text based lifestyles, eco-apologists assign a unique ecological significance to the pivotal Buddhist doctrines such as *paticca samuppada* (interdependent co-arising), *anatta* (non-self), *sunnata* (emptiness) and *tathagatagarbha* (womb of suchness). These theories joins all the sentient and insentient beings to represent a holistic worldview of environmental sustenance. The same has been illustrated by Thai monk Buddhadasa Bhikkhu (1990) as follows,

"The entire cosmos is a cooperative. The sun, moon, and stars live together as a cooperative. The same is true for humans and animals, trees, and the earth. When we realize that the world is a mutual, interdependent, cooperative enterprise . . . then we can build a noble environment."

The 'ecological self' reaches to the doctrine of shared suffering or *dukkha*. As explained by Kaza in the book "Planting seeds of joy" as follows,

"To see a once-whole forest clear-cut to stumps, the soil eroding, the wildlife gone, is to experience the impact of environmental suffering."

b. Eco-Critics

Schmithausen (1997) describes in "Early Buddhist Tradition and Ecological Ethics",

"I for one find it hard to deny that the overwhelming majority of the canonical materials suggests that in early Buddhism it was just a matter of course to strive, in the first place, for one's own self-perfection and release.

I . . . [also] find it hard to determine to what extent . . . focusing on the positive goal of 'Nirvana in this life' actually involved an evaluation of nature substantially different from that of the strand focussing on the unsatisfactoriness of existence and the world where it takes place."

Eco-critics profess that there is a lack of any explicit propaganda on environmental ethics especially for nowadays ecological phenomena. The eco-apologist's perspective is judged as a distortion of normative literatures present in Buddhist monastic practices. The mis-readings of the concept of Buddha nature were pointed out in particular from early Indian Buddhism. They do not consider that considering the realm including "nature" as fundamentally unsatisfactory (a source of *dukkha*) and subject to change (*anicca*), do not provide the essential ground for environmental ethic. Moreover, the focus for liberation is more anthropocentric and not biocentric which means it gives more value to humankind than other animal world. The non-human environment only conforms to the positive context for the spiritual transcendence. Eco-apologists oppose to this narrow criticism citing that Buddha's preaching followed the middle path "majhima magga" with broader mind set.

Ian Harris's work on this matter proves to be seminal and resonates with Horiaki Hakamaya. His work rejects the ground of environmental ethics based on normative doctrinal texts of Buddhism. His work explains that attainment of spiritual goal is more privileged with humankind over animal kind and nature. The reason behind this is animals cannot embrace *dhamma* and Buddhist doctrines such as *Vinaya* and hence, they cannot take the life of monks.

The same stands for the world of fauna. Harris concludes that the normative perception of nature is viewed either as something needing improvement or encounter. The purposelessness of nature in Buddhist cosmology is rendered incompatible with an environmental ethic. The nature under this purview cannot account for any purposeful alteration since it perceives the realm as interdependent entities.

Harris categorises this attempts to find the principle of eco-Buddhism as an American initiative to find authentic Buddhist environmental response to contemporary environmental challenges. This response was generated during 1960s with American environmental movement and inter-faith dialogues. Harris represents the difference between doctrine and practice with the following statement,

"It is the impact of modernity and of globalization, in particular, that has tended to encourage traditional religions, such as Christianity and Buddhism, to move to a closer intellectual and emotional harmony the more they move away from the geographical locations that have given them their specific cultural and historical forms."

Harris states that supporters of Buddhist environmental ethic have shown indifference to the complex narrative of Buddhist religious purviews related to nature and environment. Nonetheless, he appreciates the perception of eco-apologists taking departure from the traditional Buddhist worldview of nature to adapt to the changes as per contexts.

c. Eco-Constructivists

Schmithausen (1997) mentions in "Buddhism and Nature" a critical position about eco-constructivists as follows,

"Stating the traditional Buddhist Attitudes of not injuring (ahimsa), be- nevolence (metta/maitri) and compassion (karuna) to entail an "ecological" behaviour is surely justified in so far as these attitudes are not limited to human beings as their object but include also other living beings, especially animals. Still, it should be clear that neither of these attitudes has, primarily, an "ecological" purport."

A critical perspective of strict adherence to normative literature rather than analytical scholarship is being adopted by eco-constructivists to form their environmental ethic. The direct mentions of ecological elements or features from Buddhist doctrinal texts were used as the basis. Schmithausen, being an eco-constructivist himself proposes that the environmental ethic is dependent on the positive values attributed to nature and biodiversity following the principle of traditional early Buddhism. The act of attainment of nirvana associated with early Indian Buddhism takes a passive role in this regard to impart ecological significance especially with *Mahayana* school of thought. Early Buddhism did not focus on values of nature and environment inherently. The principal aim was liberation of all constituents existed in nature rather than its preservation or restoration from deterioration. (Schmithausen, 1997). The liberating narrative of early Buddhism though indirectly could be interpreted for the person who has attained nirvana from the mundane life whose sympathetic and compassionate nature acts on behalf of other sentient life forms. These are emphasized in *Mahayana bodhisattva*

ideals which serves passively to environmental ethic. The same has been vividly connected with the idea of interdependent co-arising (*paticca samuppada*).

The Buddhist values such as non-killing, kindness, empathy and compassion have a root in environmental ethic. The principle of *ahimsa* (non-harming) is associated with the consciousness related to environmental ethic and karma. Emperor Asoka's fifth pillar edict has a mention to prohibit slaughter of animals opposing Brahminical rules but not as an attempt to conserve those species. This reduces the chance of killing individual animals.

Although early Buddhism imparted less value on nature and environment, they used to have the idea of environmental consequences. Both eco-critic and eco-constructivist point out that the focus on liberation in early Buddhism has reduced its focus on environmental understanding of the realm. However, a few particular texts are there rich in environmental values.

d. Eco-Ethicists

Sulak Sivaraksa (2005) mentions in "Conflict, Culture, Change: Engaged Buddhism in a Globalizing World" about eco-ethic is as follows,

"I encourage people worldwide, especially the ones who are . . . indoctrinated by capitalist triumphalism and consumerism, to look to the life of the Buddha—and to see him simultaneously as one who reached the pinnacle of liberation through his enlightenment, and also as a simple and humble monk. In fact, simplicity and humility enable the Buddha to achieve enlightenment."

The religious interests and considerations are often linked with ecological concerns with a moderated way (*majjhima patipata*) to promote environmentally viable lifestyle practices. A non-exploitative and non-consumptive lifestyle was promoted by E.F. Schumacher (1973) with the idea infused with 'Buddhist economics',

"The teaching of the Buddha. . . enjoins a reverent and nonviolent attitude not only to all sentient beings but also . . . to trees".

This has led Buddhist activists and environmentalists to criticise the consumerist approach that is associated with contemporary economic globalisation. It is a very unique idea to put the perspective of virtue theory imbibed in economic ethic with Buddhist environmental ethic.

A few critical studies in Theravada Buddhism have proposed an analogical link between Buddhist ethics and the 'awakened virtue' ethics of Western tradition. Whitehill (2000) finds the cultivation of awakened virtue at the heart of Buddhist environmental ethic. This is characterised with biocentric and ecological values. A study by David E. Cooper and Simon P. James, two British scholars at the University of Durham can be cited here. In their research, it was argued that in formulating Buddhist environmental ethic, preference is given more on Buddhist purview of of human values than the doctrinal teachings from Buddhist worldview from an ecological point of view. However, the most pressing issue to environmental ethic by religion could be seen as ecological relationship between man and nature – a symbiont

ecosystem where both can thrive with sustainable lifestyle of simplicity, moderation, optimisation of resource utilisation and non-acquisitiveness.

The equivocal consideration of intrinsic and instrumental values of environmental ethicists was challenged in the study of James and Cooper. The focus was put more on human centric actions while deciding the philosophical reflection of environmental ethic on anthropogenic activities. But by shifting this focus they introduced a greater issue of finding balance between deed and consequences. It was not clear whether the obligations and duties prescribed in Buddhism are to be followed or the focus should be laid on desired outcomes from the deed. Buddhist environmental ethic is governed by *"an account of the virtues and their implications for treatment of the natural world" rather than consideration of rights or utility"* (Ibid 108).

Eco-ethicists follow the same concept as eco-constructivists and eco-critics to reject the idea of considering man and nature are inseparable. Cooper and James form an environmental ethic from the virtue ethics of Buddhism.

e. Eco-Contextualists

Swearer's "Principle and Poetry" (1986) talks about eco-contextualism as described below,

"Suthep mountain's dome-like shape is like an immense replica of the ancient Sanchi style stupa, a gift to Lanna by the Powers of Creation. Stupas are reliquaries of saints. More than that, they are a structural representation of the very essence of Buddhism. Plant and animal life are like Nature's fres-coes, both beautifying and exemplifying the Law [dhamma]…Although sometimes not being able to explain why rationally, the people of northern Thailand want to preserve Suthep mountain as it was given to them by Creation, as untouched as possible."

Eco-contextualists response comes from the endangerment of any natural site perceived as sacred, especially associated with Buddhist cultural landscape. Any commercial pressure due to expanse of tourism on a sacred site is opposed by the eco-contextualists. The religio-cultural narrative of natural site builds a deep veneration and philosophical connect amongst the followers. Countering any degrading activities for the natural and sacred site forms the strong environmental ethic by eco-contextualists. The various narratives of myth and history, past and present and man and nature get connected at a personal and cultural level (Swearer, 2001).

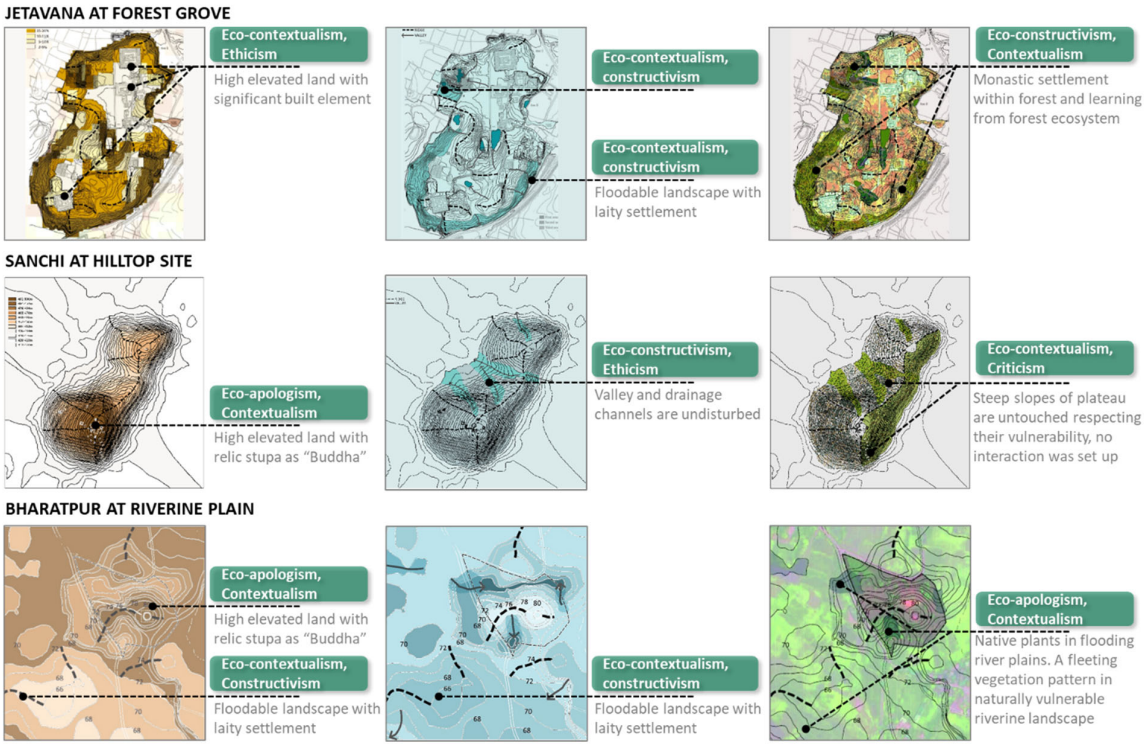


Figure 7-1: Environmental ethic interpretation on the study sites (source: author)

7.3. Plant association and ethnobotanic contribution

7.3.1. Forests directly associated with historic Buddha

Understanding of environment and cultural ecology is integral to Buddhist monasticism. The concept that is imbibed in this is that environment is contained with natural phenomena and humans residing in it with friendly association. Plants are a significant part for conforming Buddhist environmental philosophy. Traces of environmental protection can be found in Buddhist scriptures such as Tripitakas, Jataka stories. There are mentioning of trees and forests directly associated with the life of historic Buddha in Buddhist literatures (Fig. 7-2).

Nature was considered as the sustaining source and pre-requisite for life by ancient sages. It was an ancient belief system that planting trees is an act of nobility and religious merit associated with abundance and blessings. The same has been adopted in Buddhist environmental ethics.

The Buddhist period is considered one of the landmark era for tree plantation and forest conservation. Buddhist literatures and art works are replete with mentioning and use of various tree species and natural forms inspired from plants. The practice of making and maintaining gardens around *aramas* (monastic premises) also served the ethnobotanic and healing purposes both for laity and monks of the *sangha*. There are a lot of trees and forests associated with the historic Buddha also, which finds their mentions in Tripitakas, Attakathas and Jataka stories. According to these legends there were references of natural forests, man-made groves, deer parks and sub-forests. The historic Buddha used to spend his night in one of such naturalized

places such as *amravana* (mango groves), *Amalakavanat* (emblica myrobalan) or *Arandyavana* (natural forest). There are many sculptures and paintings depicting historic Buddha's life episodes of birth, enlightenment, sermons and *Mahaparinirvana* occurred and associated with trees: Asoka (Saraca asoka), Ashwattha (Ficus religiosa), Banyan or Bar (Ficus benghalensis), Sala (Shorea robusta) respectively.

The *Pali Tripitakas* and *Attakathas* mention the popular forest of middle land (*majjhima desa*). They are Anandhavana of Sravasti, Anjana vana and Kantaki vana of Saketa, Ketakivana of Nalakapan, Maha vanas of Kapilvastu and Vaisali, Lumbiniv ma of Sakya, Sa.Ivana of Mallas of Kusinagar, Veshakalavana of Vajja, Parilekyavana of Chedi, Ambatakavana of Kasi, Sisapavana of Alabiand Kausambi, Veluvana of Rajgriha and Kimbila, Pipphalivana of Moriya, Nagavana of Vajjiya etc.

Some of the forest are directly associated with Lord Buddha they are:

a. **Jetavana:** Jetavana was the-forest belonged to prince Jeta of Sravasti. Accordi'ng·to Mahapadana sutra Anatha pindika a merchant, purchased that forest and built three·monasteries (Kareri kuti, Kosamba 'kuti and Gandha·kuti). One Salalaar kuti was constructed by king Prasenjit and these monasteries were presented·to Lord Buddha and community of monks. Lord Buddha preached' Laks):lena-sutra and seventy Sutras·of Majjima nikaya in this forest. According to Anguttara nikaya and Buddhavamsa Lord Buddha spent his twenty one of forty-five rainy seasons (Varsabash) in this forest (at Gandakuti).

b. **Nyagrodhvana:** Accord ng to Attakatha (Manoratha Purani) of Angutt ra nikaya and Buddhavamsa Attakatha (Madhurattha vilasini) mentioned that Lord Buddha spent his fifteenth rainy season at Nyagrodhvana of Kapilvastu. This is the place where Lord Buddha met his father Suddhodana for the first time after the: enlightenment. Here, Lord Buddha preached five strutras of Majjima nikaya. This vana is visited by the Chinese traveller Yuan-Chwang in seventh century A.O. and mentioned in his travel account.

c. **Mahavana**: There were four Mahavanas
    i. Mahavana of Uruvela: This place was within the Malla kingdom and Lord Buddha visited here many times. According to the Anguttara hikaya Lord Buddha told to Ananda about this forest and Lord Buddha spent five years following five Brahmin's preaching before enlightenment.
    ii. Mahavana of Kapilavastu: Various Buddhist sutras have mention about this vana. Attakatha of Vinaya-pitaka is very important for the geographical history of Buddha period. This history specially for the Mahavana of Kapilvastu gives the detail description. This vana extended from Himalaya to Vaisa thus this was called Mahavana of Kapilavastu.
    iii. Lumbini Vana: According to Pali literatures Lumbini vana was lying in between the Kapilavastu kingdom to the west and Devadaha kingdom to the east. Divyavadana gives the detail description of this forest and mentions that Lord Buddha was born in this forest under an Asoka tree. Both the Chinese travellers Fa-hsien and Yuan-

Chwang in fifth and seventh centuries A.D. visited this place and named it La-Fa-ni Grove of Vaisali, Urubela and Kapilvastu as mentioned in the Buddhist literatures.

iv. Mahavana of Vaisali: Mahali s tta mentions that Lord Buddha was in the Kutirasala of Mahavana at Vaisali and spent forty sixth rainy season in this place.

d. **Venuvana**: Venuvana of Kajangala: Anguttara nikaya states that Lord Buddha spent many time in this forest. Pali Tripitakas mention.that Venuvana of Kajangala was the eastern boundary of central kingdom.
Venµvan 0f Rajgriha: ln this forest Lord Buddha preached various sutras of Majjima-nikaya: According to sutta nipata and Samangala viJasini, King Bimbisara met Lord Buddha at Rajgriha and presented Venuvar1a. (Bamboo grove).
Vinaya pitaka further tells that there were other forests too, they were Jivakarma vana, Latthivana etc. Lord Buddha spent the second, third 'and fourth rainy seasons at this Venuvana. The Chinese traveller-Xuan-xang had seen a big cave in Venuvana where Mahakasyapa used to live along with his five hundred monks.

e. **Amravana:** According to· Papanchasudini Amravana near Rajgriha was presented to Lord Buddha by o*I*ne medicaht Jivaka. This place was so peaceful and tranquil that ven. Rahula (son of Siddhartha Gautama) spent most of his life in this forest.

f. **Ambapali vana:** Various Buddhist literatures have described about this vana which was 'situated towards south of Vaisali. Lord Buddha before travelling to Kushinagar for his Mahitparinirvana he spent last year· of his life in this vana. Before he travelled to Kusinagara, Lord Buddha accepted the food offered by Amrapali 'the owner of this vana and she presented this vana to Lord Buddha and monk community. Both the Chinese travellers visited this place and Xuan-xang even mentions in his account that he saw that particular place from where Lord Buddha had observed Vaisali for the last time.

7.3.2. Plants directly associated with historic Buddha

a. Birth Tree: So far, the birth tree is concerned there are five different species (may be more) of trees mentioned in various Buddhist texts, travellers account and early sculptural panels.

i. Asoka tree: Asokavandana, the traveller account of Emperor Asoka mentions that Upagupta the spiritual teacher, pointed to· the emperor, the actual Asoka tree under which Lord Buddha was born. Fa-Hsien saw this Asoka tree still' alive when he· came to Lumbini at fifth century AD. Xuan-xang saw this asoka tree in its place, but dead. According to· the Sutta Vinaya and other authorities, it was an asoka tree. Vinayavasta mentioned that when Mayadevi went to Lumbmi garden, she gave birth by holding the branch of the tree Tathagata. Some modem literatures also support the asokan tree as the birth tree. 'The Teaching of Buddha' by B.D. Kyokai states that.; All about here were Ashoka blossoms had delight she reached out her

right is to pluck a branch and as she did so a prince was born'. 'Flowring Trees and shrubs in India' by D.V. Cowel also supports the asoka tree is the birth tree.

ii. The sculptural Panel from Nagarjunakonda, now is in the National Museum, New Delhi. On the dexter of the relief, of the third century

iii. A.O. is the bent figures of Maya, grasping the bough of a (asoka) tree, with two at ndants.

iv. The birth of Buddha and seven steps, Nalanda, now in Indian Museum, Calcutta, As shown here, the birth is attended not only by Indra and Brahma but also by Vishnu. Here to Maya holding a branch of a (asoka) tree indicated by its leaves.

v. A panel from Goli (Andra pradesh) depicted Veswantara Jataka where Veswantara is seen driving a bullock- cart; his wife and two children are within the wagon. In this panel an asoka tree is clearly seen by its leaves. The panel is now in the Government Museum, Madras.

vi. The birth of Sakyamuni, stone plaque: From Gandhara, is now in Victoria and Albert Museum, London. This plaque illustrates the birth of the infant Sakyamuni from right side of his mother and also shows the child on the ground. Here Maya is holding a branch of a tree (Asoka). Birth of Siddhartha, from Mous C, Sahri Bahiol, Pakistan, now in Peshawar Museum, Pesawar, Pakistan. This plaque represents the birth of Siddhartha when Maya grasping a branch of a tree.

b. Pipal Tree: Lalitavistara and some other Buddhist literatures make the tree to have been a pipal tree. All the Buddhist literatures and sculptural panels agreed that Lord Buddha was enlightened under a pipal tree. Some Sculptural panels which show Lord Buddha seating under this tree. They are:

i. Enlightenment represented by a pipal tree sanctuary, Relief on the Prasenajit Pillar of the stupa; from Bharhut, Madhya Pradesh, India; 2nd cent. B.C. Here pipal tree with its characteristic pointed leaves and rich decoration of parasols and garlands and the throne symbolically represent the Buddha.

ii. The first meal after Buddha's Enlightenment. Stone slab from the dome of a stupa; from Nagarjunakonda. Andra Pradesh, India, 3rd-4th cent. A.O. now Nagarjunakonda Archaeological Museum. Here, Buddha is shown seating infront of a pipal tree and receives the four alms bowls that the four Great Kings who guard the points of the compass have brought.

iii. Mara's Attack: On the wall of Cave 26 at Ajanta. On the dexter of the relief, Mara is mounted on his elephant, with his demonic hosts threatening Gautama with various missiles and weapons in order to dislodge him from his seat under a pipal tree.

iv. Miracle of Vaisali, on the northern gateway of stupa 1 at Sanchi: the relief, of the first century B.C. depicts monkey approaching Buddha (represented by a seat below a pipal tree) with a begging-bowl which has been filled up with honey.

v. Temptation and Assault of Mara on a Slab from Ghantasala, Andra Pradesh, Now in the Mussee Guimet, Paris. This Limestone Slab formed part of the stone vaneer of the main stupa. It depicts Mara's assult and retreat and Mara's daughters tempting Buddha but in vain. The later's presence indicated symbolically by a throne below the pipal tree.

vi. Devotion to the Pipal tree and Vajrasana at Bodha Gaya, from Amaravati, Andra Pradesh India, 1st cent. B.C. This scene represents the sacred place of Bodh Gaya, the sacred pipal tree under which the Buddha sat to achieve his enlightenment and his seat vajrasana.

vii. Sakyamuhi's Victory over Mara, from Bactro-Gandhara region, Pakistan, now in Freer Gallery of Art, Smithsonian Institute Washington D.C. Here the pipal tree above Buddha's head and his Bhumisparsa mudra (earth touching posture) are key elements.

c. Sala Tree: There are some high authorities like Hardy and Bigandet, D. Mitra, S.L. Huntigton identified the tree as the Sala tree under which Lord Buddha was born.

i. Their main observation is on the basis of sculptural panal, but if these panels are observed keenly their leaves are more similar to the Asoka than Sala. Nevertheless, most of the Buddhist literatures mention that Lord Buddha passed away (enter into Mahaparinirvana) under the Sala tree. There are some sculptural panels which shows that Lord Buddha passed away in between two Sala Trees.

ii. Great disease: from the Gandhara region, now in the Indian Museum, Calcutta. In this panel Buddha is seen lying on his right side with one leg resting over the other on a couch spread between two sala trees (only one tree exists on the slab; the other was presumably carved on another slab which depicted the continuation of the scene).

iii. The final Nirvana of the Buddha, from Kapisa, Afghanistan, Gandhara art, now in Kabul Museum, depicts the figure of the Enlightened One lying on his right side, his head resting on the palm of his hand and his left arm stretched out and there are the figures of two Sala trees.

iv. Mahaparinirvana, cave 26, Ajanta. This sculpture panel depicts that Buddha is lying on a couch between two Sala trees with his eyes closed and head resting on the pillow. Monks and nuns surround him morning. Indra and other gods are seen descending from sky to welcome the Great Being to heaven.

v. The final Nirvana and cult of the stupa, from Ea'st' fodia (exact provenance unknown); now in British Museuin. In this panel Buddha is lying in between two Sala trees and above him is the stupa which indicates that the stupa making tradition was started among the Buddhist after master's nirvana.

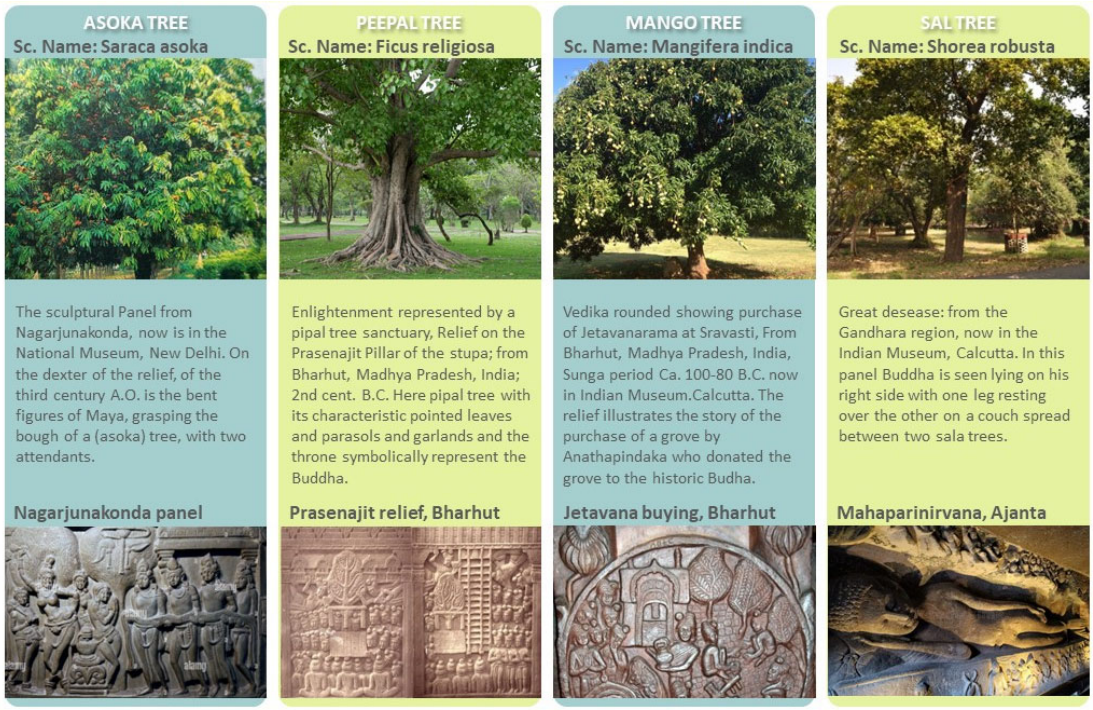


Figure 7-2: Trees associated with historic Buddha and their mention in Buddhist art works (Source: Author)

Some of the literatures and sculptural panel dipictions indicate that Lord Buddha was born 1J:11der a mango tree. This tree was.variously associated with lord Buddha in his life time. Amprapali a dweller of Rajgriha presented her Amravana (mango grove) to the lord Buddha during Buddha's visit to Vaisali. One Chinese translation merely has "Lim-pi (Lumbi-Mango trees " and under one of them the Buddha is born.

The birth of Sakya muni: Relief sculpture; from the Sundhara Fountain, Deo Patan, Nepal, early Licchavi period, now National Museum, Kathmandu, this relief shows Sakyamuni immediately after his miraculous birth from the right side of his mother, Queen Maya. She is holding the branch of mango tree and shows the panel where leaves and mango fruits are clearly identified.

Vedika rounded showing purchase of Jetavanarama at Sravasti, From Bharhut, Madhya Pradesh, India, Sunga period Ca 100-80 B.C. now in Indian Museum.Calcutta. The relief illustrates the story of the purchase of a grove by·Anathapindika, who wanted to donate it to Sakyamuni Buddha and the Ifoddhist community. This event is depicted in the right half of the composition by the workers who are covering the ground with pieces of gold in order to meet the outrageous piece requested by Prince Jeta, owner of the grove. The grove is represented with five trees and one of them as the mango tree and mango fruits are clearly identified.

Vedika roundel showing Mahakapi Jataka, from Bharhut, Madhya Pradesh India, Sunga period now in the Indian Museum, Calcutta. This panel demonstrates the performance of good works toward one's relatives. Since the story concerns an animal incarnation, there is-no reason to expect an anthropomorphic depiction of the Buddha. Once when he was king of eighty thousand monkeys, the monkey ·Bodhisattva stretched his body from one tree to another across

a river so that the other monkeys could use it as a bridge and escape attack from a human king and in his entourage who had come to find a famous m_ango tree that bore extraordinarily luscious fruit. The last monkey, who was the incarnation of the Buddha's evil co11 in Devadatta, stomped on the bodhisattva's back and broke it. Impressed by the generosity of the monkey king's sacrifice, the human care for him and the monkey king then taught the human king the virtue and marring of his own actions.

There are some Buddhist Sutras in which they mention that Lord Buddha was born under a Plaksha tree, locally known as Pakada of Kabhro (waved-leaf fig tree ficus Infectoria), but sculptural panels are not available showing this tree.

The Abhiniskramana-Sutra describes that "When the time come for the perfect Buddha, the Blessed One, to be born in Lumbini Garden, his mother stretched up and held the branch of a tree with her hands. What kind of a tree was it? It was a palaksha tree.

It also says in the Buddhavamsaka-sutra: "O son of a good _family, when the mother Mahamayadevi arrived at the site of the plaksha tree, the bodies as well as all the messes of offerings of all those who were intent upon presenting offerings to the great Bodhisattva. In the Aryaupaya Kausalya rnahayana- it is stated: "Question:_Why was the Bodhisattva born while his mother was standing upright and turned, holding the limb.c:>f a palaksha tree ?" Reply: He was born easily in order to remove the kind of doubt that would think. We find various species of trees mention in Buddhist literatures and sculptural representation which had direct or indirect association with the Lord Buddha. They are:

Bar or Banyan tree: From the ancient time this tree has continued to be an object of worship with religious and sacred values. Thus, bar tree has been worshipped by both the Hindus and Buddhist. Buddhist literatures describe that the lord Buddha spent his fifteen rainy season at Kapilavastu in Nigrodharam (monastery constructed in the bar forest). There are some sculptural representation which depicts the bar tree along with the lord Buddha and sometime bar tree alone.

The Cutting of the Hair. Borobudur. Java, 8th century A.O. In this panel Bodhisattva is shown in the middle and cutting of his hair with a sword. Behind him are chandaka and horse. There are two bar trees to the right and left side of the Bodhisattva.

Buddha's journey to Banaras, Borobudur, Java, This represents the Buddhas meeting with an Ajivika monk to whom he declared that he was going to Banaras for setting in motion the wheel of his perfect Dharma. Buddha is seen here with his right hand raised. The Ajivika with his companions is seen to the left. This panel has six different species of trees and to the right side, (lower one) is the bar tree.

King Suddhodana Paying Homage to Buddha at Kapilvastu. North gate, Stupa 1, Sanchi, 1st century B.C. Here, King Suddhodana is shown with his hands joined in adoration near a banyan (Bar) tree. A throne symbolizes the presence of Buddha. An attendant holds an umbrella over the head of the king.

Banyan or Bar tree capital. from Vidisa (Besnagar) Madhya Pradesh, India, Sunga period, Ca. 100 B.C. now in the Indian Museum, Calcutta. Evidence of a stone pillar having been erected

at Vidisa is found in a pillar capital carved in the form of a banyan tree, easily recognized by the shape of the leaves and roots, which have been set down by the limb.

Nagaraja Muchilinda at the foot of Buddha's seat. On the western gateway of stupa at Sanchi, Buddha spent six weeks after Enlightenment in the company of the serpent king Muchilinda who shielded him during a rain-shower by his coils and hoods. In this relief (1st century B.C.) however Muchilinda with a five headed hood is seen seated below the seat of Buddha under a banyan tree, over which is an umbrella. The full retinue of the king consists of his two queens, attendants and a troupe of a dancer and five musicians, all single hooded nagis.

Jamun or Black berry (Syzygium cumini) This tree is very common in Nepal and India. It is a large evergreen shady tree with smooth grey bark. There are several references regarding the association of this tree with the lord Buddha. The Buddhist people consider the Jamun as a sacred tree. There are some sculptural panels which shows the Jamuna tree associated with the Lord Buddha.

First meditation of Siddhartha (Sakyamuni Buddha) from Mound c, Sahri-Bahlol, Pakistan, Kusana period, now in peshawar Museum, Peshawar. This sculpture shows one of the important event of the Bodhisattva's life. While a young man living at his father's palace, he was brought to sit under a Jamun Gambu) tree, where he was to witness a ploughing contest as representative for the king. While sitting he practiced yogic breathing and attained his first trance. When his attendants returned sometime later, they noticed that the shadows of the other trees nearby had moved, but that of the Jamun tree had remained stationary over the meditating prince. In this representation, this specific meditation is L11dicated by the jamun tree above the head of Bodhisattva and the ploughing scene at the lower right.

The Ploughing Festival and the First Meditation. Ananda Temple, Pagan, Myanmar 11th century A.O. This sculpture shows Siddhartha as lying on his head under the Jamun Syzgygium cumini with eight nurses attending on him.

The Ploughing Festival and the First Meditation, Ananda Temple, Pagan, Myanmar, 11th century A.O. Siddhartha is shown here in meditation under the jamun tree, while his father, King Suddhodana and his foster- mother, Mahaprajapati kneel in adoration. Eight nurses are attending on him.

Tada Tree: In order to attract the mind of the Bodhisattva to worldly life, king Suddhodana got him married to a girl called Gopa or Yasodhara. At this time, he was sixteen years of age. The Lalita vistara tells us that when Suddhodana wanted to perform the marriage of his son, five hundred Sakyas offered their daughters. The choice of Siddhartha, how-ever, fell on Gopa, the daughter of Odantapani or Suprabuddha who refused to comply until Siddhartha proved his skill in archery and other arts. Although the Bodhisattva was not interested in such feats, he accepted the challenge. The competitors were all defeated in the contest, as the arrow of the Bodhisattva hit not only farther than theirs but crossed the seven Tada trees, pierced the ground and vanished completely. The present sculpture: The Archery contest, Borobudur Java, 8th century A.O. shows the Bodhisattva holding a strong bow with the arrow released. Other competitors including Devadatta and Ananda are also shown. To the left are the seven Tada trees, which were used as targets.

Unidentified trees: Many sculptural panels depots the various flower and fruit trees which are very difficult to be identified. For example: the conversion of the Kasyapas, East gateway, stupa 1, Sanchi, 1st century B.C.

Buddha had to perform a series of other miracles before he could fully convince the Kasyapas of his superiority and convert them. Once a heavy rain fell out of season and there was a flood in all the land. The Kasyapas thought that Buddha had been carried away by the water and hastened in a boat to rescue him.

In this pant shows the elder Kasyapa and one of his disciples, hastening in a boat ovH the river Neranjana in flood, presil.mably to the rescue of the Master. In the lower part of the picture, Bl..ddha (represented by his promenade) is shown waling on the surface of the water. In the foreground, the figures of Kasyapa and his disciple are twice repeated, on dry ground, and doing homage to the Mast r (represented by the throne at the right hand bottom corner of the panel) There are six trees, thrE::e in each side and right side of the middle one is the mango and other five trees are difficult to identify.

Miracle of Vaisali, on the northern gateway, stupa 1, Sanchi. The relief of the first century B.C. depicts a monkey approaching Buddha (represented by a seat below a pipal tree) with a begging-bowl which has been filled up with honey. There is a second monkey behind. Two men, four women and a child possibly represent the crowd which witnessed this miraculous spectacle. In this panel there are three trees one of course a pipal and right one is locally called Salifa middle flower tree is unidentified.

The Bodhisattva receiving a leaf of grass from Svastika, Borobudur Java 8th century AD.

Here the Bodhisattva (Who stands on a lotus cushion on the road) is seen receiving the present. There are rows of nine trees which are difficult to identify.

There are many names of the trees mentioned in Buddhist literatures like Tripitaka, Jatakas, Attakathas, Nikayas sutras etc. These trees have directly or indirectly association with the Lord Buddha. These trees have to be identified with the shape of the leaves, fruits, flowers depicted in the sculptural panels. These trees are:

1. Kadam (Anthocephalus Cadamba)
2. Sirisa or Parrot tree or East Indian walnut (Albizia labbek)
3. Harro or Black Myrobalam (Terminalia chebula)
4. Barro (Terminalia balerica)
5. Amala or Emblica Myrobalan (Phyllanthus emblica)
6. Bel or wood Apple (Aegle marmelos)
7. Palash or Bastard Teak (Butea monsperma)
8. Kera or Banana or Plantain (Musa paradisiaca)
9. Neem or Margosa tree (Azadirachta indica)

10. Srikhanda or chandan or Sandalwood (Santalum album)
11. Dumri or Gular (Ficus glomerata)
12. Chyuri or Butter fruit (Bassia buty racea)
13. Sal or Silk cotton tree (Bombax malabaricum)
14. Koiralo or Kachnar (Bahunia variegata)
15. Kabhro or Plaksha (Ficus lacor)
16. Ukhu or Sugarcane (Saccharum officinarum)
17. Rukha Katahar or Jack fruit (Artocarpus integrifolia)
18. Amaltash or Rajvriksha or Indian Laburnum (Cassia fistula)
19. Saj (Terminalia alata) etc.

The Jatakas also mention various names of the cereals which were grown in Buddha's time (even today). They are: (1) Pady Plant of Ohan or rice (Oryza sativa), (2) Vajara (Pennisetum typhoides), (3) Chana or gram (Cicer arietinum), (4) Mung or mungi or golden gram (Phaseolus aureus), (5)' Til or seasam'e (Seasmum indicum), (6) Sarasau (Bt'assica

,compestris), (7) Khursani or chilly (capsicum annum), (8) Jira (Cuminum cyminum}; :(9) Pan or, betel (Piper betle), (10) Supari or arecanut or betel n,ut palm (Areca-catechu, . (11) Ukhu or sugarcane (Saccharum officinarum) Kapasa or cotton (Gossypium arboreum) etc.

There are few names of the vegetables which are mentioned in Jatakas. They are: Pyaza or Onion (Allium cepa), Lasim or garlic (Allium sativam) Lauka or gourd (cucurbita pepo) etc.

7.3.3. Plants used in Buddhist literatures and art works

a. **Albizzia lebbeck (Sirisa)**: It was venerated as Bodhi tree in many places and finds its place in Buddhist art works. It has bi-pinnate leaves and grey outer bark. The flowers are yellow green with mild fragrance which blooms from April to July.

Figure 7-3 depicts an episode when the Naga King *Erapatra* decided to renounce his rulership and travelled to meet with the historic Buddha at the deer park in Sarnath. In this sculpture it can be seen that the Naga king is worshipping the *Bodhi* tree symbolising the historic Buddha. But here the Bodhi tree planted on a platform is Siris tree (and not Peepal tree), the *Bodhi* tree of *Krakuchchanda*. The panel reads as '*Erapatra, Naga Raja Bhagavato vandate*' Erapatra Naga King worships the *Bodhi* tree (of Buddha). The inflorescence of the tree sculpted here resembles that of Albizzia than Ficus religiosa. A large number of trees apart from Peepal were worshipped as *Bodhi* tree encircled with railing (*Vedika*) and an umbrella placed at side as symbol of royal patronage. The pinnate leaves are clear indicative of being it Siris and considered as sacred tree.

Figure 7-3: Albizzia lebbeck: legend: worship of Bodhi tree, location: Bharhut, 2nd c. BCE, Madhyapradesh (source: Indian Museum, Kolkata)

b. **Alocasia indica (Giant Taro)**: Giant Taro plant contains an underground rhizome with a swollen edible stem and large dark green leaves which is native to West Bengal and Assam as cultivated crop and sometimes considered as ornamental plant.

In the figure 7-4, it is a giant Taro plant at lower panel. But there is no mention found of its sacred value. So, the use is purely decorative here. The upper panel consists of a *Yaksha* holding floral wreath resembling giant alocasia leaves.

Figure 7-4: Alocasia species; legend: a scene from Romataka Jataka, (source: Mathura Museum)

c. **Alstonia scholaris (Saptaparni)**: Alstonia is a medium to large sized tree which is native to Africa. It has green colour leaves in rosetted format. The number of leaves varies from 5-9 though seven is the common number giving the name of the tree (with seven leaves). The pods hang down in clusters.

In the figure 7-4, Alstonia is seen to be sculpted with Vedika. This tree is extensively sculpted on Sanchi stupas showcasing the native flora and plant diversity of the surrounding forest. Garlands hanging from tree branches are often depicted as an expression of veneration. The tree in the figure below is being worshipped as *Caitya Vriksha.* Many *Jataka* story panels have *Saptaparni* tree.

d. **Anthocephalus cadamba (Kadamba)**: Kadam or Kadamba is a large deciduous tree with greenish yellow simple leaves and yellow-coloured flowers drooping from the branches. It is native to India and profusely spread in wilderness and naturalised areas in central and north India.

Figure 7-5: Alstonia scholaris; legend Caitya vriksha; Source: Auwa (Pali, Rajasthan)

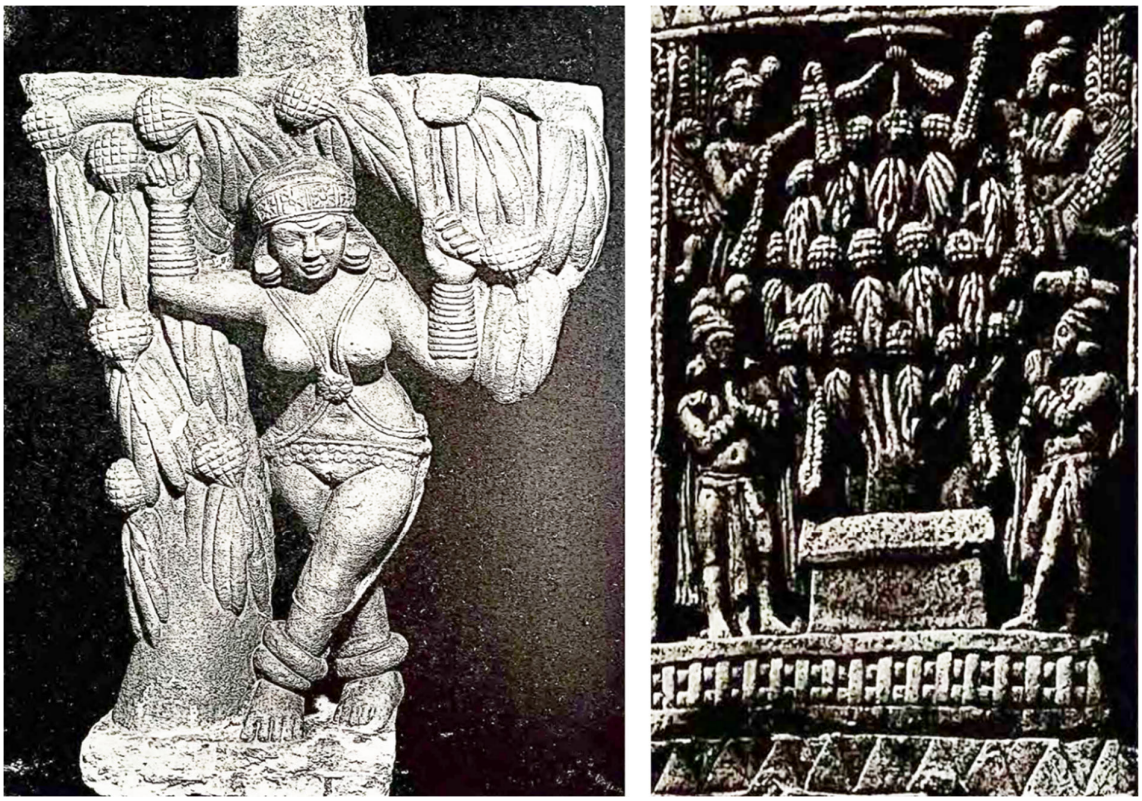


Figure 7-6: Anhocephalus cadamba, legend: vrikshaka, A woman standing cross legged holding the branch of Kadamba tree and worship of the tree with garlands (source: Sanchi Monument, Madhya Pradesh)

One interesting observation is that though it has been vividly used in sculpture and artworks of Sanchi and Bharhut stupa (Figure 88), there hardly any trace of Kadamba tree in the vicinity of those monuments.

This tree is often seen in association with *Vrikshaka*, a woman standing underneath the tree, a common scene in Buddhist art. The large leaves sculpted to perfection in this motif with bulbous flowers is a sure shot proof of Kadamba tree. From the panels of Sanchi it could be observed that Kadamba trees were worshipped then with offerings of garlands from laity as well as monks.

e. **Artocarpus heterophyllus (Kathal)**: Kathal is a large evergreen tree native to India. It is known for its unique elliptical shaped large fruits. The leaves are dark green and medium to small size.

The best depiction of Kathal can be spotted at Bharhut stupa as *Kalpavalli* or wish fulfilling creeper (Fig. 7-7).

Figure 7-7: Artocarpus heterophyllus, legend: Jataka stories, six deer revering the tree bearing large fruits (source: Bharhut stupa, Madhya Pradesh)

f. **Bambusa species (Bamboo)**: Bamboos are basically large grasses which reaches height more than 30ms avg. This plant grow in abundance in any part of India. Sanchi monument finds its use in the artworks.

The historic Buddha was fond of the Bamboo groves. The mention could be found in many Buddhist texts of *Venuvana*, the bamboo grove at Rajgir (Figure 90). Buddha is being

worshipped symbolically with an empty seat adorned by clumps of bamboo plants on either side of the seat.

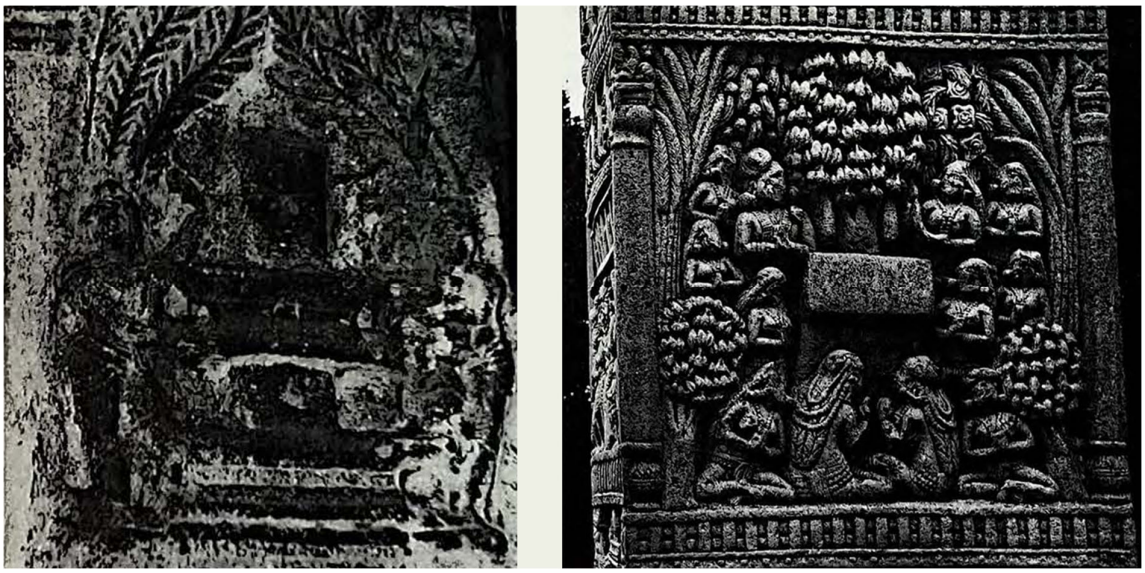


Figure 7-8: Bambusa species, legend: Venuvana (source: Sanchi monument, Madhya Pradesh)

g. **Bauhinia variegate (Kachnar)**: Bauhinia is a medium sized deciduous tree which flowers in late winter through spring. The leaves are bi-lobed with characteristic shape. The tree is of great medicinal value and probably for that reason it was of significance in Buddhist ethnobotanic practices.

This tree was considered as *Bodhi* tree in many places. As there is a railing or *Vedika* surrounding it bears the proof for it. The scene was recreated in the motif as tree worship with offering of flowers as can be seen in Bharhut stupa (Fig. 7-8 and 7-9).

h. **Bombax ceiba (Simul)**: Bombax ceiba is a large deciduous flowering tree. This is a winter flowering tree with bright red colour. The fruits contain floss and the tree trunk is covered with prickles. This tree grows in wild forests of northern India and central dry forest regions.

Figure 7-10 depicts the legend from Buddhist texts that Hariti, a cannibal woman in Rajgir who used to feed on children in the city. Upon receiving grievances from citizen, the historic Buddha counselled with her by hiding one of her children. Hariti realised her sin and became disciple of the Buddha. On the other panel, Mayadevi, mother of Gautama Buddha is depicted holding a branch of Simul tree. As there was no clear mentioning of under which tree Buddha was born in Gandhara, the artisans have used their creative imagination and sculpted this five petalled flower which resembles Simul tree.

Figure 7-9: Bauhinia variegate, legend: Venuvana worship of Bodhi tree (source: Bharhut stupa, Madhya Pradesh)

Figure 7-10: Bombax ceiba, legend: Hariti and Panchika; and Mayadevi holding a branch of the tree (source: Chandigarh Museum and Gandhara)

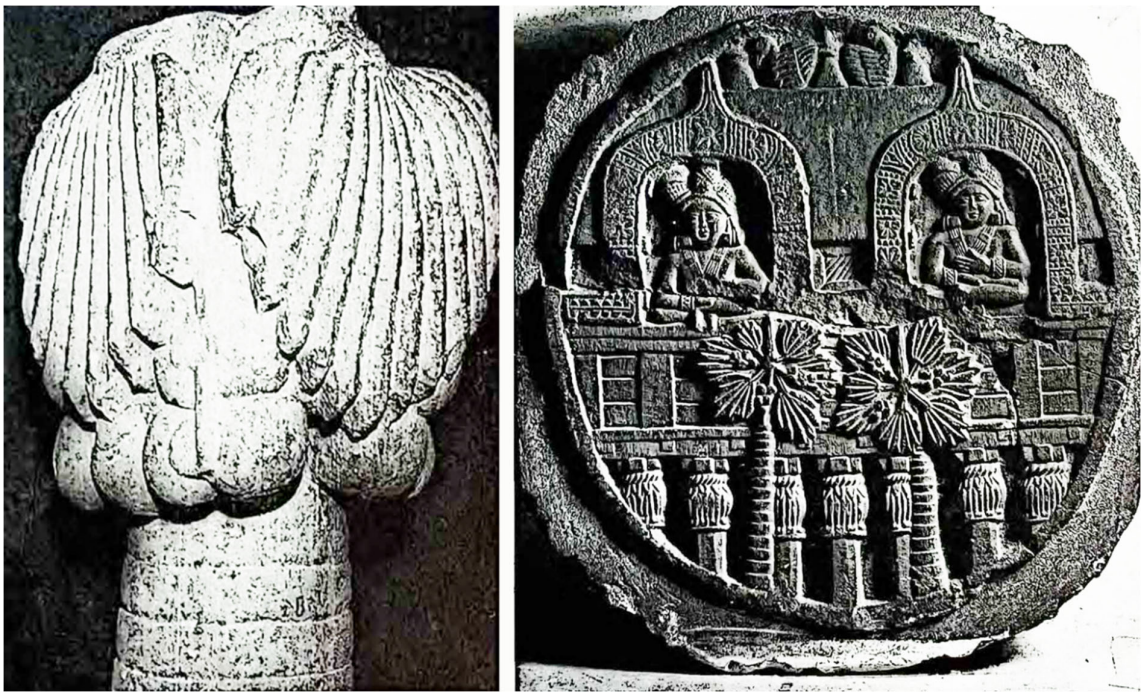


Figure 7-11: Borassus flabellifer, legend: two men looking out of the window, lower panel sculpted with two Tala trees (source: Bharhut stupa, Madhya Pradesh)

i. **Palmyra Palm (Taal)**: Asian Palmyra palm is a tall unbranched tree. The leaves are distinctly fan shaped which forms a crown atop the tree. It bears round shaped fruits with fibrous content inside. It grows abundantly in eastern and southern India in naturalized spaces and near waterbodies. Taal is showcased in sculpture and artworks of Sanchi and Bharhut in Madhya Pradesh as *Taladhwaja.*

Figure 7-11 depicts a *Taladhwaja* sculpture, capital of a stone column stylized with palmyra leaves which was discovered at Pawaya near the Buddhist era town Besnagar-Vidisha. In parallel to that, a natural scene was depicted in Bharhut stupa, two Taal trees growing side by side in front of a building and two people are looking out of the window.

j. **Cocos nucifera (Coconut)**: Coconut palm is native to India and can be seen growing naturally in eastern and southern India. But surprisingly this tree is depicted in many sculptures in Sanchi stupa.

Figure 7-12 depicts a *Purna Kumbha* with coconut which later was replaced by lotus in Amravati stupa, Andhra Pradesh.

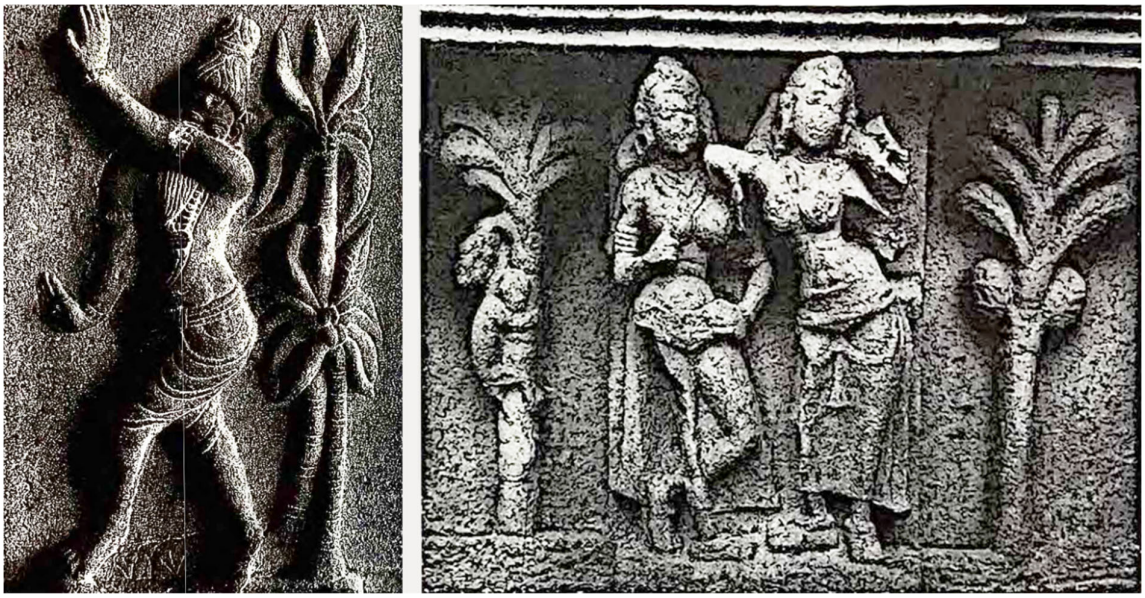


Figure 7-12: Cocos nucifera (source: Bharhut stupa, Madhya Pradesh)

Figure 7-13: Euphorbia and other plants, legend: Miracle of Sravashti, (source: Sanchi stupa, Madhya Pradesh)

k. **Euphorbia plants**: Euphorbia plant is rarely depicted in Buddhist temples except Sanchi. This tree grows on fallow lands especially in the sub-Himalayan region and in arid zones.

Figure 7-13 depicts the scene of Miracle at Sravasti. Buddha walked on flooding river on his way to deliver sermon with his three disciples or kashyapas. In the motif the historic Buddha is symbolically depicted with six petalled lotus floating on water. Along with Euphorbia tree Mango, Kadamba, Nagakesara trees were depicted on the panel.

Figure 7-14: Fern leaves; legend: decorative slab (source: Sanchi stupa, Madhya Pradesh, Lucknow Museum)

l. **Fern leaves**: Ferns are understorey plants which grows in moist areas belonging to Pteridophyta group.

Figure 7-14 depicts a decorative panel with Fern leaves in Sanchi stupa. The upper panel shows the fern leaves whereas the lower panel contains lotus leaves.

m. **Ficus benghalensis (Banyan)**: Banyan tree is native to India which was referred as *Nyagrodha* tree from the ancient time. This tree is considered sacred due to long association with deities. The tree is characterised by its prop roots spurring out from its branches.

Figure 7-15 depicts a Banyan tree as Bodhi tree at Sanchi with oval shaped leaves and prop roots. It is worshipped by Elephants with the offering of garlands. Another panel shows the Banyan tree is worshipped by a king and queen in the episode of Kapilavastu. The legend describes the historic Buddha sat under Banyan tree for seven days after his enlightenment received under Peepal tree (the original Bodhi tree).

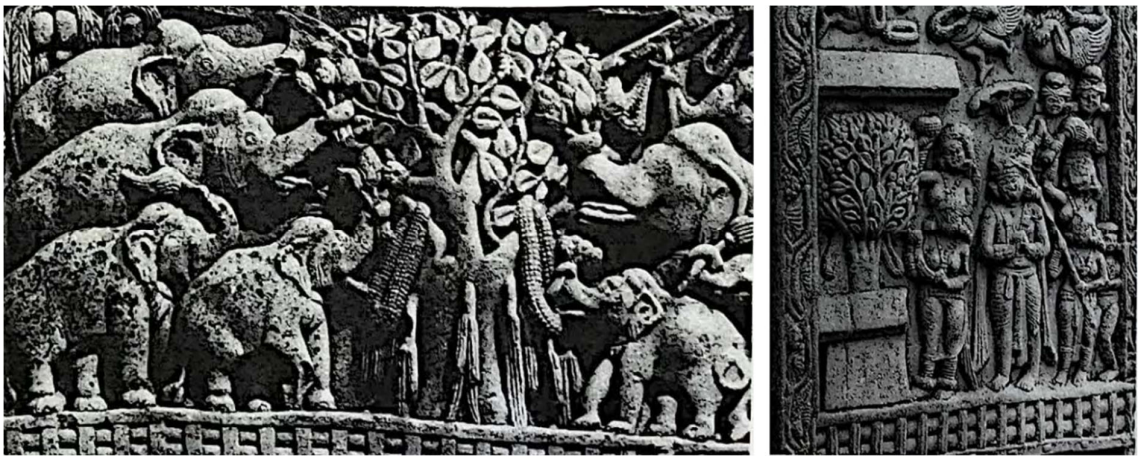


Figure 7-15: Ficus benghalensis, legend: Bodhi Tree (source: Sanchi stupa, Madhya Pradesh)

Figure 7-16: Ficus elastica, legend: a male yaksha standing under the tree (source: Mathura 3rd c. CE)

n. **Ficus elastica (Rubber tree)**: It is native to India's eastern part and Himalayas. But this tree is not considered as sacred in any of the religions such as Buddhism, Jainism or Hinduism.

Figure 7-16 depicts a rubber tree motif under which a male Yaksha is seen to be standing. This may be an expression of tree worship cult existing over that region during 1st c. BCE to 2nd c. CE.

o. **Ficus glomerata**: It is native to India's eastern part and Himalayas. But this tree does not have a strong religious association with Buddhism, Jainism or Hinduism. This is a large-sized evergreen tree which grows up to 18-20m height.

Figure 99 depicts a rubber tree motif placed on high platform. It is held sacred because Kanaka muni attained his enlightenment under this tree. Hence it is considered as *Bodhi* tree.

Figure 7-17: Ficus glomerata, legend: Bodhi tree worship (source: Bharhut Stupa, Madhya Pradesh)

7.3.4. Ethnobotanic activities in Buddhist monastic practices

In this segment the medicines and ethnobotany practiced within the precincts of monastic settlements are discussed. As a literature source, Buddhist chronicles and Chinese pilgrims' travelogues, Tibetan records, various narratives on the Ayurveda, epigraphs and wall inscriptions on monuments and museum exhibits were referred extensively. The ethnobotanic practice was also considered as an integral part of monastic education system. To understand their vigour of medicinal plant practices the reliable literature which could be cited are *Mahavagga sutra* and travelogue of Iijing. The *Mahavagga* is the primary source for extracting information on the early historic monastic medicinal practices. It provides theoretical insights about the monastic ethnobotanic practices during the formative stage of early *sanghas.* The sixth chapter of *Mahavagga sutra* mentions various sections on how monastic rules came into play for plant based medicine and treatment of ailment. Furthermore, it gave authentication to numerous medicinal formulae and pre-conceived treatment adopted from precedent practices. In addition to this, Iijing's travelogue from the latter half of 7th c. CE throws some light on actual medical practices prevalent in monastic complexes from that time.

A passage from *Mahavagga* depicts that, a monk inmate suffering from a bowel disorder (*kuucchivikarabadha*) lay fallen in his own urine and faeces (*muttakarisa*). As the monk was deemed to be not useful (*akaraka*) to monastic chores in this bad health condition, he was neither attended nor nursed (*upattheti*) by any other monk. However, the historic Buddha reaching out to him, nursed and took care for his betterment. He further advocated some rules pertaining to the nursing of sick inmate monks,

"You, O bhikkhus, have neither a mother nor a father who could nurse you, If, O bhikkhus, you do not nurse one another, who, then will nurse you? Whoever, O bhikkhus, would nurse me, he should nurse the sick".

This particular incident is an example of the root of healing philosophy in Buddhist monasticism. It expresses Buddha's empathy towards mankind in one hand, and on the other hand represents his cognizance and leadership skills. His sensitivity towards mundane suffering made him realise the necessity of healing and nursing. The rules formulated on medicinal treatment offers specific insight in this regard.

The healing rules find their roots in the Buddhist doctrine which revolved around the concept of *dukkha* (sorrow) and its extinction. The basic principle of the doctrine is expressed in the *arya saccani* (four noble truth). All the suffering (*dukkha*) has a cause (*samudaya*), which can be removed (*nirodha*) by following eightfold path (*attanga magga*). This eightfold path was rooted to healing paradigm. In fact, the inclusion of herbs or medicine among the essentials of ascetic life prominently shows the attempt to mitigate the sufferings to maintain a healthy well-being in order to stay focused achieving spiritual enlightenment.

The Buddhist normative literatures suggest that the knowledge of medicine became an essential part of the Buddhist monastic lives. According to a segment in *Vinayapitaka*, the wandering monks or *bhikkhus* from primitive *sangha* had to embrace four aids (*nissaya*) for sustenance of their lives namely, meals (acquired only through means of alms), robes, lodging under trees or in forest and medicine in the form of herbs and/or decomposed urine of cattle (*puttimuttabhesajja*). This non-permanent pattern of life called for the necessity of self-healing techniques in early stage of *sangha*. With the strengthening of monastic establishments in post historic Buddha phase, the knowledge of medicine became an integral part not only for self-healing but a mean for exchange with laity.

The interrelationship of Buddhist ideology and philosophy with medicinal texts proves the importance of it. When the *sangha* started to grow, their temporary stays (avasas or lenas) such as rain retreat (*vassavas*) gained permanence. Consequently, the permanent establishments needed monastic orders for operation and monitoring. Adhering to Buddha's teaching of 'Middle Path' (*majjhima nikaya*) this rules were set up. According to Richard Gombrich, this was interpreted as "that one should treat oneself well enough not to be distracted from spiritual life by hunger and moderately enough not to be distracted by overindulgence". With the advent of monastic establishments these knowledge of medical practices was fused with the philosophical ideas and got codified as way of leading monastic life in the *Vinayapitaka*.

In the *Mahavagga*, there is a narration of the historic Buddha's concern on ailing monks during his monsoon time stay in Jetavana, Sravasthi. He noticed the *bhikkus* as lean with malnutrition, yellow skin tone with veins protruding their body parts. On being asked by Buddha, Ananda said about them that those monks were under influence of sickness due to hot weather; they threw up whatever they had eaten or drunk (*sāradikena ābhādhenā'ti sarada-kāle uppannena pittābādhena…tasmim hi kāle vassodakena pi tementi, kaddamam pi maddanti, antarantarā ātapipi kharp hoti……tena tesam pittam katthabbhantara-gatam hoti*). At that moment Buddha considered providing medicine for their wellbeing which "may be authorised as common medicine to be diffused through the body and not to be regarded as ordinary (material) food". Five types of medicine were sanctioned by Buddha at that time- ghee, butter, oil, honey and molasses; they must be taken at right time in right quantities. But even after that, Buddha noticed the *bhikkhus* were still leaner due to reduced digestive capacity. Hence, he authorised not only to take the medicine in right times but other times also. Here this shall be pointed out that a little relaxation was allowed by the Buddha. A detailed reading of *Mahavagga* shows many an occurrence of easing of rules for the purpose of medical treatment of monks. In due course of time, it can be found out that apart from those five materials a large number of other ingredients were added to the rapidly growing monastic establishments and their ethnobotanic practices. These were mentioned in *Mahavagga*; different types of minerals, plant and animal products as medical drug which can be categorised in seven groups. For example, fatty substances (*vasa*), roots (*mūla*), astringent (*kasāva*, *kaṣāya*), leaves (*paṇṇa*, *parṇa*), fruits (*phala*), gums (*jatu*) and salt (*loṇa*, *lavaṇa*).

*Mahavagga'*s descriptions are the proof of institutionalisation of medical practices during the existence of the historic Buddha. Though the evolution of streamlined medical practices and study as academic subject took much longer time it was gradually reflecting the integration of Buddhist ethics and eco-philosophy also. This was mentioned by Iijing also who witnessed the continuous evolutions and amalgamations of various medical practices over the years. It was a sheer outcome of deep-rooted Buddhist environmental ethic and eco-philosophy as well as the desire of sangha to uphold the ancient traditional teachings as legacy. At the early days, this was not so classified nor practised with rigour. The monastic community used to rely on lay disciples for all sort of medical activities and support. *Mahavagga* mentions that lay women disciples were playing key role in medical services to cure sick inmates. A woman disciple named Suppia needs a special mention here. She came to forefront in medical services in order to provide care for the monks and nuns. Apart from lay disciples there are references of lay physicians also. Jivaka's mentioning could be found in scriptures who provided his service to the historic Buddha and his monk communities. In *Vinayapitaka*, we also find the mention of a medical surgeon named Akasagotta. Another important part of Buddhist medical history was the *bhaisajyaguru* or medicine Buddha. He was considered as medical expert who could heal all sufferings (*dukkha*) by using medicines.

With the progress of time *sangha* gained permanence and monastic orders were established; medical practices were also perhaps standardised. Donations of land and other material resources from royal patronage followed with the advent of monastic practices. And a significant part of the donation was to seek for medical assistance. There are records which

states that not only the lands were donated to monasteries for their daily functions but also ensuring medical help and supply of medicine at time of distress. For instance, five plots were granted to a Mahayana Avaivarttika Buddhist monastery in Bangladesh in 507 c. CE. The land was donated to the monastery to ensure necessary amenities and supply of goods such as bed (*sayana*), seat (*asana*), fragrance (*gandha*), lamp (*dipa*), ailments (*glana*) and medicines (*bhaiṣajya*). A similar mentioning could be found in Nalanda Copper plate inscription of Devapaladeva and the Copper plate of Dharmapaladeva in Murshidabad district.

From the discussion above it is proven that the healing practice through medicine was imbibed in the Buddhist philosophy and doctrines. This was preached and endorsed by the historic Buddha himself. However, from the scriptures or donative plates this is not clear what were the actual medical applications that were practised inside the monastic establishments. Furthermore, there was no hint of spatial distribution of such practices. Most of the donative inscriptions or medallions mentions that these were donated to monasteries for medicine. It could be interpreted from the inscriptions that one of the primary objectives of donation was to "provide income for the medicines and requisites for the sick" (*glana-pratyaya-bheshajy-adya*). But these are devoid of any information on particular procedures practised by the monk inhabitants. Literature becomes only source of information for further inquiry.

In 7th c. CE Iijing visited India and stayed in various monasteries then especially in Nalanda Mahavihara. All the daily activities and ritual practices inside the monastery was recorded by Iijing there. A few chapters such as 23, 27, 28, 29 were specifically dedicated to academic and medicinal or ethnobotanic practices. These chapters deal with benefit of regular exercise or meditation. Along with that symptoms of illness and process of providing medicines were also covered.

A detail study of Iijing's account reveals the general healthcare practices in Buddhist monasticism. It was noticed by Iijing that a same health routine was exercised by the monks inside the monastery and the laity outside. The *Materia medica* was compiled taking care of this wellbeing habits. From these descriptions it is also clear that hygienic lifestyle was non-negotiable for them. The rules and regulations regarding cleansing foods, storage of water, usage of utensils, bathing and defecation practices shows a deep connection with maintaining hygienic practices. Iijing was impressed by the efforts taken by ancient Indians to maintain hygiene and purity which was missing in his homeland China. Iijing mentions that,

"*Once upon a time when the Mongolians of the North sent men to India, the messengers were despised and ridiculed, as they did not wash themselves after evacuation, and preserved their food in a tray. This was not all; they were scorned and spoken ill of, as they sat together (on the floor) at a meal, with their feet straight out and touching one another's and they did not keep out of the neighbourhood of pigs and dogs and did not use a toothbrush".*

There were rules on food consumption, storing of water also. The rules regarding 'pure and impure food' comes first which was dealt in chapter 4 in Iijing's book. Firstly, it was recommended that only fresh food shall be consumed and stale food shall not be kept for further consumption. This practice was probably a legacy carried forward from Brahminical practices.

In the successive chapters further details such as washing of hands and mouth after every meal was mentioned. Three kinds of cleansing materials were mentioned to remove the grease from the foods: pea-flour, dried earth and cow-dung. The next two chapters, 5 and 6 narrates the rules about storing of water. There were two types of storage criteria mentioned, one the one hand it is for drinking water or as mentioned as clean water and on the other hand it was for cleansing purposes as touched water. The clean water was mandated to be touched with clean hands stored in earthenware or porcelain utensils which used to remain covered by bamboo planks, wood, linen or leaves. The water for cleansing could be used only after using lavatory and should be stored in copper or iron jars. There was a practice of appointing a monk inmate for inspection of the status of water stored for these purposes. There was a detailed description of steps to examine the water. Iijing's book has reference of this practiced witnessed by him at Tamralipta monastery. Iijing documented the process of straining water also. Fine white clothes were used for this purpose. The process was as follows,

i. A handful of water should be taken out by inclining the jar into a pure bronze cup or a bronze ladle, a conch shell or a plate of lacquer.
ii. The water should be poured slowly on brick or wooden platform.
iii. If any insects are found the jar is supposed to be washed twice with water from other storage device.
iv. In case there is a waterbody or river in proximity to the monastic establishment the water should be thrown away and fresh water to be filled in after filtration.

There was mention of oral hygiene amongst Buddhist monks. As per Iijing's documentation it can be found that 'every morning one must chew tooth-woods, and clean the teeth with them, and rub off the dirt of the tongue as carefully as possible. Only after the hands have been washed and the mouth cleansed is a man fit to make a salutation, if not both the saluter and the saluted are at fault'. This also mentions about the *danta-kastha* (Tooth-wood) for brushing teeth every morning. The tooth-wood were used to be made out of any large wood or branch of the paper mulberry, a peach, a *Sophora japonica* or willow tree. However, the best tooth-wood was considered as 'rough root of northern Burr-weed'. The interesting fact is that these two trees *Sophora japonica* and Northern Burr-weed are not native to India but to South America. How they reached here in that ancient time is a bigger question. Along with that there is mention of ancient practice of traditional yoga. In Iijing's book it was mentioned that *Nagarjuna*, the great monk from *Mahayana school of thought* would practice inhaling water through nostrils in 3rd c. CE which is called *neti* or *jalneti* in current times. All these measures observed by monks throw light on the aspect of how they were keen to create a hygienic living environment not only for the monk inmates but also for the laity. By doing this they were able to embrace various aspect of living and enable the religion stand out with pragmatic approach.

Iijing observed another practice of doing exercise or walking by monks during his stay in various monasteries. It was recommended that to stay healthy and fit a long walk can be beneficial. Early morning or late afternoon was advised as ideal time for walking. Monks used to take a stroll outside the monastic establishment or along the long corridors inside to maximise their daily walking practice. But there was no proof whether this was recommended

by the historic Buddha himself or not; but this became an integral part of the daily monastic life. In the *Mahavagga* it can be noticed that Buddha himself used to take tours inside the monastery. In the chapter of 'medicaments' it can be seen that Buddha himself enquired about the poor health conditions of monks and introduced five medicines for their well-being. Iijing mentioned about special places named cloisters or *kankrama* which were used for walking. These were located at Vulture peak, deer park at Rajagriha and other sacred places where the Buddha used to go. The cloister's measurement was also mentioned in Iijing's book,

"*They were about two cubits wide, fourteen or fifteen cubits long, and two cubits high, built with bricks, and on the surface of each are placed fourteen or fifteen figures of an open lotus flower, made of lime, about two cubits in height, one foot in diameter, and marked (on the surface of each figure) with the footprint of the sage. At each end of these walks stands a small caitya, equal to a man's height, in which the holy image, the erect statue of Śākyamuṇi is sometimes placed''*.

Iijing's book also throws light on the actual medicinal practices also. The medical book of Indian science comprised of eight sections. The details of the sections were as follows,

i. The first section deals with internal and external sores.
ii. The second section deals with the details of acupuncture and any diseases related to face and head.
iii. Bodily diseases are dealt in section three.
iv. The fourth section deals with demonic or evil spirits and their remedial measures.
v. The next chapter, fifth section deals in medicines or antidotes for poisonous substances.
vi. The sixth section details out the pediatrics.
vii. The seventh section is about maintaining lower body fitness.
viii. The final chapter, section eight deals with the rejuvenation of strength of body.

In the chapters 27 and 28, in his book, Iijing mentioned about the diseases and their treatment techniques in the monastic complexes where he stayed. All the treatment were based on four great elements of nature or *mahabhuta*: earth, water, fire and air. Also, the concept of *tridosa* was prevalent in Buddhist monastic medicinal practices.

The next part of the discussion is focused on the Buddhist healing medicines practised by the *sangha.* It evolved as primitive protective measures to upkeep the well-being of monk inmates. The first recorded medicine prescribed by the historic Buddha was the cattle urine. With reference to the Pali literature only naturally decomposed animal's urine was permitted as a medicine to cure any diseases. There were two-fold benefits of this practice. Firstly, availability of animals' urine was not a challenging issue and no animals were getting harmed in the process of procurement. Secondly, in order to obtain it the monks did not need to depend on any grant or donation. Later on, he added five more items as mentioned in the earlier segment of this chapter, ghee, butter, oil, honey and molasses. As these elements were also available without much effort their use became popular in Buddhist medicine. From the *Mahavagga* and monastic book of medicine *Materia medica* it can be found that there were seven groups of ingredients which were allowed as medicine. The historic Buddha mentioned the resources from where these could be obtained and he concluded with the phrase, 'and whatsoever others

used for medicine, could be used as medicine'. By this way a lot more flexibility was introduced in the medicinal practice. The list of medicines allowed by Buddha are as follows,

i. Fatty substance: The historic Buddha had permitted use of five types of fatty substances from animals such as- bears, fish, alligators, swine and ass. This should be consumed with oil at correct time during illness.
ii. Roots of plants: Total eight kinds of plant roots were allowed by the Buddha to be included in the medicine list. They are turmeric, ginger, orris root, white orris root, ativisa, black hellebore, usira root, bhaddamuttaka. Apart from these Buddha allowed any other roots which impart the quality of healing in the food those could be used as root-medicine. Root flours were advised to be stored in case of emergency.
iii. Astringent: Decoctions made from various plants were also authorised by the Buddha. Plant extracts from *nimba* (Azadirachta indica), *kutaja*, *pakkava, nattamala* and other astringent roots were used.
iv. Leaves: Leaves of medicinal plants such as *nimba, kutaja, patola, Tulasi, kappasika* and other leaves with similar healing attributes.
v. Fruits: Fruits such as vilanga, pippala, marika, haritaka, amlaka and gotha fruit were allowed as medicine.
vi. Gum: Seven types of gums extracted from plants were allowed as medicine. For example, hinga, lac, sipatika, taka, takapatti, takapanni, saggulasa and other similar ingredients.
vii. Salt: Five kinds of salts were permitted to be consumed as medicine. For example, sea salt, black salt, rock salt, kitchen salt and red salt.

The question arise now on the basis of referring the historic Buddha as supreme healer whether he had the knowledge of medicinal practice prior to establishing *sangha*. His closest physician *Jivaka* has recommended the same remedial measures as the Buddha following traditional medicines practiced even earlier time to Buddhism. All his medicines find connection to the *Ayurveda* or traditional Indian medicine. Following Jivaka's training under *risi Atreya* at Taksasila university it could be interpreted that his treatment methods were quite influenced by the *Ayurveda.* Healing methods mentioned in *Mahavagga* shows the prominent impact of *Ayurveda* on Buddhist medicine. When Buddhism spread in central and southern India beyond its cradle in Gangetic valley, it adapted to regional diversities and transformed into more permanent solution with medicinal practices. The regional differences came into play to evolve distinct medical practices at various regions. That is how the variation came into being with Buddhist medicine practices. This was possible due to the one main principle of Buddhism is 'following the Middle Way'. This allowed for incorporation and adaptation to localized regional varieties mixed with traditional medicinal practices.

Till date *Mahavagga* can be regarded as an unparallel literary source to know the details of Buddhist medicinal and ethnobotanic practices during ancient time. Apart from the literature sources there are a few archaeological evidence which indicates toward existence of hospital building or similar facility to treat the ill people. *Nagarjunikonda* bears this evidence in its extant remains. An archaeological site from 3rd c. CE was found with an inscription with mention of a 'health house' for monks and laity who were suffering from illness (*[śo]bhane*

vihāramukkhye vigatajvarālaye). The next proof can be obtained from another archaeological site at Kumrahar which dates back to 300-400c. CE, a much later phase monastic site. A building with four rooms with bricks and of varied sizes were discovered here along with some inscriptions. This reads as "*śrī ārogyavihāre bhikṣusaṅghasya"* (in the auspicious health house of the monastic community). There are a few more references from Nepal around 600c. CE of land donated by local ruler for construction of healing house or '*arogyasala'* and Sarnath in 8th c. CE. The most prominent reference was discovered from Sri Lanka. A 9th c. CE monastic site bore evidence of old hospital building with a monastery at Mihintale. The unique practice of immersing a patient entirely in medicinal oil in a stone platform shaped like a canoe was most notable reference.

However, these are very few archaeological remains as the only evidence available in Indian subcontinent bearing the proof of hospital buildings under monastic practices. It is particularly astonishing why in the description of Xuan-xang and Iijing mention of hospital buildings were avoided. It was only Fa-xien's travelogue from 5th c. CE which has a reference for hospital or similar type of set up. In the city of *Pataliputra* (current Patna, Bihar) the heads of trademan families used to set up healing houses for treatment of ill, poor and destitute. The patients were provided with food, medicinea and decoction as discussed in the segment of different categories of medicines in this chapter.

It might be possible that Iijing avoided mentioning any monastic hospital structure at the places where he had stayed might be due to distantly located hospital facilities beyond the walls of monastery. But even with this it could have been mentioned. The absence of any prominent mentioning raises doubt about the existence of *arogyavihara* of the Buddhist literature.

It could be found in the *Jataka* stories that many young students would pursue medical studies at Taxila despite Brahminical dominance over the medicinal practices. It was quite possible that after completion of their studies they used to establish health houses upon their returning to city. State involvement in setting up hospitals was rarely seen may be due to the interference of Brahminical practices. This resulted in setting up healing houses or hospital by *vaisya* leaders in the city and later as donation inside monastic complexes.

Buddhist literature also depicts the role of physicians in their medicinal practices. The most famous name in this field was *Jivaka Komarabhacca.* There are two more physicians mentioned in Pali texts *Akasagotta* and *Sivaka*.

This is a brief interpretive study on the vast topic of ethnobotanic practices performed by the Buddhist monasteries and *sangha*. Because of the limited number of resources or sole dependence on literature sources a part of it could be studied and narrated. There are a few avenues where a deeper study could be conducted such as the socio-religious impact of this practice on laity or rulers from then time. Also this could be studied that how the *sangha* extended their services beyond their monastery.

8. Theorisation and Interpretation of Buddhist Landscape Principles

8.1. The essence of the Indian Buddhist monastic landscape tradition

Environmental concepts followed in Buddhist monastic sites had influenced the evolution of distinct identity, form and meaning in spatial planning of Indian Cultural Landscapes. The research focuses on this nature-based narrative of Buddhist landscape. Going further, the study enquires into the unique landscape planning principles (USPP) followed in the planning of Buddhist monastic landscapes. The primary objective of the study is to emphasize on these dominant themes and perceptions towards nature that shaped Buddhist cultural landscapes over time in India.

The environmental concepts followed and mentioned in various Buddhist scriptures gave the spatial form to the monastic sites. The early and a few later phases Indian Buddhist monastic institution and built landscape tradition expressed values of a new socio-religious and environmental order of settlement practices. The essence of Buddhist philosophical notion imbibed with ethical notion imparted its key ethos of inhabiting within nature with harmony. These archaeological sites are replete with cues for sustainable and environment friendly development if read to their fullest potential.

The task of current research is quite pressing – to unearth in the ancient past of environmental and cultural landscape of Buddhist monasticism. The key essence of its core ethos is redefined and reinterpreted with a creative renewal of environmental and philosophical forms. For each study sites there is a reinvented landscape and ecological values. This value system is manifested in cultural landscape construct and connected with a common thread of environmental design, though the study sites belong to varied geo-climatic zones of India.

In quest for unique landscape planning principles, it is significant to interpret the hints of unison of built and unbuilt components of the study sites with their environmental expressions.

8.2. Interpretive landscape characteristics of Buddhist monastic sites

8.2.1. The symbolic approach and its influence on site planning

Symbolism played a major role in Buddhist monastic site planning. the idea of '*dassana'* as elucidated in chapter 2, 5 and 6 are major exemplars in these interpretive characteristics. The relic stupa believed to be as the manifestation of historic Buddha himself was also considered as manifestation of natural forces. The varied topographical features were leveraged to imply this philosophical construct on the study sites under consideration (Fig. 8-1 and 8-2).

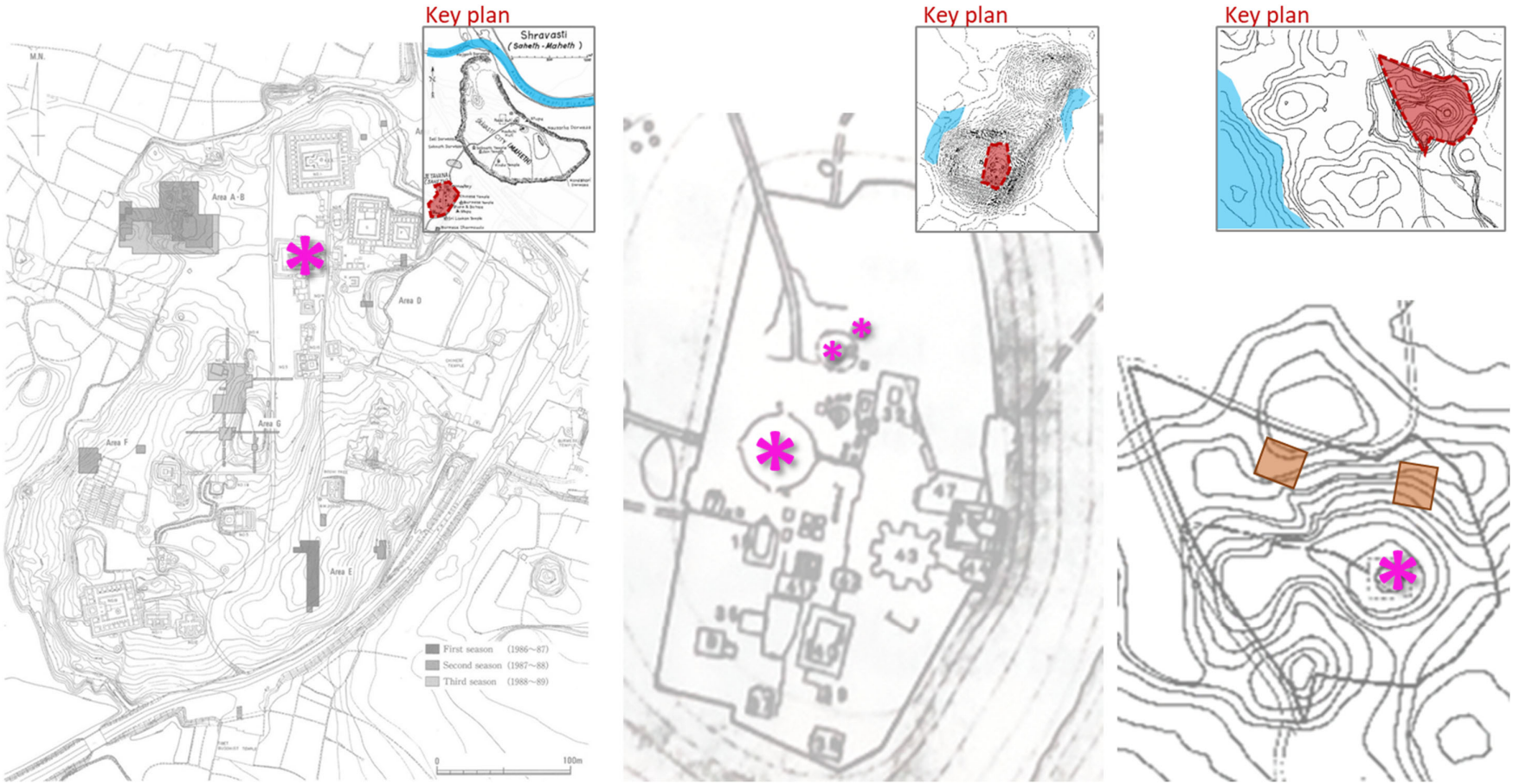


Figure 8-1: Illustration on principle 01: Influence of symbolism in Buddhist monastic site planning (source: author)

* Relic stupa or Buddha's stay

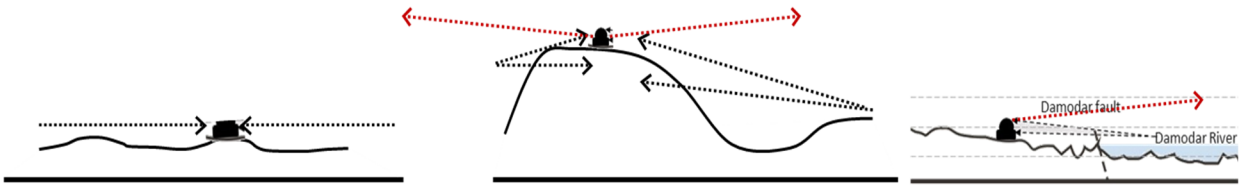


Figure 8-2: Reflection of "dassana" principle as per Schopen, Gregory on siting the Relic stupa in monasteries for Jetavana, Sanchi and Bharatpur (source: author)

a. Jetavana monastery

i. Buddha's Gandha kuti (perfumed chamber) was considered as his manifestation during his absence.
ii. Visual corridors were made to be visible from other part of the monastic site.
iii. Inward looking spatial layering preserving the sanctity of Buddha's hut.

b. Sanchi monastery

i. Relic stupa seen from distance is considered as "Buddha" himself.
ii. It is a symbolism from the tripitaka- theory of "dassana".
iii. Visual connections were established with other Buddhist hilltop sites in the vicinity.

c. Bharatpur monastery

i. Relic stupa is set as stark contrasting feature against flat agricultural horizon.
ii. Visible from river route marking the presence of the local royal patronage & religious prowess.

d. Inference

i. The Buddhist tradition of space making is a tradition of myth and symbol.
ii. The world mountain, as symbol and cultural memory is manifested in the stupa. The axis mundi are considered to pass through it as primordial source of energy.
iii. Metaphoric statements of "stupa as manifestation of Buddha" governed their site planning within the natural landscape setting.

8.2.2. Attitude to land and topography

The main physiographic layer of landscape is topography. With its varied expressions monastic site planning showed unique conformity to mingle with the context. The siting of important structures such as stupa (located at highest point and regarded as most sacred), temples and monasteries followed the topographical clues to generate an adaptable landscape language each contextually appropriate to their environmental programmes (Fig. 8-3).

Figure 8-3: Illustration of principle 02: Attitude to topography (source: author)

a. Jetavana monastery

i. Buddha's perfumed chamber was within visible range of two monasteries and other temples.
ii. From the high plinth of chamber placed on a comparatively higher mound, the view of *Bodhi* tree is unhindered with land gradually sloping up towards south.
iii. Inward views with points of visual arrests as it was set within tree covered grove.

b. Sanchi monastery

i. Relic stupa is visible from almost 90% of the site.
ii. The heightened hilltop made it visible from distant laity areas and surrounding flat agricultural field.
iii. The hilltop was leveraged to situate the monastery; one for security reasons that it cannot be invaded very easily due to its steep slope. Secondly the access to monastery from nearby laity also remains less frequent.
iv. Outward views with panorama of urban centres & other hilltop Buddhist sites comes under the viewshed.

c. Bharatpur monastery

i. Relic stupa was visible from the riverbank of Damodar which was the ancient inland riverine trade route in Radh region.
ii. The outward panorama was also unhindered due to its location on higher ground and riverine flood plain in the vicinity of the monastic establishment.
iii. The stupa was situated on a high mound against the backdrop of flat agrarian horizon.
iv. The monasteries inside the site were oriented toward stupa from lower elevation.
v. A balance of inward and outward views for the site.

d. Inference

i. The terrain was considered as more naturalised base for setting up monastery than an opportunity to showcase lad alteration.
ii. Accepting the dominating land features of the place the monastic site is laid out and the resultant form is celebrated.
iii. Following Buddhist normative literature the sites were selected. Hence it was influenced by naturalistic environment more.

8.2.3. Attitude to water resources

Each of the study monastic sites' manifestation can be regarded as hydrologic landscape. The natural hydro-geological pattern governs the siting of built elements to a greater extent. Leaving the regional drainage unharmed not only creates a sustainable landscape scheme but also establish a connection with surrounding agricultural landscape evolved by laity.

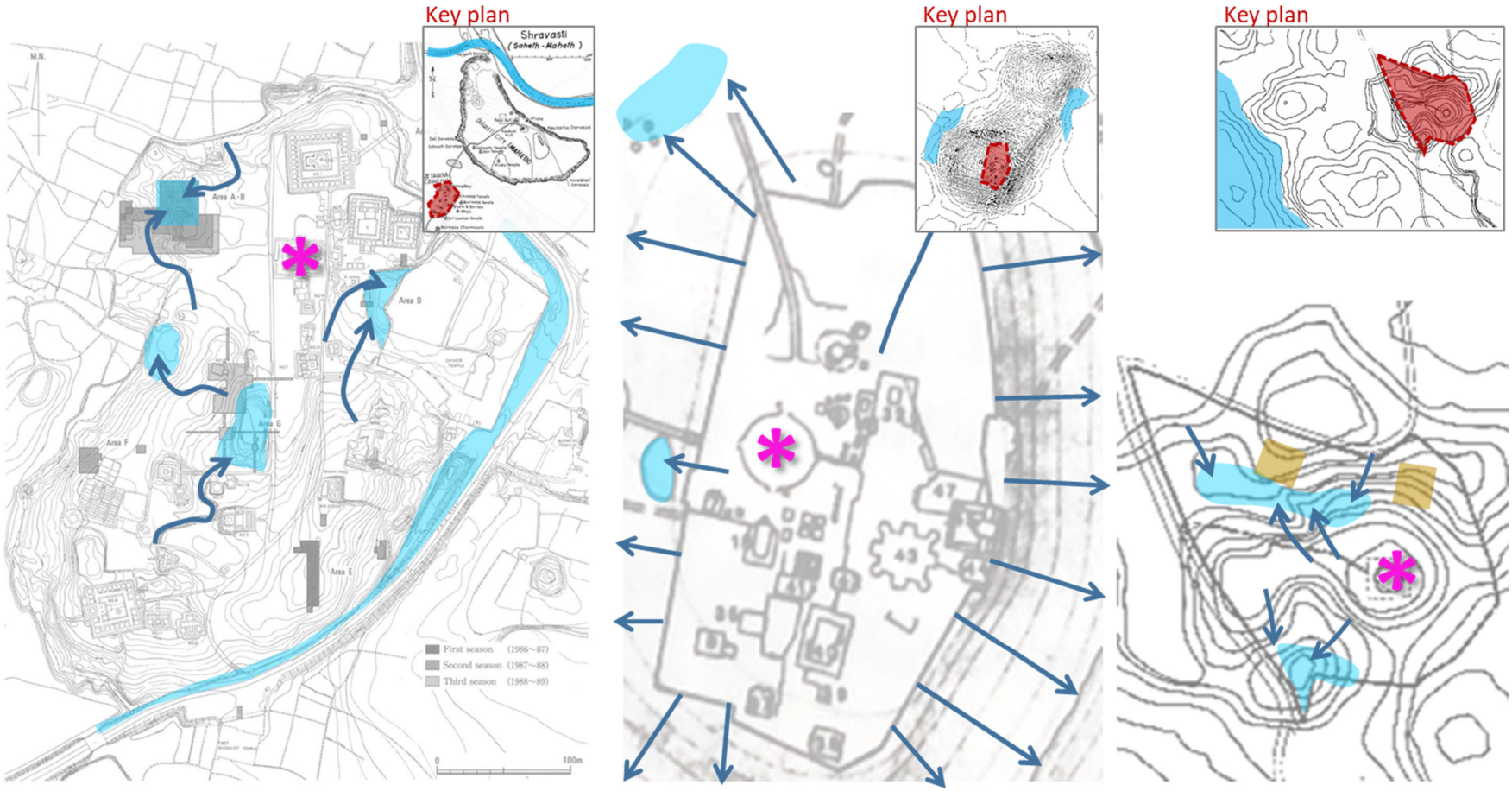


Figure 8-4: Illustration of principle 03: Attitude to water resources (source: author)

* Relic stupa or Buddha's stay

a. Jetavana monastery

i. Drainage channels were unaltered to respect the wider landscape drainage pattern.
ii. Lowest discharge points were converted into rainwater storage tanks.
iii. Built elements were placed on higher elevations to keep safe from water accumulation.

b. Sanchi monastery

iv. Relic stupa is visible from almost 90% of the site.
v. The heightened hilltop made it visible from distant laity areas and surrounding flat agricultural field.
vi. The hilltop was leveraged to situate the monastery; one for security reasons that it cannot be invaded very easily due to its steep slope. Secondly the access to monastery from nearby laity also remains less frequent.
vii. Outward views with panorama of urban centres & other hilltop Buddhist sites comes under the viewshed.

c. Bharatpur monastery

vi. Relic stupa was visible from the riverbank of Damodar which was the ancient inland riverine trade route in Radh region.
vii. The outward panorama was also unhindered due to its location on higher ground and riverine flood plain in the vicinity of the monastic establishment.
viii. The stupa was situated on a high mound against the backdrop of flat agrarian horizon.
ix. The monasteries inside the site were oriented toward stupa from lower elevation.
x. A balance of inward and outward views for the site.

d. Inference

iv. The terrain was considered as more naturalised base for setting up monastery than an opportunity to showcase lad alteration (Fig. 8-4).
v. Accepting the dominating land features of the place the monastic site is laid out and the resultant form is celebrated.
vi. Following Buddhist normative literature the sites were selected. Hence, it was influenced by naturalistic environment more.

8.2.4. Attitude to plant resources

Though the original planting design is not available now at archaeological sites due to climatic phenomena over 2000 years, the hints of vegetation pattern from today's landscape form tells the environmental story partially. Pollen study from those multi-cultural archaeological sites reveals the plant types and characteristics from the then timeline. The built elements were set amidst forested areas or seasonally vegetated areas without causing harm to regional floral pattern.

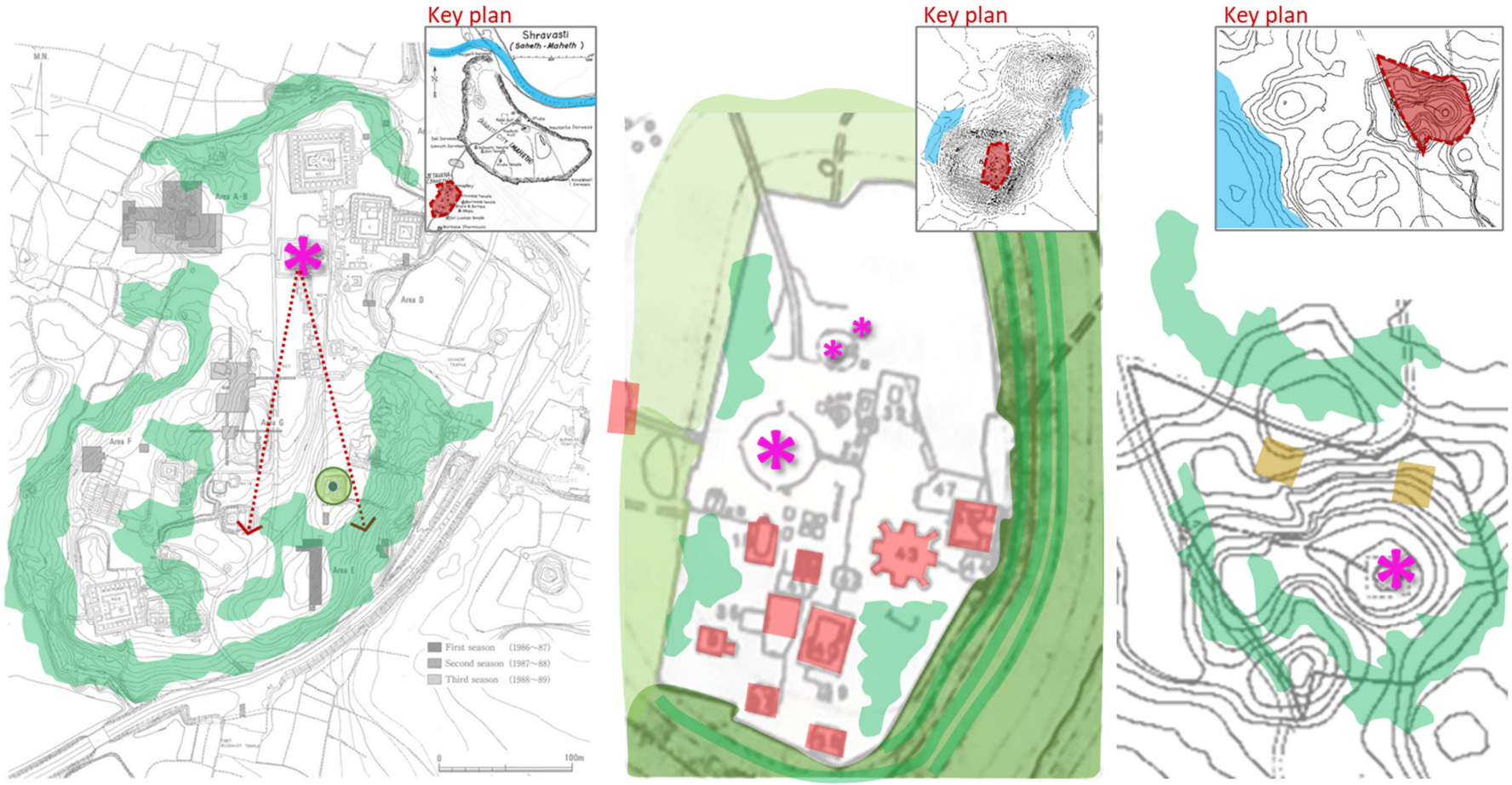


Figure 8-5: Illustration of principle 04: Attitude to plant resources (source: author)

a. Jetavana monastery

i. Covered in trees the built elements were hidden within canopy, the monasteries, man-made tanks were covered under tree canopies. The temples were strategically located on high mounds with lesser vegetative cover for visibility.
ii. The same goes with Buddha's staying chamber *gandhakuti*; kept free from dense canopy cover.
iii. Though forest clearing occurred during setting up of monastery, there existed a myth of replanting 500 trees.
iv. Bodhi tree was given more prominence.

b. Sanchi monastery

i. The vegetation on steep slope is not disturbed.
ii. Critical vegetation was avoided to establish built elements such as regional drainage corridors which still contains some moisture and soil deposits for plants to grow.
iii. Bodhi tree might have been close to the stupas but there is no trace currently being found after archaeological exploration of the site.

c. Bharatpur monastery

i. Set amongst evergreen landscape, the site is profusely vegetated.
ii. View from river's trade route was kept unharmed as indicator of its existence.

d. Inference

i. Naturalised vegetation at the site was considered as resources. Native plants are given
ii. Critical vegetation patches were kept unharmed. Necessary removal of trees and plants were compensated at the site with replanting and re-wilding (Fig. 8-5).
iii. Tree canopies were often used to create share at the monastic garden or visually cut off the private ritual spaces.

8.2.5. Sense of Anchor

The sense of anchor in Buddhist monastic designs were never the physical centre or geometrical centre of the physical extent. It was always metaphorical or philosophical centre and often occupied by most sacred element which is the relic stupa. The geometric centre is always an open space or landscape space following the concept of *"shunyata"* or void in Buddhist doctrines.

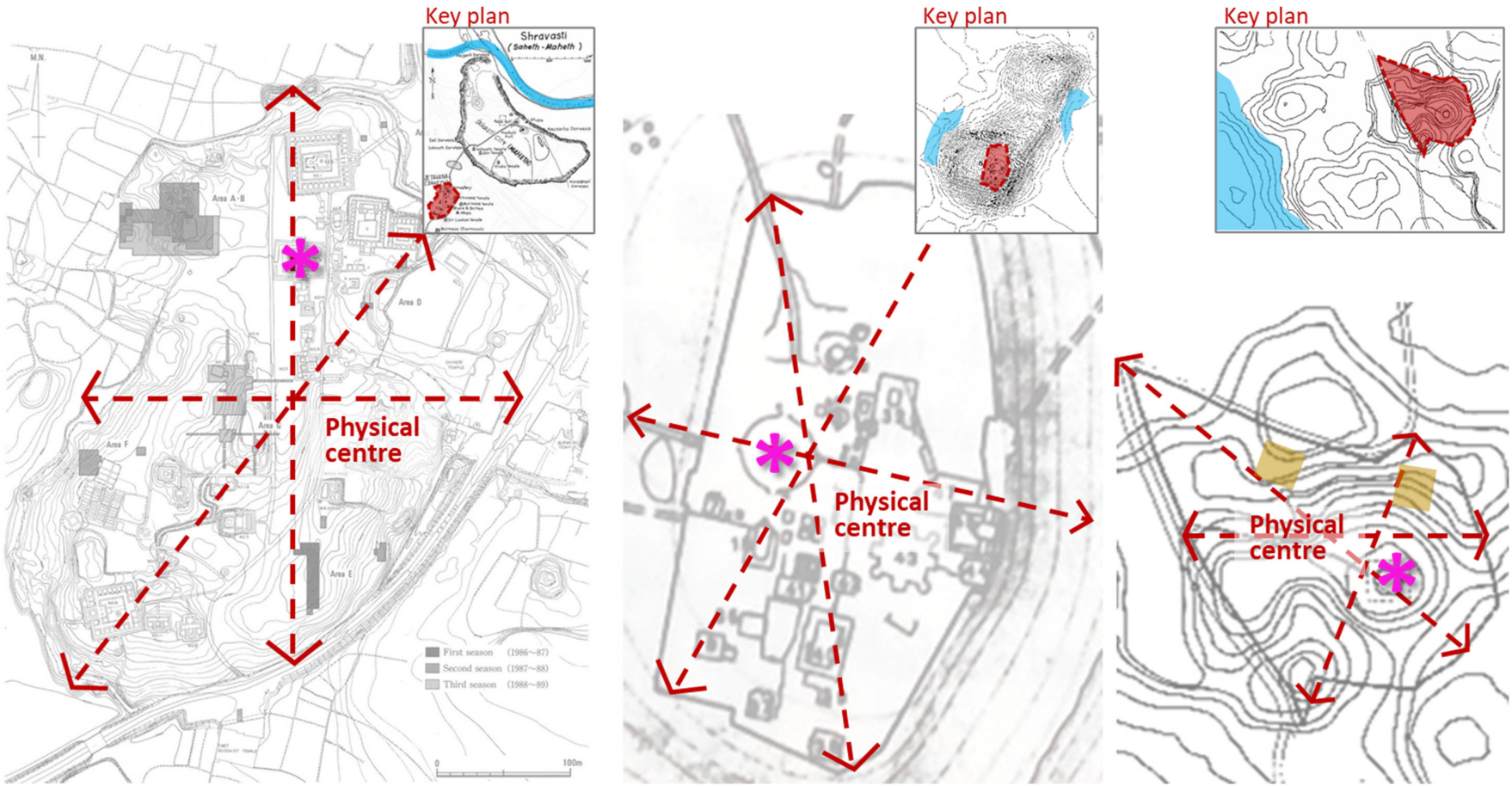


Figure 8-6: Illustration of principle 05: Sense of anchor (source: author)

a. Jetavana monastery

i. Three numbers of monasteries are there on the site.
ii. Buddha's perfumed chamber *gandhakuti* as anchor.
iii. The physical centre is an open space at higher elevation.
iv. So the physical centre was probably used for having a visual gauge of the entire site or could be interpreted as localised vantage point.
v. The bodhi tree is accessed from this central open space.

b. Sanchi monastery

i. Five numbers of monasteries are there on the site.
ii. Relic stupa, stupa 1 is established as anchor. There are smaller stupas such as stupa 3 and 4 which were relic stupas of Buddha's disciples create a focus
iii. The physical centre is immediately beside the stupa.
iv. The centre opens up in multi-directional elements on site.

c. Bharatpur monastery

i. Two numbers of monasteries are there on the site.
ii. Relic stupa as anchor placed at higher elevation.
iii. The physical centre is immediately beside the stupa.
iv. The physical centre acts as foreground to the stupa.

d. Inference

i. The sense of centre to the Buddhist tradition was meta-physical.
ii. This notion of centre as anchor, beginning or conceptual, ideational centre but not necessarily as geometric or physical centre (Fig. 8-6).
iii. Often occupied by relic stupa or Historic Buddha's hut for stay.

8.2.6. Attitude toward visual composition

To establish a connection with wider landscape the visual composition of monastic sites intervened very carefully. The balance between inward and outward views and panoramas were treated with careful design thoughts. Stupa was always considered as the epitome of visual attention. The other structures such as temples, monasteries are composed with a decreasing order of significance and their spatial significance which is linked to the next landscape design principle of spatial composition.

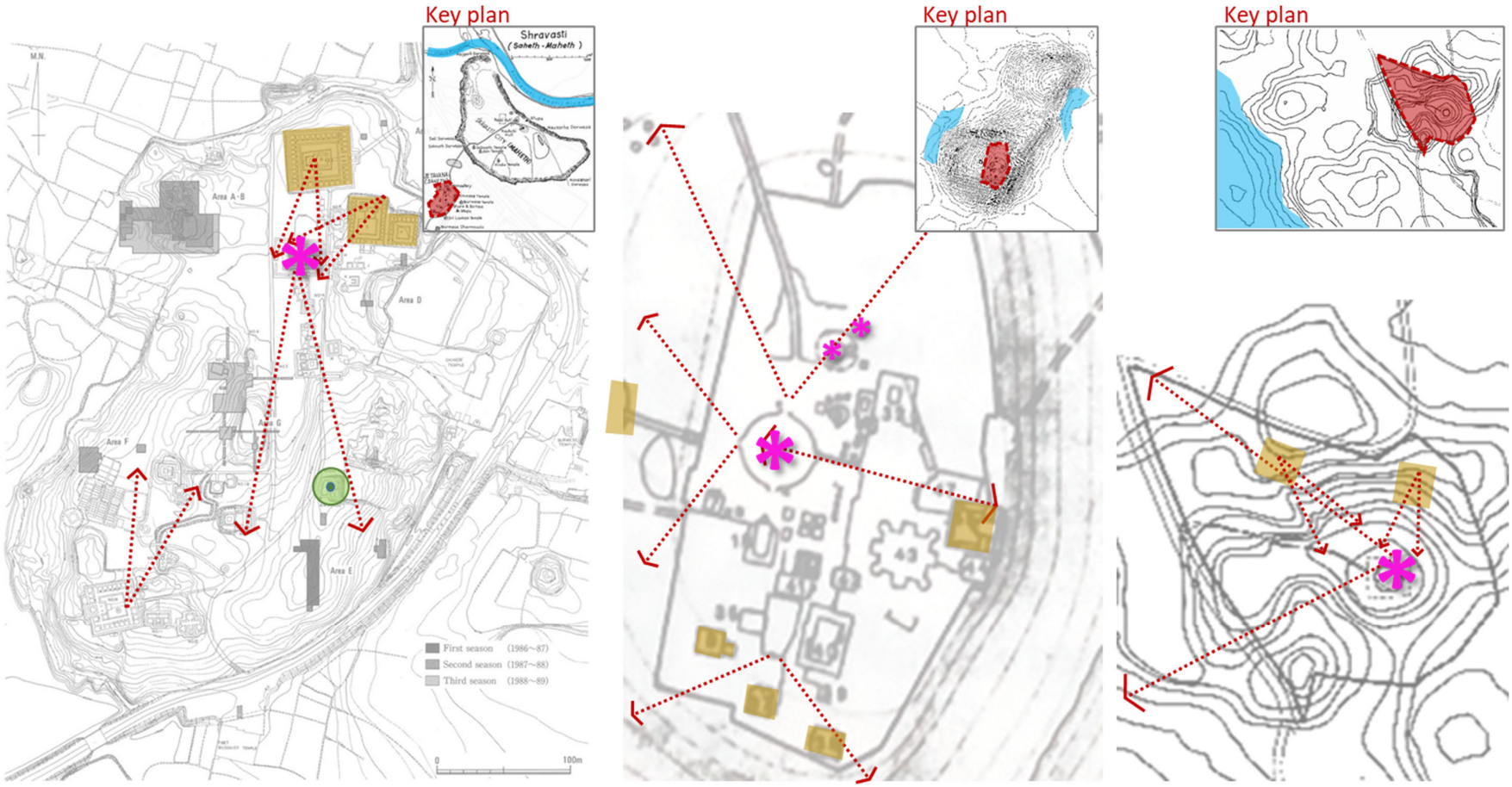


Figure 8-7: Illustration of principle 06: Attitude to visual composition (source: author)

a. Jetavana monastery

i. Buddha's perfumed hut was within visible range of two monasteries.
ii. From the hut the view of Bodhi tree is unhindered with land gradually elevating.
iii. Inward views with points of visual arrests as it was set within tree covered grove.

b. Sanchi monastery

i. Relic stupa was visible from almost 90% of the site.
ii. The heightened hilltop made it visible from distant laity areas.
iii. Outward views with panorama of urban centres & other Buddhist sites.

c. Bharatpur monastery

i. Two numbers of monasteries are there on the site.
ii. Relic stupa as anchor placed at higher elevation.
iii. The physical centre is immediately beside the stupa.
iv. The physical centre acts as foreground to the stupa.

d. Inference

i. Sight within site and outside are major component in Buddhist monastic spatial planning.
ii. The sight of stupa from distance is a connotation of metaphoric way of seeing the Buddha himself. So, identifying such points of visual arrest or interest was one of the major site planning principles (Fig. 8-7).
iii. The visual corridors or panorama was inclusive rather than exclusive landscape design.

8.2.7. Spatial inter-relationship among elements

The topography of site imbibed with kinesthetics resulted in a unique spatial configuration of the monastic sites. In order of their functional multitude and order of privacy the spatial layering was manifested. Stupa was considered as the semi-private space for sangha for performing rituals where laity and royals could offer homage. Monasteries, on the other hand, were considered most private core of the monastic sites.

Figure 8-8: Illustration of principle 07: Spatial interrelationship between elements (source: author)

a. Jetavana monastery

i. Buddha's perfumed chamber is placed at the core as most significant element in the landscape.
ii. The temples are in proximity to the chamber creating first layer of spatial tension and semi-private spatial core.
iii. Monasteries are set farther to create private ritualistic space where the entry of laity were restricted.

b. Sanchi monastery

i. Relic stupa at the intersection of private and semi-private core.
ii. Temples are set in a separate core with direct linkage to stupa.
iii. Monasteries are set apart at the lower elevations and visually cut off.

c. Bharatpur monastery

i. Relic stupa is placed at the core and highest elevation.
ii. Monasteries are set at lower elevations looking toward stupa.
iii. Layering of built units was achieved leveraging topographic features of the landscape.

d. Inference

i. The attitude of Buddhist space making is through 'layering' – outside to inside; The spiritual exchange space to sacred core of stupa (Fig. 8-8).
ii. This resulted in an informality- there is no definite axis in the landscape.
iii. The strictly formal architectural mass and diverse elements gradually develops into a wholesome landscape composition.

8.2.8. Statement of landscape integration: narrative of sacred dimensional order

Investigation into the composition principle of site elements is facilitated with a grid system which corelates and inter-relates the built elements with the un-built spaces such as forest, meadows, berms or man-made water features (Fig. 8-9).

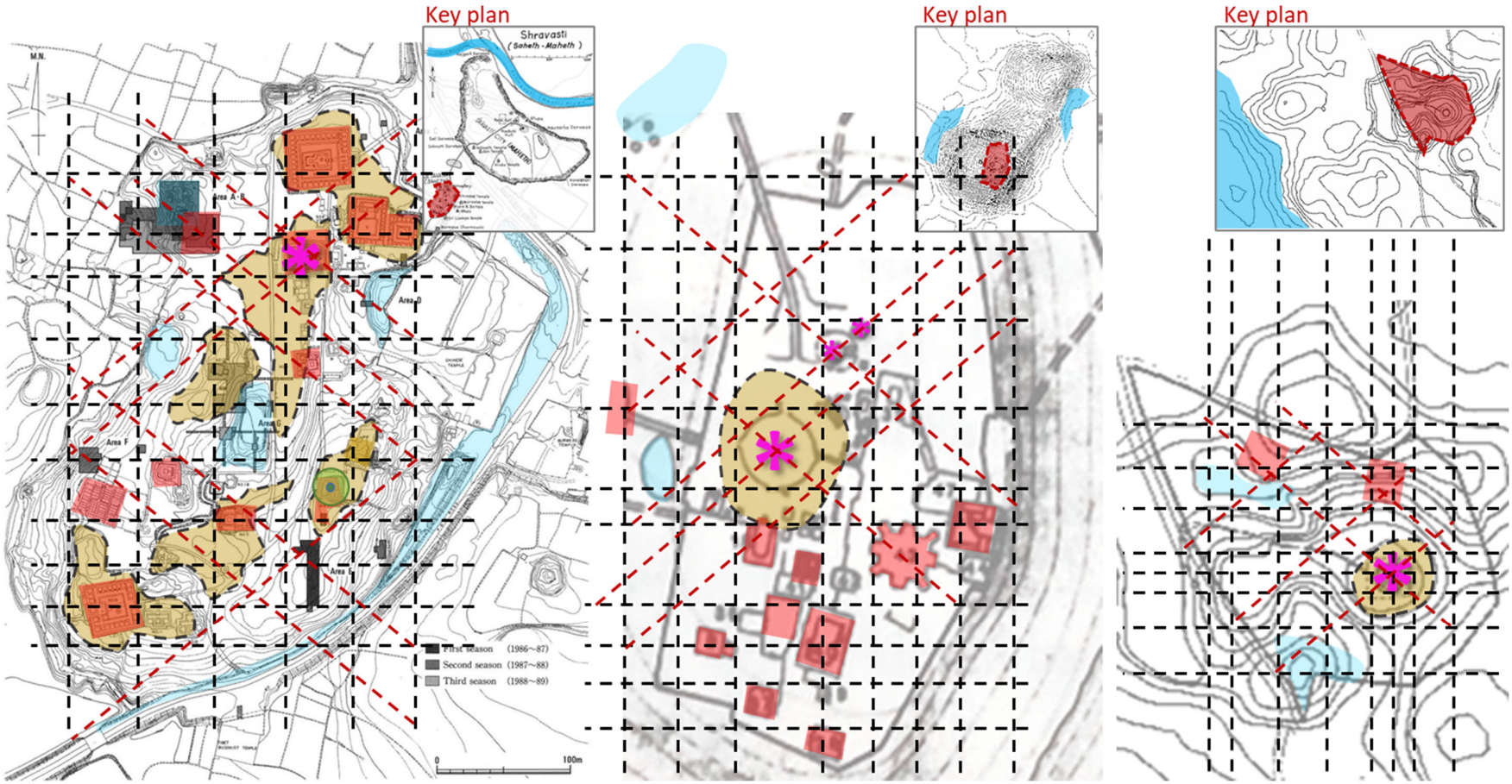


Figure 8-9: Illustration of principle 08: Narrative of sacred dimensional order (source: author)

a. Jetavana monastery

i. The final spatial configuration respected the undulated terrain and respecting the drainage of the site (Fig. 8-10).

ii. Monasteries and temples were placed atop the high mounds.

iii. Vegetation was used as tool for cooling.

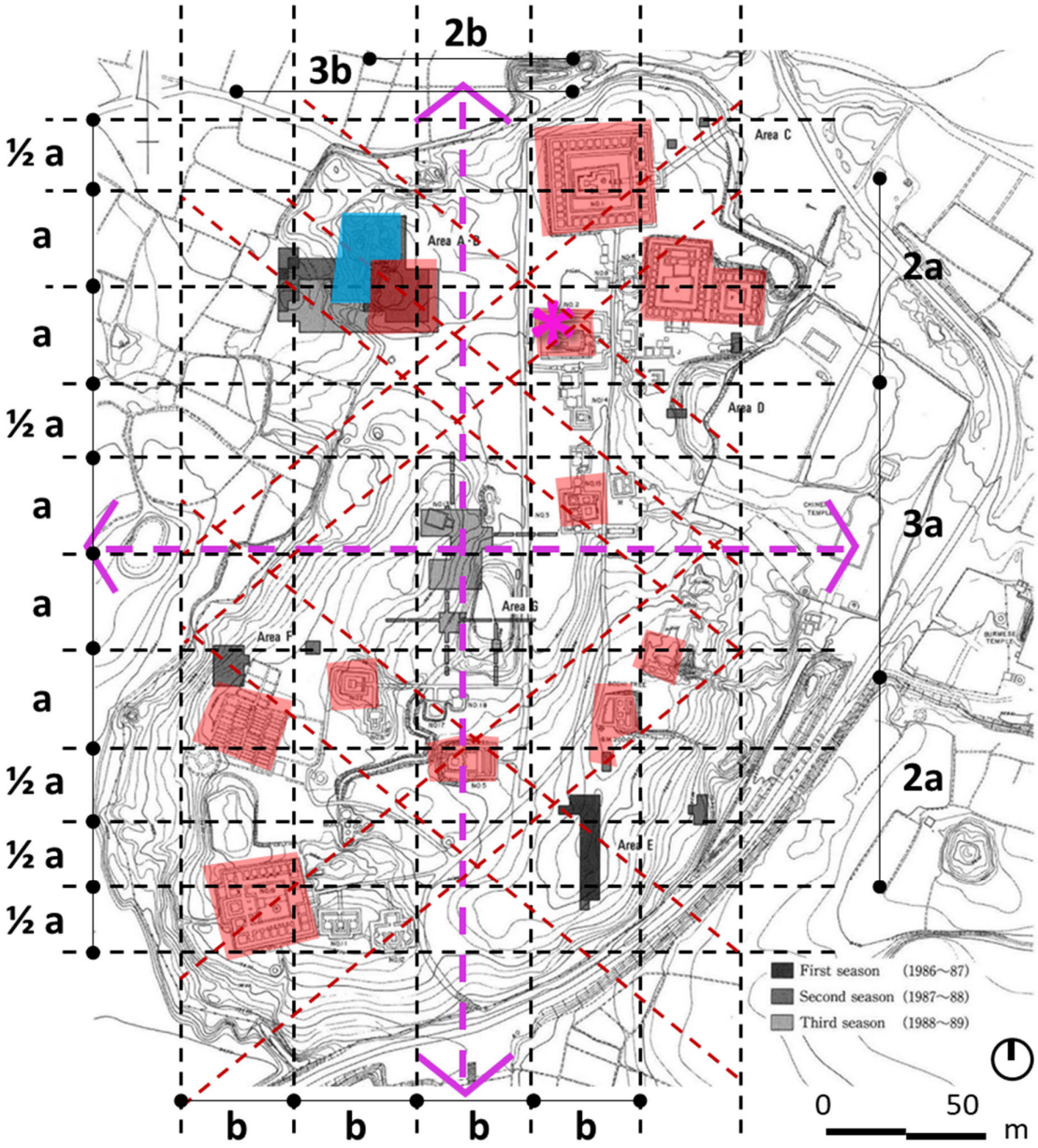


Figure 8-10: Jetavana monastic site; an interpretation of underlying dimensional order (source: author)

- The **physical geometric centre** divides the site into four directional quadrant. This follows Buddhist principle of having **major divisions** of site, especially **east-west**.
  East – temple and monastery aligning with full moon's orientation
  West – stupa as symbol of reverence to the souls attained nirvana

- The vertical grid dimensions (a) originating from the extent of "Gandha kuti", and this is replicated for Monastery external dimensions. The east facing edge of "Gandha kuti" marks the entry of monastery and temple adjacent to it.
  The "Bodhi Tree" is situated thrice the dimension from Gandhakuti northern edge; the entry to west quadrant monastery is five times its dimension.

- The horizontal grid dimensions (b) originating from the extent of "Gandha kuti", and the tank is built at twice the dimension. The monastery at western quadrant is set at triple of its dimension.
  The diagonal relationship works in setting the entry points and courtyards of monasteries. The central geometric space is a void and shallow land, signified as "sunya" ideology in Buddhism.

b. Sanchi monastery

i. With the stupa later units were set organically yet keeping the terrain undisturbed (Fig. 8-11).
ii. Water tanks were placed at lower levels and corresponded to panoramas.
iii. Natural vegetation was integrated.

- The **physical geometric centre** divides the site into four directional quadrants. This follows Buddhist principle of having **major divisions** of site, especially **east-west**.
  West/ North – stupa as symbol of reverence to the souls attained nirvana and temples opening or entrance orientation
  East – monastery openings or orientation of entrance aligned with full moon's rising

- The vertical grid dimensions originating from the extent of Stupa 1, and this is replicated for temples external extent. The stupa falls on the western quadrant.
  The directional angle originating from stupa's tilted toranas, keeps parallel to temples and equals the half dimension of it. The southern edge aligns with temples' and monasteries' entrances.

- The horizontal grid dimensions originating from the extent of Stupa 1. The tank is built at twice the dimension. The temple extent at eastern quadrant is set at double of its dimension.
  Stupa's Torana diagonal relationship works in setting the entry points and courtyards of monasteries. The other two stupas fall in the diagonal extended edge at northern quadrant. The central geometric space is a void, signified as "sunya" ideology in Buddhism.

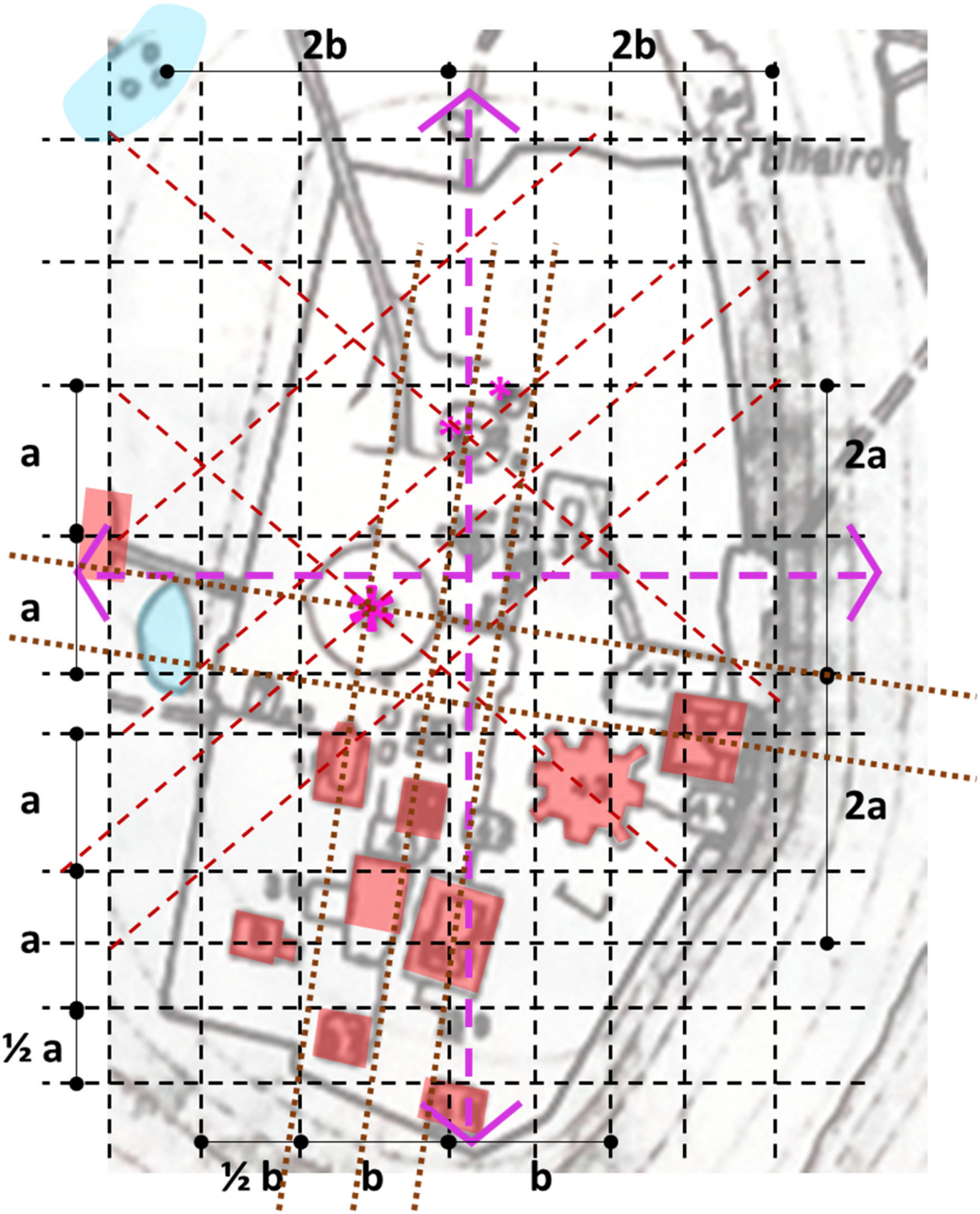


Figure 8-11: Sanchi monastic site; an interpretation of underlying dimensional order (source: author)

c. Bharatpur monastery

i. Mound is leveraged to create stupa's setting and view (Fig. 8-12).
ii. Natural drainage flow was integrated into the scheme.
iii. Vegetation was used to connect with surrounding green.

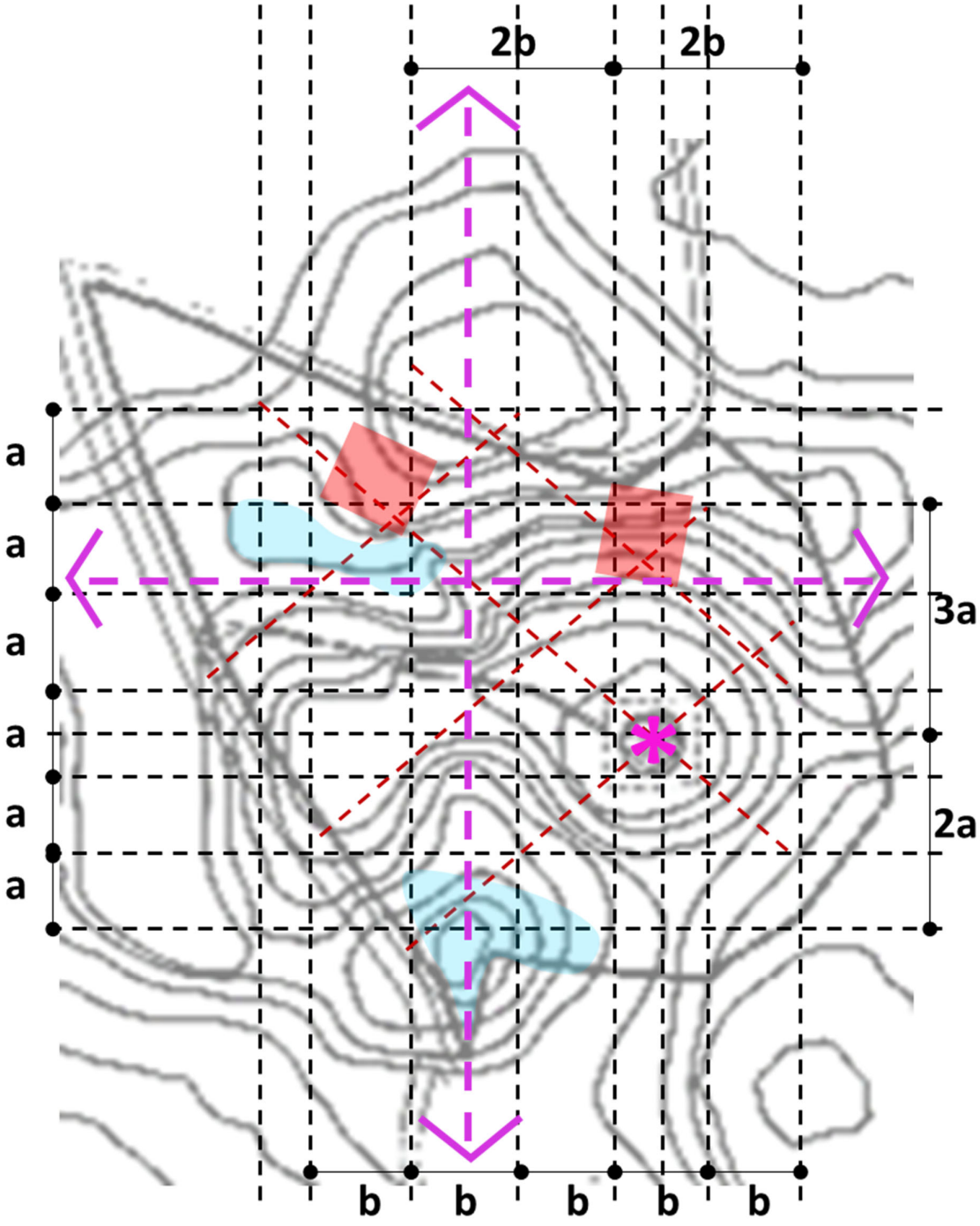


Figure 8-12:Bharatpur monastic site; an interpretation of underlying dimensional order (source: author)

- The **physical geometric centre** divides the site into four directional quadrants. This follows Buddhist principle of having **major divisions** of site, especially **east-west**.

  East – Stupa is placed at eastern quadrant with interpreted opening toward west
  East/ North – monasteries are located with southward opening or orientation

- The vertical grid dimensions originating from the extent of Stupa, and this is replicated for monasteries external extent. The stupa falls on the eastern quadrant, a later stage Buddhist ideology alteration or probably this is due to the virtue of largely unexcavated portion of the wider archaeological extent.

  The directional angle originating from stupa, keeps parallel to monasteries' entrances and/or courtyards.

- The horizontal grid dimensions originating from the extent of Stupa. The natural waterbodies or shallow retention areas are linked to the diagonals with twice and thrice the dimension.

d. Inference

i. Buddhist monastic site planning was always a holistic and harmonious spatial configuration with the landscape.
ii. The layering of physical and metaphorical elements was tied with each other to create a microcosm where natural parameters were given utmost importance.
iii. Contextual adaptation with respect to site setting was remarkable noticed.

9. Conjectural reconstruction of study sites

9.1. Analytical observations on spatial forms influenced by landscape setting

As discussed in chapter 2, literature review, the archaeological and historical explorations and interpretation conducted till date are primarily an attempt to understand the antiquarian value. Influenced by specific visitor's interest the site is unearthed and fitted with contemporary facilities like pathways, stairways or ramps. But these interventions were carried out without the understanding of actual spatial design or intent of the then builders. The impact, the landscape setting had on the spatial conformity of the monastic site planning is often overlooked. To bridge this gap, chapter 8 analyses the monastic layouts as interactive media of landscape and architecture. The eight interpretive characteristics traits takes into account the landscape spatial features. This helps to recreate the conjectural form of monastic landscapes with qualitative and quantitative approaches. The present chapter focuses and interprets landscape architectural values reflected through the creative visuals of the study sites of Jetavana, Sanchi and Bharatpur monastic sites.

9.2. Landscape architectonic principles to re-construct the conjectural forms

9.2.1. Background studies of previous attempts/ interpretations

As it is detailed out in chapter 2, there are a number of attempts taken to rediscover the Buddhist archaeological heritage. But in doing so the key essence of monastic practice which is environmental landscape programming was overlooked due to its overwhelming quantum of art-historical focus. The architectural marvel of that ancient era has been talked about and glorified over time. But the outcomes of such attempts were mostly textual adding to the existing knowledge repository.

A detail account on monastic layouts on their spatial terms are yet to be explored. Many parameters for historical accuracy are required to be accounted to recreate the original characteristics of the site. A lot of attention goes into analysis and interpretation of art works to derive the architectural and spatial conformity of the site with its extant remains.

Hence, only a few such isolated attempts could be found to reimagine the architectural forms as their description also can be found vividly. What lacks is the landscape character recreation. A meticulous study on the living media of the monastic sites, essentially the plant resources contribute maximum. Reading artworks or archival resources to extract the information provides appropriate clues in order to add landscape values to architectural conjectures of these cultural landscape monastic sites.

9.2.2. Lines of formal layout – axial arrangement

As mentioned in previous segment of theorisation of chapter 8, the axes connecting eastern and western cardinal points of the monastic planning schemes in the three sites were mostly

designed to stay confined to various built elements within site limit i.e. a physical boundary. It acted as an 'internal axis' or 'architectural axis' of the formal spatial layout. Moreover, the north-south axes of the site tend to extend beyond the site limit and connect to the wider landscape phenomena happening around. This can be regarded as 'external axis' or 'landscape axis'. Most significantly, this axial arrangements were never prominently pronounced positioning buildings at the culminating end. They were rather passing through the interstitial open spaces to connect with wider natural context.

Although the conservation and preservation work sometimes fail to take this original interpretation into account, efforts for restoring within site axial arrangement can be highlighted. Another unique observation is that though the axis passes through the site's internal open space and outside landscape, they do not create symmetrical layout. The siting of monuments or their habitable buildings were strictly governed by the topography and drainage pattern of the site. That is how the open space connect was more prominent in the formal layout.

The axis can be seen also progressing through staggered open spaces or different terraces naturally occurring at various elevation levels. Therefore, it is also imperative to take an architectonic approach in recreating the conjectural landscape experience of the monastic sites.

9.2.3. Siting and orientation of built structures

The extant composition of study sites or other monastic sites per say can be interpreted as combination of spatial and environmental forms. The original scheme's concept cannot be derived to the fullest as the surrounding landscape context has changed enormously. However, a few interpretive clues can aid to the understanding of this parameter.

As mentioned in the composite analysis of the study sites in chapter 4, 5 and 6 following Ian Mcharg's site suitability principle, the architectural element's siting can be appropriated. Linking their siting with landscape layers showcase the original planning decisions from the then time. This also throws light on the probable functional programming and landscape open space compositional factor.

The interplay and corresponding response to topographical features and aspect of the site can be corelated to the building forms. The openings, access routes are determined through this. Along with this another parameter of visual connectivity is closely associated which determines the orientation of the structures. A connection with other similar monastic sites, agricultural laity network or the scenic wider natural landscape gives rise to the appropriate orientation interpretation for the current research work.

9.2.4. Geometry of the scheme

As shown in chapter 8, the theorisation of landscape planning principles, the geometric composition of the study sites varies as per the natural settings. There are no strict geometric commonalities among the formal schemes of the monastic site planning. the landscape physiographic layers resulted in this site coherent geometry.

Topographically composed architectural elements are organised though following the cardinal axes. The directional composition was connected to the Buddhist philosophy of positioning structures as per their associated meanings. For example, the western direction was regarded as the space for deceased, so relic stupa used to be sited in the western quarter. The temples were oriented towards east.

So, the site inherent geometry was adapted to create monastic layout rather than imposed relational geometry.

9.2.5. Symmetry and asymmetry

As shown in previous chapter, the three study sites exhibit an apparently symmetrical order along the axial open spaces. But the elements arranged against these axes are not put with exact symmetry. The climax of the experience was not governed by positioning the most significant element at the end of axial journey.

In Buddhist philosophy the most important feature is relic stupa or Bodhi tree within the monastic precinct. The area beyond the anchor areas as mentioned in interpretive characteristics in chapter 8 are not arranged in symmetry.

9.2.6. Activities and functional elements and their programming

The current extant remains of the study sites only highlight the architectural elements and their importance in art-historical paradigm. The current study emphasises on reading the landscape with the open-vs-built space relationship which helps to visualise the three-dimensional features and technical programming of the design layout. As mentioned in previous chapter within the monastic precinct the most dominant religious, symbolic and programmatic element is the Relic stupa. This was connected with other entities on the site through physical as well as metaphorical forces. Although the three study sites did not follow a strict geometrical shape of their sites but an underlying four-quartered layout was ingrained. This asks for a renewed approach to associate architectural elements with the open space programming of the site.

The landscape layers especially the topographic features and hydrological features determined the siting principle of the built elements. the inter-relationship among them evolved through the landscape media only. Therefore, it is very important to perform a comprehensive investigation to establish the conjectural reconstruction.

9.2.7. Spatial depth and visual limits – impact on site composition

The current study showcase that the open spaces laid out within the sites in front of the anchor elements act as spatial foregrounds in order to link visually and philosophically with the natural landscape lying outside. The best example can be cited as Sanchi monastic site. The almost rectangular layout of the main terrace is associated with the four-quartered feature. Each quarter opens up to panoramic view of other hilltop Buddhist sites, natural landscape or nearby urban centres with agrarian lands. The same is leveraged with Bharatpur monastic site set against the riverbed of Damodar River. The anchor element, relic stupa is posited on high ground to create a contrast and also point of visual arrest. The stupa is visible from the

unhindered aquatic trade route and vis-à-vis the panoramic view is also leveraged from within the site. The outward and inward views connected to Buddhist philosophy of '*dassana'* as discussed in chapter 2 and 8. However, in the forest grove site of Jetavana, the visual connection from within the site is not very prominent. The forest canopy cover extends into the outer forest cover of flood bed of ancient river *Achiravati*.

The conjectural reconstruction of monastic sites adopted the outer landscape as natural setting to offer panoramic view from the highest points of the sites. The entire panoramic view for its spatial layout connecting the regional landscape was considered as main design constituents of the monastic planning scheme.

The natural setting and landscape layers (topographical features such as hillock, mounds, native forest cover, hydrological features such as drainage channels, riverbeds or water impounding areas) as well as cultural landscapes (historic urban centres, other monastic sites, agrarian laity settlements, man-made water reservoirs) were treated as significant features of the spatial organisation.

9.2.8. Attitude to symbolism and expression in spatio-environmental form

Symbolism played a major role in Buddhist monastic site planning. the idea of 'dassana' as elucidated in chapter 2, 5 and 6 are major exemplars in these interpretive characteristics. The relic stupa believed to be as the manifestation of historic Buddha himself was also considered as manifestation of natural forces. The varied topographical features were leveraged to imply this philosophical construct on the study sites under consideration.

9.3. Interpretive re-conjectural reconstructions of three prototype study sites

9.3.1. Forest grove site – Jetavana, Uttar Pradesh

Figure 9.1-1: Bird's eye view of Jetavana monastery showing landscape context (source: author)

Figure 9.1-2: Aerial view of the monasteries mingled within forest cover (source: author)

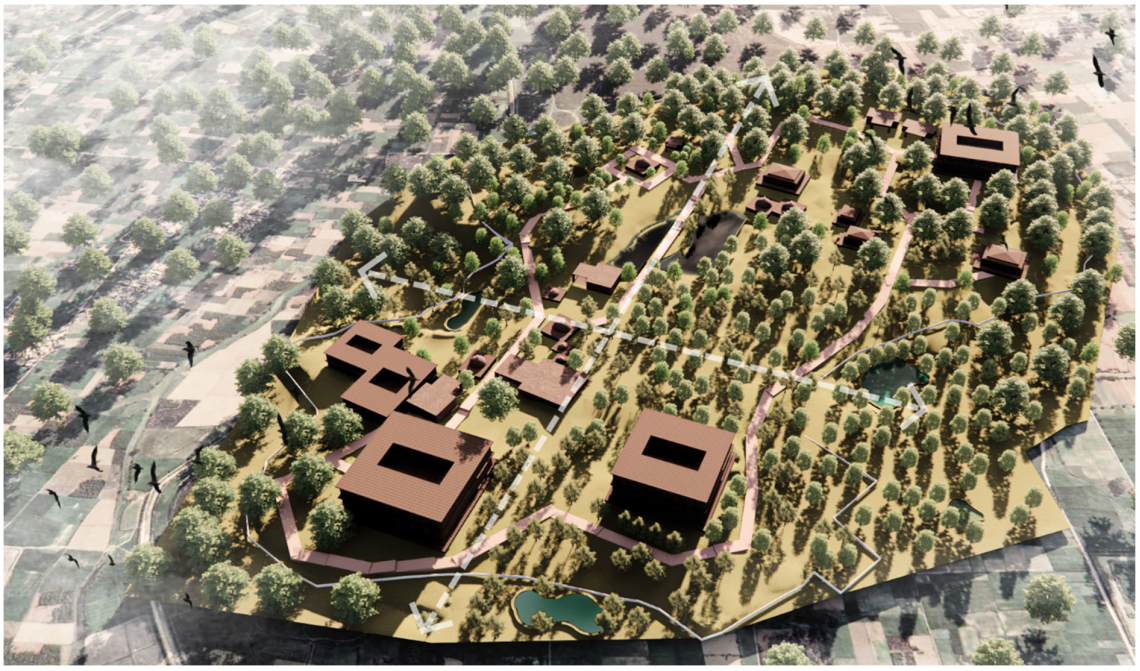


Figure 9.1-3: North-south and East-west axes passing through open space within Jetavana site (source: author)

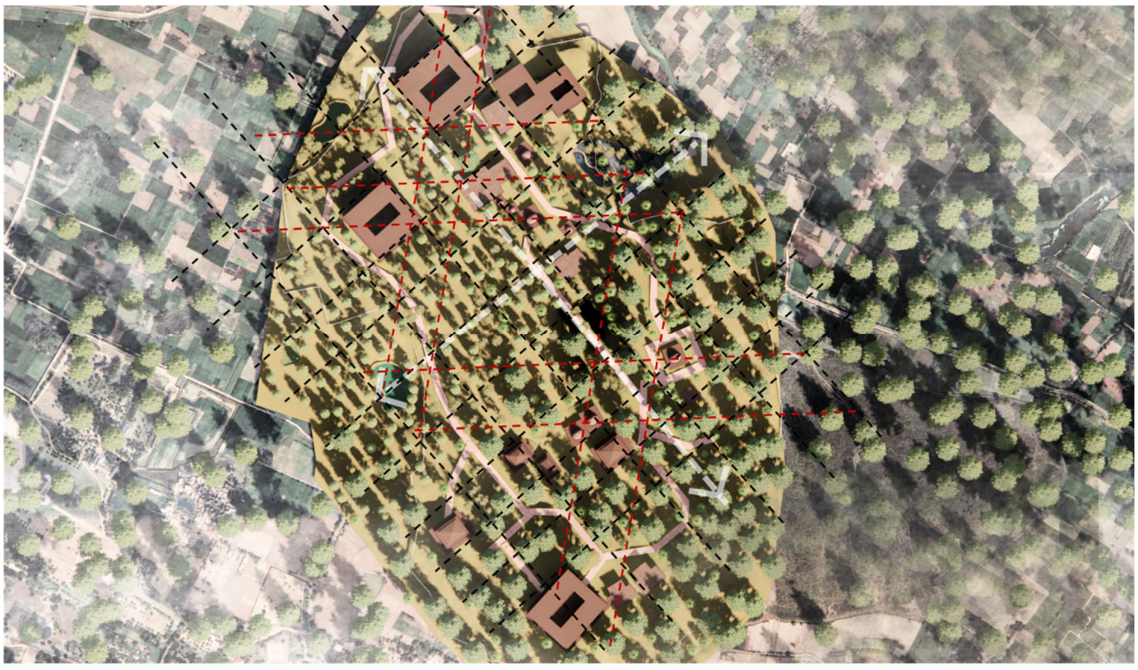


Figure 9.1-4: Interpretation of dimensional order and inter-relationship among built elements (source: author)

Figure 9.1-5: Conjectural reconstruction of open space and pathway connections within site (source: author)

Figure 9.1-6: Monastic activities within open spaces of precinct

9.3.2. Hilltop site – Sanchi, Madhya Pradesh

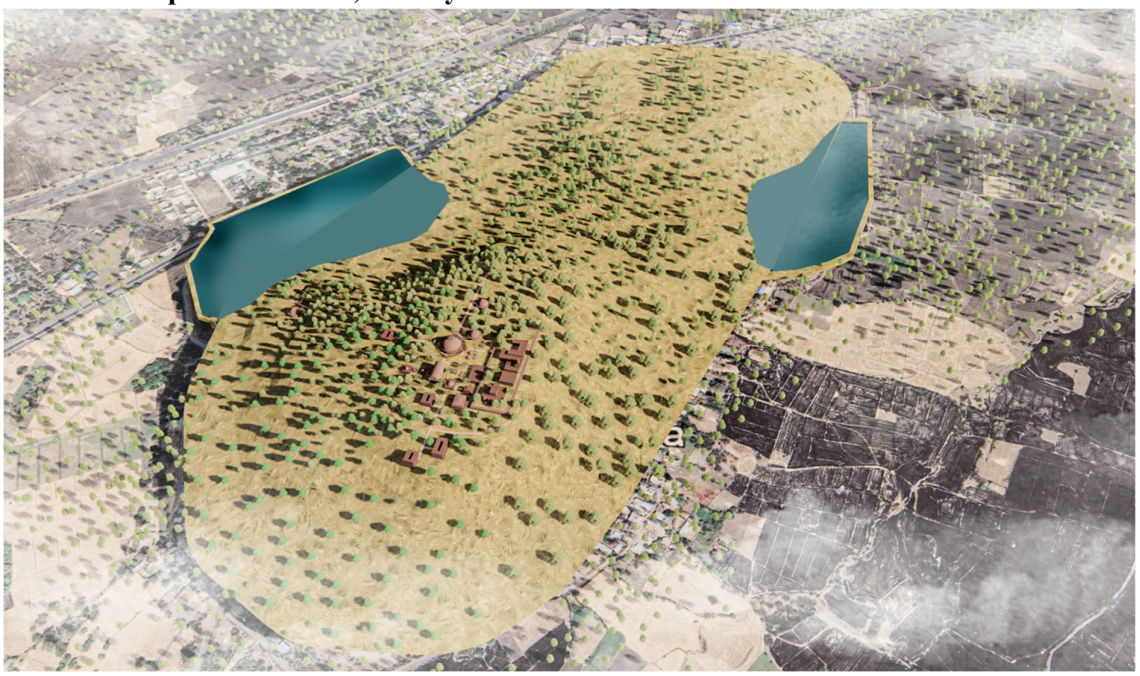


Figure 9.1-7: Bird's eye view of Sanchi monastic site showing hillock landscape context (source: author)

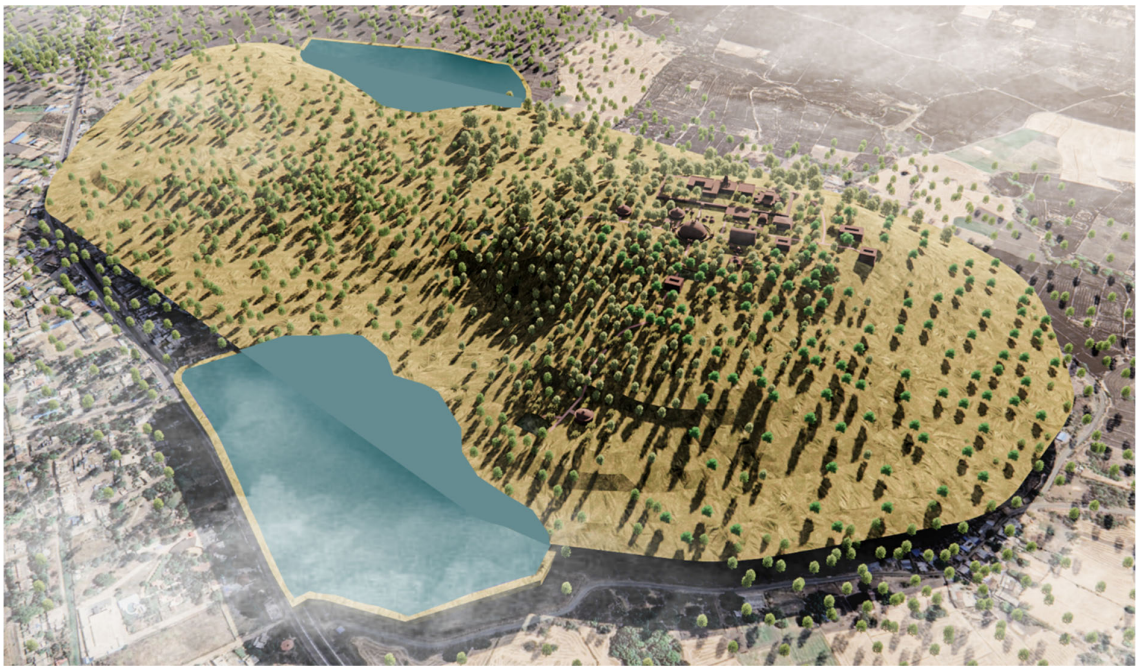


Figure 9.1-8: Hillock and water impounding areas in wider landscape context (source: author)

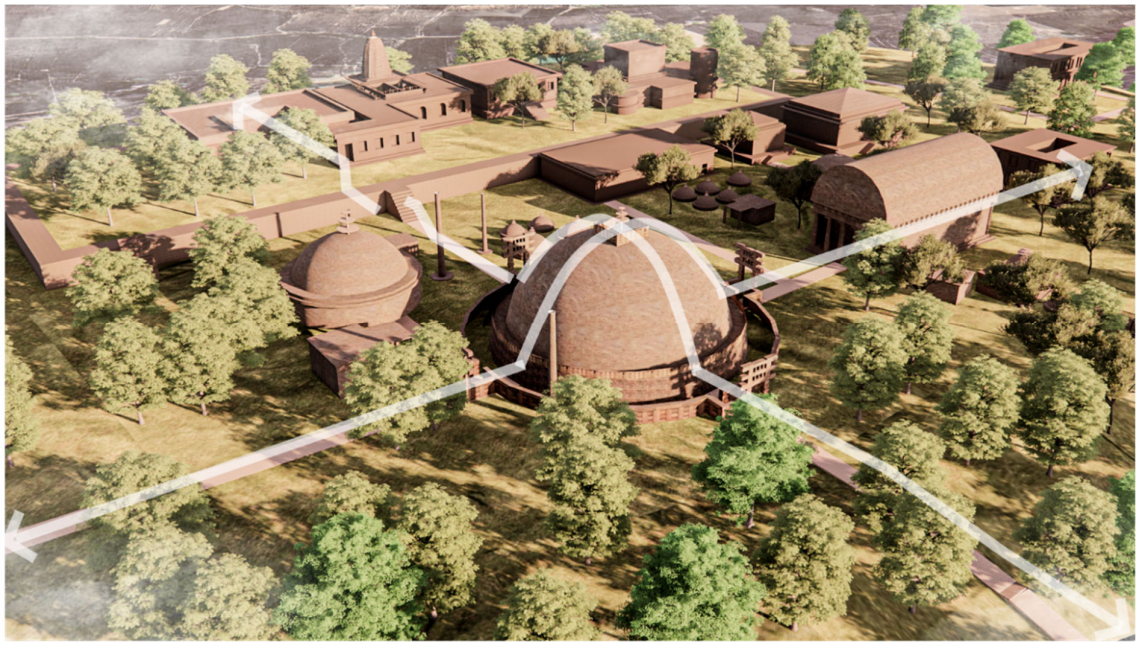


Figure 9.1-9: North-south and East-west axes passing through open space within Sanchi site (source: author)

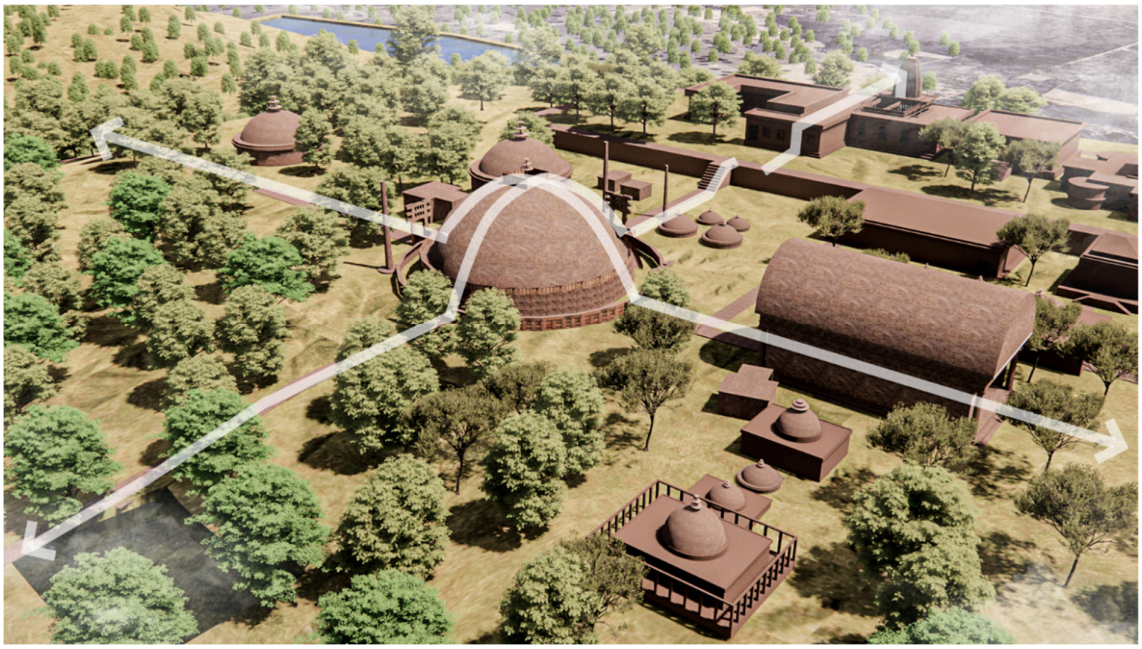


Figure 9.1-10: Axial connection passing through Stupa 1 in Sanchi site (source: author)

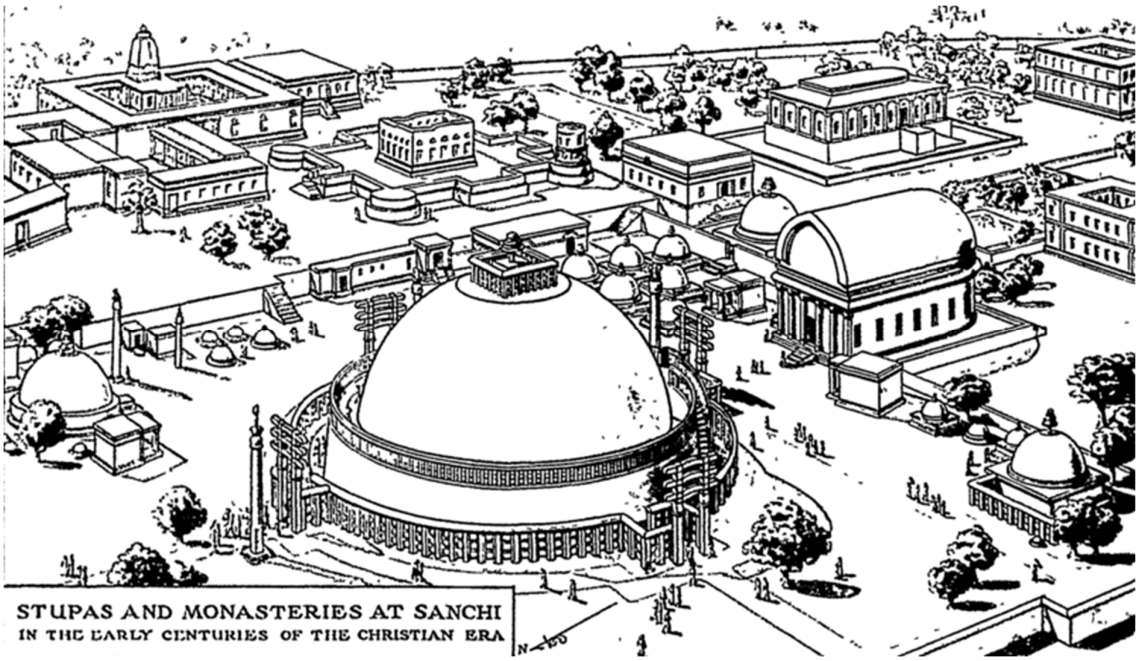


Figure 9.1-11: Architectural conjecture of Sanchi monastic site (source: Brown, P., Indian Architecture (Buddhist And Hindu Period), 4th edition, 1959, Treasure House of Books, Mumbai)

Figure 9.1-12: Landscape reconstruction of Sanchi monastic site (source: author)

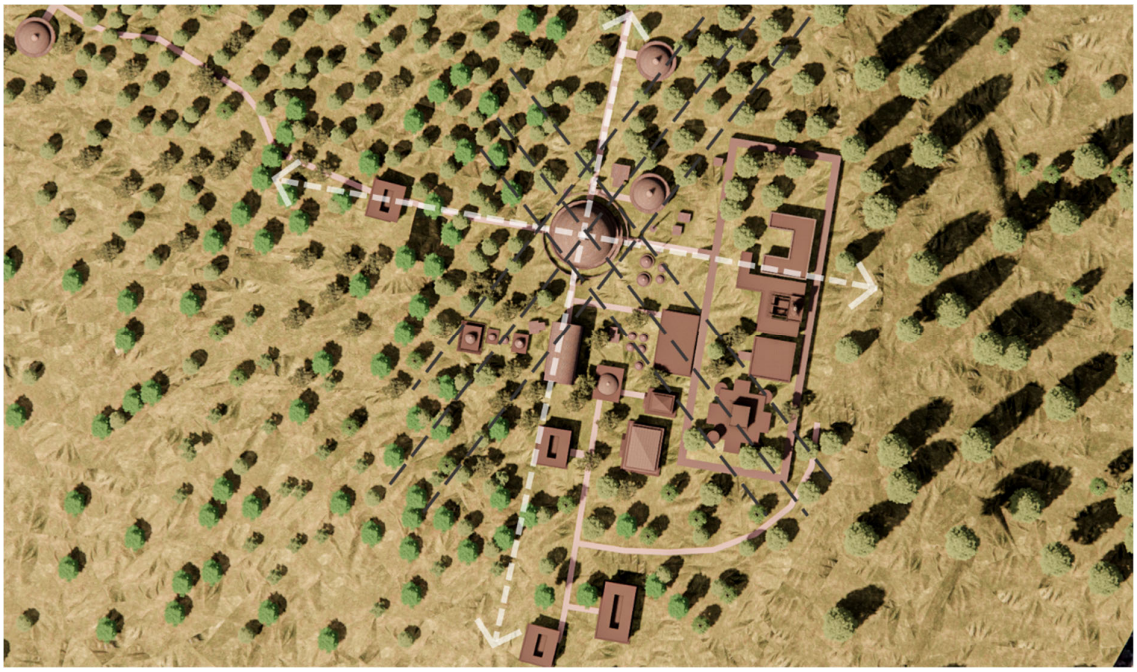


Figure 9.1-13: Dimensional order and inter-relationship among elements of Sanchi monastic site (source: author)

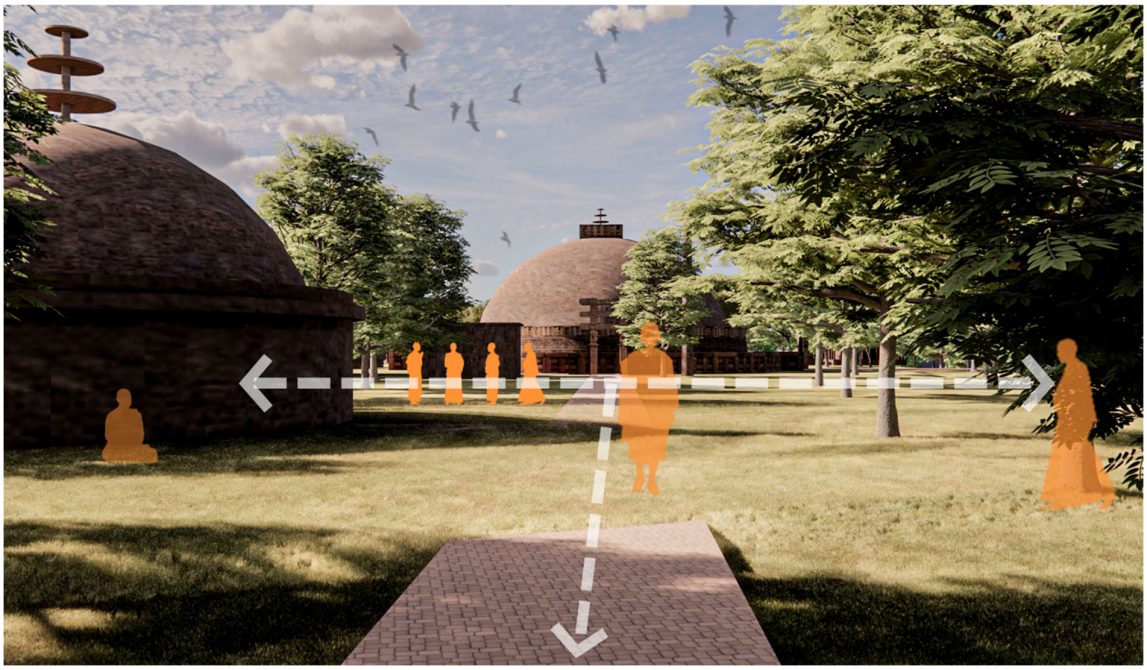


Figure 9.1-14: Monastic activity in open spaces inside Sanchi precinct (source: author)

9.3.3. Riverine flood plain – Bharatpur, West Bengal

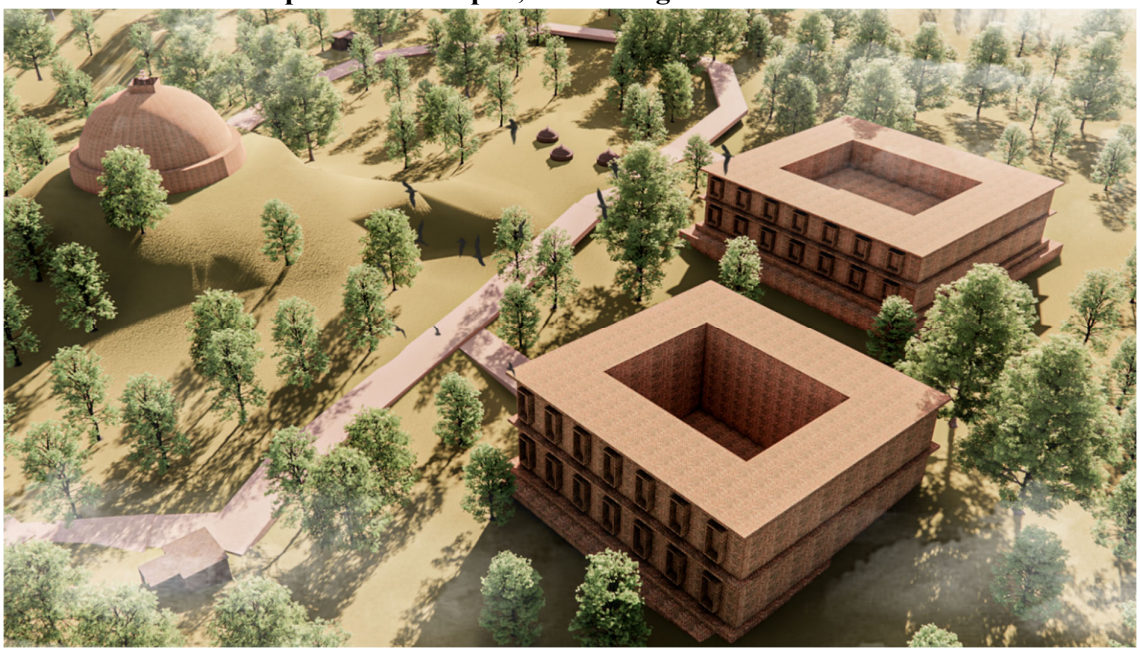


Figure 9.1-15: Bharatpur monastic site in its wider landscape context (source: author)

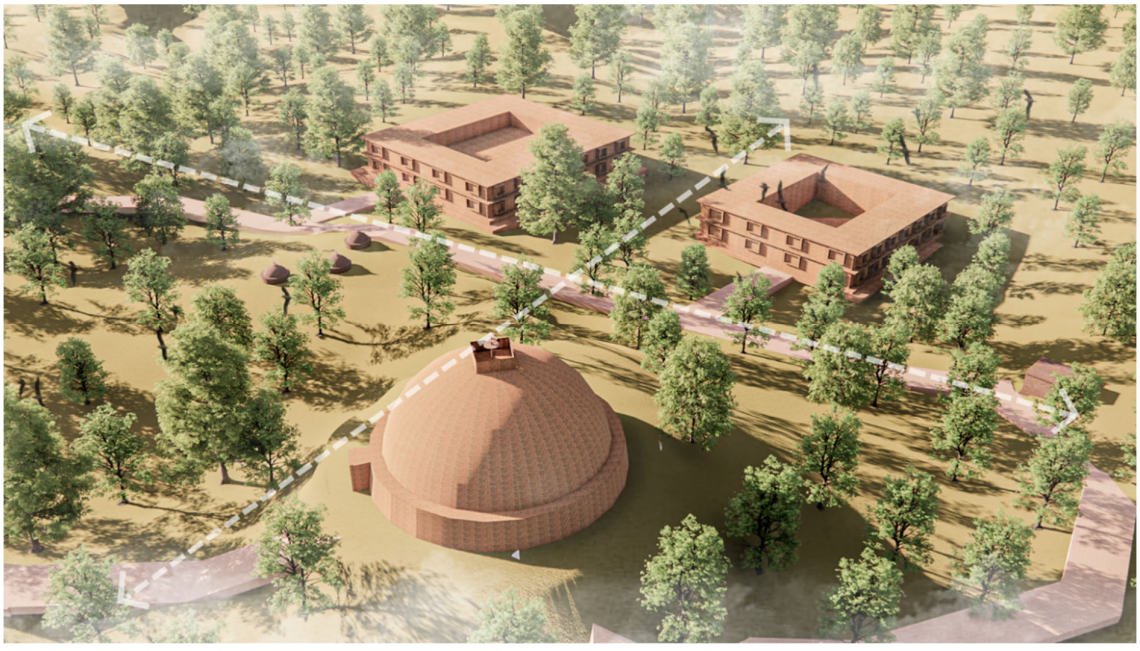


Figure 9.1-16: Axial arrangement of anchors and open spaces within Bharatpur monastic site (source: author)

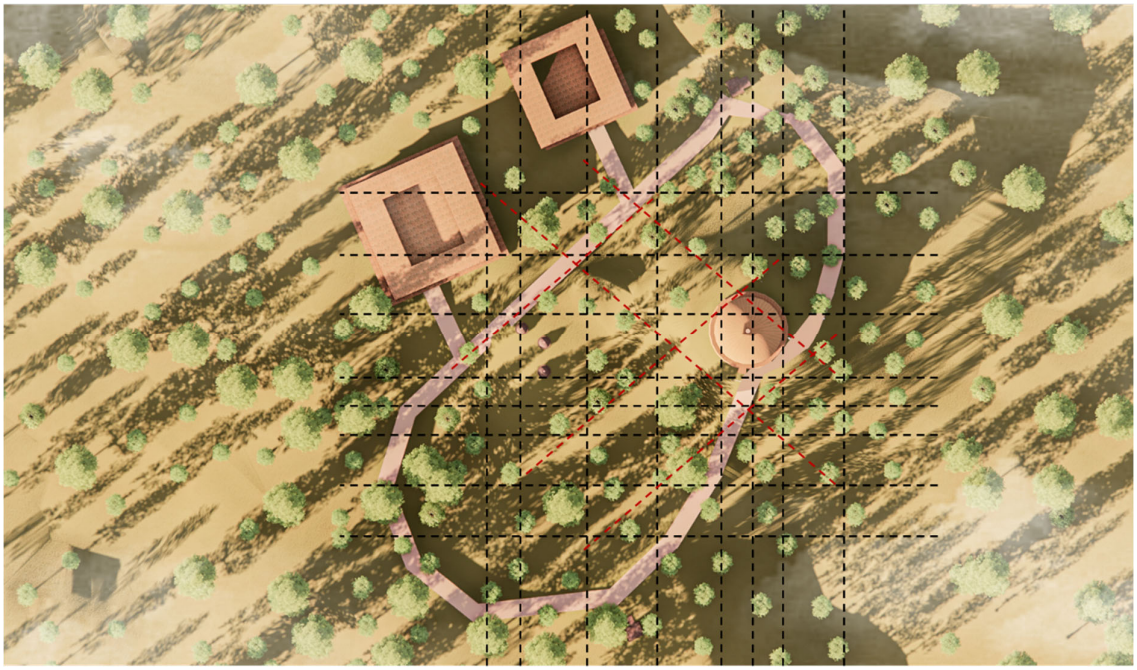


Figure 9.1-17: Dimensional order and inter-relationship among built elements in Bharatpur site (source: author)

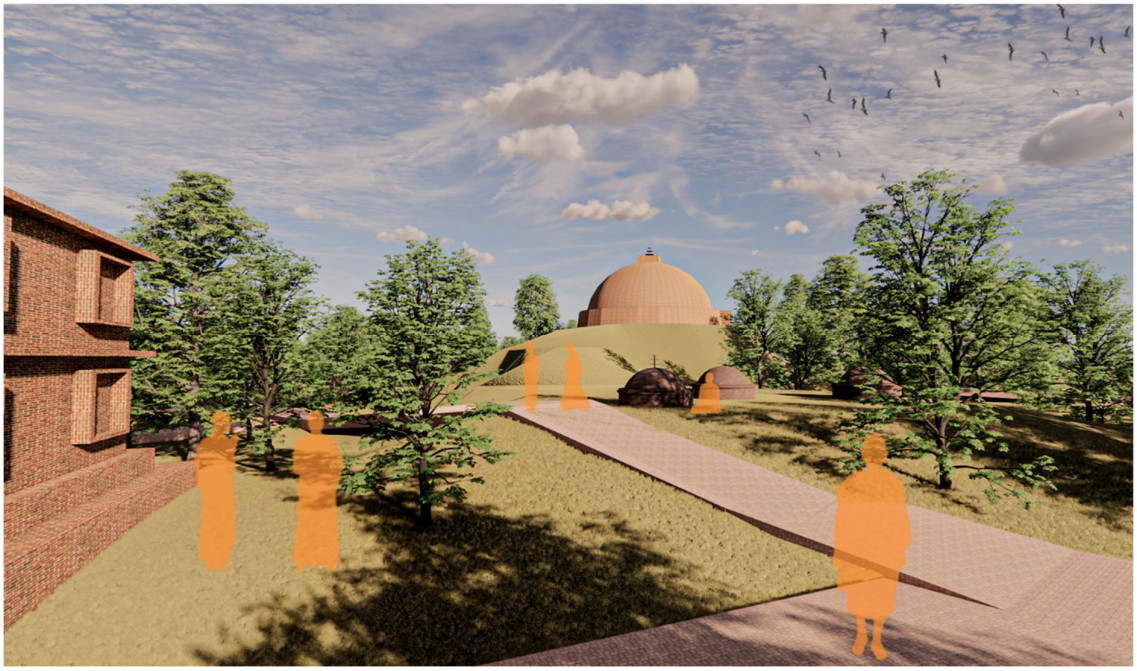


Figure 9.1-18: Monastic activities in Bharatpur site (source: author)

10. Conclusion

10.1. Analytical observations on spatial forms landscape design characteristics of Buddhist monastic sites in India

As discussed under Chapter 2, the preservation and representation programmes conducted till date within the precincts of the study sites are principally an attempt to reinstate the architectonic morphology. The archaeo-historical and topographical features uncovered through excavation, with the principal objective of enhancing the antiquary character of the monuments and its art-historical value. As such, except the elements that are related to visitor experience and to practical reasons, such as connecting pathways, steps, ramps and contemporary style horticulture work or planting the general strategy adopted with regard to the spatial layout is 'minimal' intervention to the archaeological extant. However, the current research indicates apart from archaeological and art-historic values, the Buddhist monastic sites have landscape architectural and environmental values reflected by several attributes. To prove the study hypothesis these attributes are analysed based upon the research questions and their corresponding objectives.

Since the key objective of the current research is to interpret Buddhist monastic sites as a landscape architectonic design, it is imperative in this section to recognize its unique landscape planning principles (ULPP) based on the observations of the analysis carried out in Chapter 4, 5 and 6. These ULPP in turn imparted the distinct identity to the Buddhist monastic sites under current purview as envisaged in chapter 3. These landscape characteristics are represented with the design tools, principles/ rules and traditional environmental techniques utilised by the ancient designers of monastic sites under the four aspects: the elementary form, spatial form, philosophical form and environmental form. All these forms or expressions have their own meanings relating back to Buddhist eco-philosophies and environmental ethics.

10.1.1. The elementary form or landscape form

The basic forms of the three monastic study sites are governed by many landscape factors. But to begin with, the three different types of geomorphologic characteristics associated with three different sites makes the first impression on spatial planning. Whereas in Jetavana site the undulating ground provides a ground to set the monastery mingled with the forest cover, the Sanchi and Bharatpur site posed a visual contrast. The high plateau at Sanchi rising 97m avg. against the flat agrarian plains dominated the natural landscape. Leveraging this the stupa was set atop the hillock offering 360º panorama. The steep slopes around it renders the site challenging to access. In the case of Bharatpur site, the archetypal positioning of the relic stupa on the hydrological regime did strengthen local political and religious prowess. The pattern emerged from natural and agricultural drainage around the site with agrarian settlements undoubtedly served the reasons for suitable selection of the site as discussed in chapter 6. The orientation, natural and architectural axes, four-quartered spatial arrangement, dimensional order of the comprehensive site planning scheme were also governed by the natural features of the sites.

The major line of sight or visibility with regard to the dominance of the relic stupa or Buddha's staying chamber created the design interventions accordingly with the influence from natural landscape layers. The physical extents of the sites were determined and impacted by the topographical setting of the sites and their regional settings. In case of Sanchi, the natural morphologic characteristics of the hillock and lower terraces at western side were leveraged to place the monasteries and other stupas. The open spaces acted as foreground to these architectural pieces and also created a visual link between terraces at various levels. What goes into design consideration more prominently is the treatment of panorama. The hillock offers 360^{o} panoramic views of the natural and agrarian landscape. The lower terraces as can be seen occupied by the monasteries and temples offers views to other hilltop sites or urban centres. Bharatpur monastic site, though not situated on very high ground followed the same principle of creating a contrast against the widely spread flat terrain. Although such design decision of having an exposed scheme had undoubtedly made the then designers to invent technical solutions for strengthening the buildings and orienting them as per natural and climatic phenomena such as prevalent wind flows or monsoon rains.

The apparently scattered built elements within the monastic precinct is actually a direct response to the comprehensive understanding of natural setting no matter whatsoever it appears haphazard or unthoughtful spatial planning. The terrain and other physiographic features were utilised to the maximum to connect the built spaces with pathways in a low key manner in order to facilitate human movement and also physical as well as visual structuring of the site.

Therefore, the design responses at the three Buddhist monastic study sites reflect the inherent wisdom and traditional knowledge system of landscape design and planning. It was considered as the suitable contextual modificaton to the natural landscape and physiographic features of the wider landscape. Most of the site planning principles show that the unique features of the natural, cultural landscapes shape the monastic landscape. The unique geomorphological and natural landscape features associated with the sites, therefore, had acted as primary inspiration for the then designers and builders.

10.1.2. The spatial form or organisational form

The panoramic view oriented spatial conformity is organised in the hierarchic order of the relic stupa, gardens if any or place of exchange between monk and laity and wider natural landscape setting outside to emphasise the stupa as the essential anchor in the spatial system.

The site planning mostly consisted of three discrete spatial grouping or categories. The stupa or Buddha's chamber (principal anchor element on elevated ground), the temples and prayer halls and congregational open space (semi-private spaces where monk and laity could mix up) and the ritualistic spaces and residential units such as monasteries (private core where laity was not allowed). This entire spatial conglomeration was set not to impose on the landscape regime rather integrate with the natural systems. By placing the stupas or Buddha's chamber on elevated land and mostly highest level of the overall site, the visual boundaries were not narrowed to the physical limits of the spatial layouts. The monasteries were specifically

oriented for the wider visual connect and it created impressive spatial depth from the regional landscape.

The compositional balance was also achieved in the scheme by aligning the cardinal axes running through east to west and north to south through the interstitial open spaces amidst the landscape. The overriding elements of spatial configuration both architectural such as monasteries, temples and others as well as natural elements such as Bodhi tree, the herb gardens were aligned against the principal axes.

10.1.3. The philosophical form

The hierarchical organising of philosophical foundations to emphasise the divine and sacred character of the site. The relic stupa's presence in the scheme was considered as most significant linkage to Buddhist philosophy and ethics. Stupa was regarded as manifestation of the historic Buddha himself after his Mahaparinirvana. The landscape influenced visual and spatial structuring pattern of the design consisted of several visual and spatial layers arranged along the anchor element, the stupa. The stupa was considered as the point where axis mundi of Buddhist cosmic landscape passed through. With the mammoth volumetric imposition stupa was intentionally made the dominant philosophical or metaphorical traits of the formal site planning scheme. This cosmographical composition was probably intended to impart the divine and sacred position of the monastic establishments.

The order of planning of built elements reflected the cosmological pattern. This represented the sites' intrinsic watershed system also. The drainage patterns and flow of water to wider landscape setting represented virility on mundane world. If the site planning scheme of Sanchi is considered the lower terrace at western side is placed with a man-made tank at the foothill of first terrace where the stupa was positioned. The vertical sequence of spatial and visual structuring gives an interpretive imagery if the water is originating from the stupa at the hillock summit. But a distinct pattern of scheme in Buddhist designed landscape is that the natural resources were not given various aesthetic form but leveraged them for utilitarian purposes. The evidence can be seen in Sanchi and Jetavana where lowest points of catchments were converted to ponds or tanks. The natural entities were kept natural following Buddhist environmental ethic as described in chapter 7. By devising such principle, the hydraulic engineering had reached its glory at the outside landscape.

10.1.4. The environmental form

The spatial planning scheme consisted of several programmatic domains which were direct response to the landscape setting. Environmental considerations such as local climate, topographic features, hydrological pattern, vegetation resources influenced the shaping of monastic establishments. The detail analysis in chapter 4, 5, and 6 showcase the meticulous site planning skill based on environmental understanding. They interpret the influence of landscape/ environmental forces on the architectonic planning and composition of monastic sites (Fig. 10-1).

The elevated locations of the relic stupas or Buddha's staying chamber was symbolic representation of the divine nature that dominates the entire landscape of laity around this. As this was considered a mean to manifest Buddha's symbolic presence the environmental consideration to keep their most significant monument free from flood or any invasion was commendable. Bharatpur's riverine flood plain always posed a threat of flooding and restructuring of the natural land profile. Positioning the stupa on a high mound eliminates the flooding risk.

On the other hand, the hilly terrain of Sanchi, which was associated with more programmatic functions, the scheme was freed of rigid axial arrangement. Preserving the highest elevation for the most sacred element the rest of the site was kept with its natural setting. The steep slopes in the watershed remained undisturbed in order to contribute to the regional drainage and agrarian irrigation pattern. Similar hydrologic measures could be seen at Jetavana monastic site. The undulating forest land was followed to their fullest potential to locate the built elements. The localised drainage corridors were channelised to the lowest catchment points to collect rainwater for sustenance of monastic life.

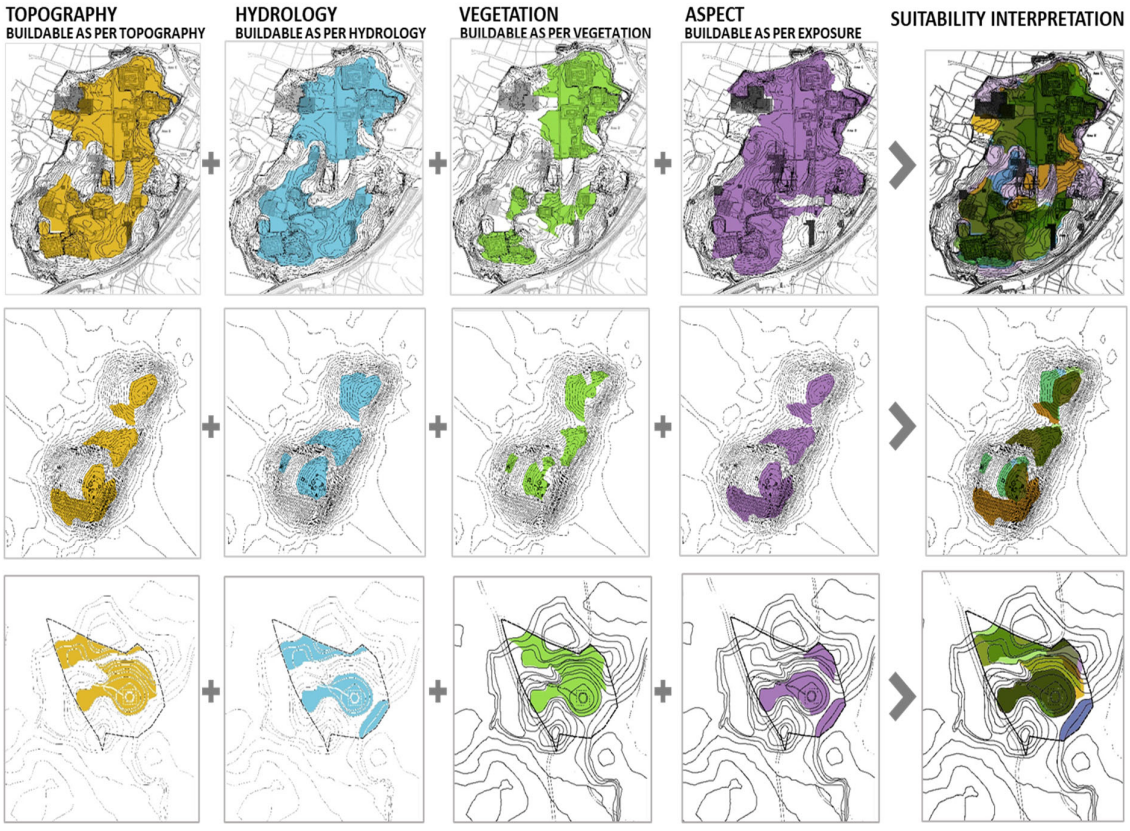


Figure 10-1: Environmental form evolution in the monastic sites of Jetavana, Sanchi and Bharatpur (source: author)

The three varied geo-climatically located sites adapted to the natural settings and reciprocated to regional landscape system with their cultural landscape interventions. The comprehensive understanding and interpretation of the environmental adaptation and the evolved forms are provided in the table 10-1 which proves the research hypothesis with full merit.

Table 10-1: Comprehensive understanding of environmental forms of Buddhist monastic sites (source: author)

Category of site → / **Characteristics ↓**	**Forest grove site: Jetavana**	**Hilltop site: Sanchi**	**Riverine floodplain site: Bharatpur**
Major influencing natural factor	Existing forest cover	Hilly and plateau terrain	Major perennial river and its seasonal flood
Secondary influencing factor	Water regime	Water regime	Flat terrain
Spatial outcome	Built units are placed on elevated ground	Built units are at elevated ground, man-made water tanks at lower areas	Built units are placed on elevated ground
Visual composition	Inwardly focused on Gandha kuti (Buddha's chamber)	Outward panorama towards other Buddhist sites & vice-versa	Outward panorama towards trade route and vice-versa

10.2. Assessment of research questions and objectives

After successful proving of the key points of hypothesis the next task is to examine and assess whether the findings of the study are able to answer the research questions proposed with their respective objectives in chapter 3.

10.2.1. Buddhist monastic landscape as architectonic conformation and common compositional characteristics

'Composition' as an environmentally responsive landscape ideal is the way in which the monuments and designed landscape elements are assembled and integrated in Buddhist sites. As mentioned in research question 1 whether the monastic sites from varied geography and landscapes belong to one family of common characteristics this discussion can throw some insight. The architectonic analysis of the built landscape revealed that there are certain qualitative parameters followed in all the study sites to achieve environmentally viable spatial conformity. Following the rules of normative literature, non-invasive construction, spatial conformity, visual connectivity and eco-friendly development process resulted into architectonic whole for the Buddhist monastic sites. Composition combines and activates all the above-mentioned aspects of spatial manifestation into a structure or form that permits reading and interpretation, over and above the boundaries imposed by the programme or the construction (Steenbergen, 2008, p.17). In this line of thought the composition is at the core of architectonic design and determination of the architectonic quality.

The analysis carried out in Chapter 4, 5 and 6 made it possible to identify a number of essential elements that are/ were active in the spatial operation of the design (the compositional elements or identifying traits). The compositional scheme (figures 6.8, 6.9) shows these active

compositional elements in relation to one another. With regard to the qualities of landscape architectonic composition, Steenbergen and Reh (2003:388-389) use the standards stipulated by the Roman architect Vitruvius (1st century BC), that is 'utilitas', 'firmitas' and 'venustas' or utility, solidity and beauty. These themes enable one to see how various aspects, layers and elements enhance each other and fit together to assemble a coherent landscape architectonic composition.

Function or utility-based composition: The analysis shows that there is a clear functional zoning with different functional domains with some of the domains, the pleasure garden in particular, having a multifunctional character. There are also deliberate degrees of mixing between individual, collective and public activities in each of these functional domains. The landscape design of monastic sites, while facilitating the enjoyment of nature, sensual pleasure and leisure (otium) and the king's efficient rule of the country (negotium), also provides a planned balance between otium and negotium. This functional organization is clearly expressed in both the ground plan and the spatial structure of the complex.

Integration with architectural or natural mass: The composition integrates everlasting geological features (central rock pillar and the geomorphology of the wider landscape setting) in a basic geometric pattern. The composition has a very strong but yet simple basic pattern (axes, rocks), so that it can be reduced to the basic elements without losing its fundamental dramatic power. There is also a strong formal coherence between different elements and layers of the plan; they are complementary to one another and reinforce each other (for instance, the divisions and measurements of the ground plan have their own meaning, but are also a necessary condition for the unfolding and sequence of spaces, as well as for the observation of the panorama from the rock summit; the position of the pleasure garden just outside the hilly terrain along the principal axis has a specific role in the spatial structure but also facilitates the interaction of different social strata in the programmatic structure; the four-quartered feature has different meanings and roles to play in material, spatial and programmatic structure). The composition is based on long-term functional, social and cultural elements that are influenced by the traditional attitude towards nature, cosmology, discourse on kingship and the philosophy of water management of society. As such the composition has a stable and durable character.

Site aesthetics-based composition: The basic plans of the monastic study sites are anchored in the (natural) topography by a careful geometrisation of local natural features. These are slightly transformed and nevertheless skillfully exposed in a new dramatic way. This gives the monastic sites a high degree of local specificity and originality. The spatial effects of Buddhist monastic sites are organized in scenographic sequence – viewpoints and panoramas that reveal the composition step by step from a monument-oriented to a panorama-oriented one. Thus, the composition spans all scales of human perception. The metaphoric interpretation and materialization of nature culminating in the landscape fabric on the site and water features add a specific cultural way of reading, understanding and dramatizing nature and the natural conditions.

All these point out that the landscape design of the monastic sites constitutes multiple design layers and multiple layers of significance. The present study, therefore, demonstrates that the

various aspects, layers and elements enhance one another and bind together, thus assembling an architectonic composition with material-spatial-metaphorical functional coherence. Although such observations would naturally tend to raise questions as to who and with what professional background designed The Buddhist monastic sites at Jetavana, Sanchi and Bharatpur (an architect? landscape architect? did landscape architecture exist as a specific design discipline in ancient India?), how the complexes were actually designed (the design process?), it is not the intention of the present study to answer such questions; the facts regarding these might be forever lost in time and history. Whatever the answers are, the present study clearly shows that Buddhist monastic sites can certainly be read as a real landscape architectonic composition. It has both general and very specific (unique) landscape architectonic elements, aspects, characteristics and qualities.

The three monastic study sites could be regarded as distinguished landscape architectonic interventions.

10.2.2. Influence of natural forces and ethnobotanic contribution of Buddhist monastic practices

The influence of natural or environmental forces on the landscape architectonic planning and composition of monastic sites were revealed through this current study which was also inquired in research question 2 in chapter 3. The detailed physiographic analysis conducted in chapter 4, 5 and 6 demonstrates the influence of various topographic settings on the design and planning of three study sites. The designs were nothing but skillful adaptation to varied geo-climatic parameters.

The design expressions are different in each case. It is remarkable how the ancient builders and designers leveraged the site resources to manifest Buddhist philosophies and intangible environmental ethics into spatial configuration. Whatsoever the final outcome the recurrent theme was common; environment friendly planning and sustainable resource management to reflect on the minimalist way of habitation within the natural settings. Here is a summary (Table 10.2) of natural forces which shaped the Buddhist monastic sites under current purview,

Table 10-2: Influence of natural parameters on the landscape planning of monastic sites

Sites ➡ Parameters ⬇	Jetavana forest grove	Sanchi hilltop	Bharatpur flood plain
Major influencing element	Forest land, vegetated park land.	Plateau condition, contrasting flat land around.	Flood prone riverine plain, vulnerable to erosion.
Other influencing element	Ground water regime potential of natural storage due to proximity of Rapti river.	Surface water regime due to hot-dry climate; essential stormwater storage and management.	Abundance of water, emergent agrarian surrounding.
Adaptive measures	Positioning Buddha's chamber "Gandhakuti"	Stupa was located at the highest tabletop as	Stupa was positioned on a high mound creating a stark

Sites ➡ Parameters ⬇	Jetavana forest grove	Sanchi hilltop	Bharatpur flood plain
	on higher elevation at forest opening. Lowest point of site at N-W converted into tank to collect all the runoff. The ritual spaces were keyed within forest buffer to cut off laity.	highest honourable monument. Moderate hill slopes on S_W side were used to house the residential units. Foothills were dotted with man-made tanks to arrest runoff from upper elevations.	contrast against the flat landform and also to protect from floods or inundation. A lot of shallow ponds or ephemeral water dots existed to drain the relatively higher ground.
Spatial outcome	Consciously curated designed elements which connects open and built spaces. Buddha's chamber at highest elevation to impart sense of natural sacredness. Following a spatial hierarchy the next immediate slopes are dedicated for various temples.	Stupa at the highest open ground. The next elevations are populated with temples and ritualistic spaces. Furthermore, the residential units are set apart in seclusion leveraging the challenging slopes. So a multi-layered spatial scheme was evolved.	Dominating dome structure left its mark on the ground. It did set a spatial tension between trade route and consumer sites or lay communities. The residential units were laid at lower elevations; not to contest with the stupa.
Visual composition	Inwardly focussed considering the forest cover. "Gandhakuti" positioned at higher elevation is made visible from other temples complying to Buddhist philosophy of "dassana" but in altered way.	Positioned at all sides open hilltop leveraged the Buddhist philosophy of "dassana" to the fullest. Stupa is made visible from far distance as to showcase the religion's potent presence. Panaromic views toward other hillocks of Buddhist settlements creating sense of visual connectivity at regional scale.	Positioned on berm with an imposing domed structure is made visible from the aquatic trade route dominating the flat horizon. The visual intent was to connect to the outer world as well as showing local patronage.

Dealing with natural factors led the Buddhist monks associating their practice with native floras especially herbs and medicinal plants. Plant based medicines were the only source of survival in case of illness during that period.

The importance of trees, groves, forests or naturally vegetated lands was established by the historic Buddha himself. The groves he stayed during his lifetime had been immortalised by the legend of the lands. A detailed list has been produced in chapter 7 on the forest sites that is associated with the historic Buddha and his disciples which proves the objective of this study on finding the significance of ethnobotany in Buddhist settlement and philosophical practices. There are 61 + forests in total mentioned in various Buddhist literatures – Tripitakas, Attakatha, Jatakas and geography of the Buddha period. Apart from these there were references of man-made forests, groves, deer parks and sub-forests. Buddha used to spend his night stay near the pond or in Amravana (mango gorve), Amalakavanat (emblic myrobalan) or Arandyavana (natural forest). Not only it spread awareness on embracing close to nature lifestyle but also it preached the concept of natural habitat preservation. Many monument sites are referred as green monument sites as they could be restored to their original form with gardens, forest covers and biodiversity rich habitats. The close association of Buddha's life with natural landscape setting and vegetation in particular, hint towards an archetypal meaning of nature. Trees are often regarded as symbol of life and inexhaustible fertility/ virility. *(Eliade Mircea, 1963, Patterns in comparative religion, World Publishing, New York)*. This belief in the tree of life underlines the then prevalent practice of tree-worship in India. The significance lies in periodic regeneration; as centre of the world and support of the universe and the tree-altar as constituting an effective microcosm.

Jetavana, one of the study sites which was a forest essentially has been transformed to Buddha's stay amidst the natural enclosures. That was an indication of spatial planning in harmony with site resources.

A special association was established with *Bodhi* tree. Attaining enlightenment under Ficus religiosa (*Bodhi*) tree by the historic Buddha manifested its meaning at metaphysical level. The tree is perceived as Buddha himself. Mahabodhi temple, Bihar receives innumerable visitors, pilgrims and scholars as the tree is preserved at that sacred site. The Bodhi tree: it marks the centre of the world. In *Budhacharita* by *Asvaghosa*, the tree under which Bodhisattva (the historic Buddha) obtained enlightenment is described as such "For this is the navel of the earth's surface, entirely possessed of the highest power; for there is no other spot on earth which can bear the force of his concentrated thought." (Johnston, E.H., 1984, Asvaghosa's Buddhacharita or Acts of the Buddha. Motilal Banarsidass, Delhi p.201).

Symbolic meaning of Trees in Buddhist philosophy, "the cosmic Tree in Buddhist landscapes"- came into existence in early Buddhist period. The meaning and values could be found by reading and interpreting key episodes from the life of the historic Buddha. The narrative emerges in the transformation of 'tree of life' to 'tree of wisdom' (bodhi tree). The meaning has been extensively represented or recreated in their spatial planning and natural forms have been attributed to their architecture of stupa (Monastic gardens by Las Forgelin).

This proves the then prevalent practice of tree-worship in ancient India. A shift in meaning occurs post enlightenment of the Buddha. The tree of life becomes a symbol for the Buddha's enlightenment- its branches a metaphor for psychic growth and its elevation a breaking free of and rising above the mundane plane of griefs and desires. In Buddhist iconography and

architecture, the depiction of tree signifies the centre of the world and its axis a place of transcendence. Coomaraswamy's study interprets this as "Water cosmology". This represents a configuration of cosmic abundance corresponding to the human plane as maximum fruitfulness of family and flocks. All the natural forms are depicted as pattern are perceived as living and growing in nature.

10.2.3. Synthesis of ancient Indian cultural and environmental values in spatial planning of Buddhist monastic sites

The underlying principles of ecological stewardship in Buddhist monastic sites synthesised the whole planning processes. Prevalent practice of environmental consciousness was assimilated in Buddhist settlement practice through pragmatic approach. The historic Buddha preached for temporary stays amidst natural habitats for the wandering monks, the *"Bhikkhus".* Vinaya pitaka and other Buddhist literature has documentation supporting this. Buddha himself stayed in forest groves such as Jetavana, Veluvana for a substantial period (monsoon retreats) of his lifetime. As many life forms sprouts during rainy season it was suggested that monks do not wander with the slightest chance of affecting new beings. They used to take shelter temporarily at *avasas* near urban outskirts. These *avasas* were consciously selected on natural grounds without altering the topographic conditions. This showcased the synthesis of a philosophical idea into physical transformation.

The environmental consciousness was not new for ancient India. The underlying ecological principles was embedded in the traditional site planning practices across various natural settings of India. Aitareya Brahmana, Jaminiya Upanishad are also said to be describing the planning of towns in Indo-Aryan era such as Varanasi, Pataliputra etc. to some extent. Early Buddhist texts refer to well organized cities that must have grown up in response to demands made by increasing human activities. Historic cities were closely linked to and were deeply respectful of nature and there was an intricate weave of natural and cultural ecology.

This study understands monastic settlements as an integral part of the landscape. A long-lasting establishment must be sustained drawing resources from the surrounding environment. Landscape plays a key role to shape the habitation with a complex dynamic of topography, hydrology, vegetation and material evolving as ecologically sustainable settlements. Buddhist monastic sites reflect the integration of Natural Landscape resources. With an emphasis on Ian Mcharg's site suitability principle, the study re-envisages the traditional site planning approach with ecological understanding through an overlapped interaction (through reductive analysis) amongst the physiographic layers. This study indulges into a renewed understanding for the ecological stewardship in ancient settlement sites. This is instrumental in unearthing the root of modern day's nature-based solutions. This approach has been adopted as a departure from the general physio-morphic studies to understand the historical ecology of the area.

10.2.4. Identification traits of Buddhist monastic landscapes from ancient India

Varied geo-climatic settings had influenced the spatial design expression regionally. Uniqueness in adaptation has been discussed at large in chapters 4, 5 and 6 for the study sites from forest, plateau and riverine plain. Although differences in design could be witnessed from

the extant forms a common binding principle was Buddhist normative and eco-philosophical principles. From there eight unique landscape planning principles (ULPP) emerged out which are individually discussed in chapter 8.

Imbuing the intangible aspects from Buddhist philosophy as well as tangible aspects of physiography provided the cues for identifying spatial traits. Furthermore, the dimensional proportions and inter-relationship between built and unbuilt spaces evolved as sacred geometry for the Buddhist monastic sites. Relic stupa or Buddha's chamber acted as principal anchor from where the strategic siting of other secondary anchors was emanated. This way the built and open spaces were integrated in the landscape scheme. This is a unique statement which was underlined the monastic plan.

Distinct regional variations might be encountered when the current methodology would be adapted for studying other sites within the same archaeological landscapes of the current sites under discussion. Sanchi shows a promising potential to scale the sacred geometric order to go beyond the individual sites to regional scale connecting other Buddhist sites around. In similar way this could be studied with vertical as well as horizontal explorations at other study sites. This truly proves the study objectives to find the cultural landscape pattern in Buddhist monastic expanse.

10.2.5. Values embedded in Buddhist symbolic art and landscape design expressions

Buddhist art and iconography are inspired by nature. Each is designed, created and venerated under the influence of local landscape setting and laity. The regionally distinguished symbols were expression of natural phenomena and ecological systems prevalent in those local places. Robert Beer provides an in-depth insight on the vast array of symbols and icons of Buddhist religion. The symbols are multi-layered and a synthesis of Buddha's teachings, local flora-fauna and Buddhist cosmology. Ananda Coomaraswamy's work on this field is also ground breaking; this is covered extensively in chapter 7. Living forms are borrowed from surrounding natural landscape mostly flowers, vines, creepers are sculpted on stupa walls. They were symbols of growth and virility. Buddhism accepted the ephemerality of nature yet the celebrated the growing and living aspects of nature.

The objective of the study gets achieved with these interpretations that how the symbols represented various facets of Buddhist religion. Moreover, it proves the innate connection between rituals and natural elements or phenomena. There are many Buddhist symbols and motifs, including the various groups of auspicious symbols; cosmological symbols; natural and mythical animals, such as the dragon, garuda, and makara; the entire assembly of ritual tantric implements and weapons; magical and wrathful symbols; handheld emblems, attributes, and plants; esoteric Vajrayana offerings; and mudras, or ritual hand gestures (Beer, 2003).

Buddha sculptures are also steeped with symbolic meanings and gestures which connect with nature and cosmic world. Buddhas and Bodhisattvas regularly are portrayed in Buddhist craftsmanship with adapted hand motions called mudras. "Mudra" is Sanskrit for "seal" or

"sign," and every mudra has particular importance. Buddhists now and again utilize these emblematic motions during rituals and contemplation.

The most significant universal identity of Buddhist iconography is the "*Dharma chakra*" or Wheel of religion. It showcases the eightfold paths of Buddhist religion. It could be compared to another global religion of Christianity. The dharma chakra unifies the Buddhist customs and practices globally. "Turning the dharma wheel" is a delineation for the Buddha's training of the dharma in the world. In Mahayana Buddhism, it is said the Buddha turned the dharma wheel on numerous occasions. The essential turning was the exercise in the deer park, after the Buddha's enlightenment. Here, the Buddha explained the Four Noble Truths. The resulting turning was the introduction of the perfection of knowledge exercises on the possibility of sunyata. The third turning was the introduction of the guideline of Buddha Nature.

10.2.6. Learnings from Buddhist environmental systems for contemporary practices

The design and planning of Buddhist monastic sites at all scales from individual site to a region, contain lessons that are still of relevance today. If the principles of 'traditional' planning is weighed against contemporary rationale, many salient features distinguish out. This includes a multidisciplinary approach imbibing the ethos of historical landscape and its comprehensive interpretation for contemporary spatio-ecological planning regime.

A new field of study has emerged out in the current world of environmental challenges is religious environmentalism. Buddhist religion with its world view, Buddha nature and environmental morals shows promising path toward overcoming those climatic adversities. Though the environmental ethic is sometimes contradictory with the implication on sentient fauna world and not abiotic components of environment. However, the concept of interconnectedness governs all ethical construct on environment which is referred as origin of dependent theory or "*pratitya samutpada"*. As per the Buddhist environmental ethic scholar John J. Holder the emphasis on Buddhist ethic could be instrumental combating current global environmental predicament (Holder, 2007). He mentions,

"Buddhism has some important ideas to contribute to the current conversations on environmental ethics – especially among the scientific community where naturalism (not theism) is a common conceptual framework".

Applying Indian spatio-landscape planning lessons as Nature-based solutions (NbS) to address contemporary environmental challenges.

10.3. Further scope of study

10.3.1. Typological taxonomic classification of Indian Buddhist monastic sites

The research methodology devised for the current research has adopted a technical-analytical approach imbibing three aspects from the conceptual framework (chapter 3); philosophical form, spatial form and environmental form. This gave a chance to look into the cultural heritage sites beyond their art-historic values. As analysed in chapter 2 most of the studies on Buddhist archaeological sites were approached from historical or antiquarian value point of view. The

present study takes on the spatial interpretation and more importantly the landscape-spatial and environmental dimensions of Buddhist monastic sites. Hence, this study of Buddhist monastic landscapes is an attempt to bridge the gap in the unearthed plethora of traditional landscape knowledge. Although there is a scarcity of documentation, this study becomes the light house project about studying ancient historical archaeological sites imbibing information available from extant remains and geo-spatial analysis for interpretation of environmental features.

To achieve the principal objective, the current research has dealt the monastic sites with landscape architectonic perspective to interpret its unique landscape planning principles (ULPP). If the central issue or objective of this study is referred to from chapter 1 and its corresponding research questions in chapter 3 this study should be considered as point of departure from the conventional approach. As stated in chapter 3 the further stage is to conduct individual analysis on monastic landscapes of other substantial ancient Buddhist monastic sites of India to identify their own unique features of philosophical, spatial and environmental planning. A comparative study of characteristics of all these sites, including the sites of Jetavana, Sanchi and Bharatpur, would finally provide the answers to the central issue of learning different categories of Buddhist monastic cultural landscape sites.

Since the methodology delivered positive result for the current study, it could be used and suitably contextualised for analysing other similar sites set at varied natural landscape. Since the readiness of spatial and technical information of each of those sites is a criterion to interpret them, it is also imperative to have a clarified programme of documentation through literature study and site validation for each of them.

10.3.2. Conservation, preservation and management perspectives with a deeper understanding of landscape environmental principles

As mentioned in chapter 3, the global theories on landscape design and environmental landscape developments have been extensively analysed to allow typological comparison among the global standards and study sites. Therefore, the present interpretive study in positioning the Indian Buddhist monastic sites in the worldwide historical built landscape design regime is limited to those three study sites of Jetavana, Sanchi and Bharatpur. This study will also establish both the parallelism and differences of each category sites of historically built Buddhist monastic landscape sites. Such a series of analyses produce design awareness of bygone era and unearth the historic layers of the archaeologically and culturally significant heritage sites. Apart from archaeological and architectural values these sites represent landscape and environmental values also.

As discussed in chapter 1 and 2, the conservation programme carried out till date within the site boundaries were focused to restore the formal architectural layouts. These are primarily perceived as the restoration of architectural extant than offering a comprehensive renewal of the historic site where landscape or open space programming is an ignored component. To facilitate tourists' interest contemporary interventions such as pathways, terraces or ramps are added to the sites but not to recreate the then landscape programming.

The overarching strategy relating to the conservation, representation and managing of the ancient archaeological Buddhist monastic sites has to be determined through a thorough understanding and reading of all spatial planning and landscape planning principles. The site validation based on these interpretations is the next significant step. This consideration would enable the heritage conservationists formulate better strategies and programming for cultural tourism also.

10.3.3. Contemporary significance and evaluation of traditional landscape wisdom and knowledge system in global context

Ecological traits of Indian Buddhist landscape configuration are yet to be explored with deeper understanding. Spatio-temporal linkages and legacies of traditional wisdom into contemporary period in specific and their changes over period of time can be taken into account for further studies. The environmental ethic and association of nature with Buddhism explained in chapter 7 open up a vast area of study. It is quite interesting to realise that considering the ancient time, the skillful understanding of environmental planning surpasses even modern day's spatio-environmental planning paradigm.

Learning traditional wisdom and knowledge system of planning in depth can be enlightening how the ancient planning system inherently integrated environment and landscape layers to create sustainable design. The contemporary revival of this approach could be cited as 'nature-based solution'. Nature-based solution and ecosystem-based adaptation in contemporary spatial planning discipline are extensively followed now to build climate resilience and sustainable man-nature coexistence.

Learning from past can enable the implication of Nature based solutions in contemporary spatial planning discipline and urban challenges.

Bibliography and Reference

Aboshi, Y. & K. Sonoda ed. 1997. *Excavations at Jetavana (Saheth) - A Buddhist site in Uttar Pradesh (98689).* Kansai University.

Agrawal, D.P. & Ghosh, A. 1930. *Radiocarbon and Indian Archaeology.* Tata Institute of Fundamental Research, Bombay.

Almond, P., 1988. *The British Discovery of Buddhism*, Cambridge: Cambridge University Press.

Allchin, B. & R. 1982. *The Rise of Civilization in India and Pakistan.* Cambridge University Press, Cambridge.

Allchin, FR. 1989. City and State Formation in Early Historic South Asia. *South Asian Studies,* 5: 1-16.

Allchin, FR. 1995. *The Archaeology of Early Historic South Asia: The f,mergence of Cities and States.* Cambridge University Press, Cambridge.

Bandaranayake, S. 1993a. Amongst Asia's Earliest Surviving Gardens: The Royal and Monastic Gardens at Sigiriya and Anuradhapura. In: Historic Gardens and Sites, ICOMOS Series. Colombo, Central Cultural Fund: pp. 3-35.

Behrendt, Kurt. 2006. 'Narrative Sequence in the Buddhist Reliefs from Gandhāra', in C. Jarrige and V. Lefevre eds, *South Asian Archaeology 2001: Proceedings of the 16th International Conference of the European Association of South Asian Archaeologists,* Paris: Editions Recherche sur les Civilisations, vol. II, , pp. 383–92.

Beck, A. 2006. Google Earth and World Wind: Remote sensing For the Masses, Antiquity, 80, p.308.

Balee, William and Clark, L. Erickson. 2006. "Time, Complexity and Historical Ecology." In *Time and Complexity in Historical Ecology: Studies in the Neotropical Lowlands*, by William and Clark, L. Erickson Balee, 1-20. New York: Columbia University Press.

Bernard, Knapp A. and Wendy, Ashmore. 1999. *Archaological landscapes: Constructed, conceptualized, ideational in Archaeologies of Landscape:Contemporary Perspective.* Oxford: Blackwell Publishers.

Bunnag, Jane. 1991. "The way of the monk and the way of the world: Buddhism in Thailand, Laos and Cambodia." In *The World of Buddhism:Buddhist Monks and Nuns in Society and Culture*, by Heinze and Gombrich, Richard Bechert, 159-170. London: Thames and Hudson.

Bhattacharya S, Chatterjee S. 2009. "A Preliminary Note on the Archaeological Investigation in Dantan and its Adjoining Region, West Medinipur." *Abhijnan: Studies in South Asian Archaeology and Art History of Artefacts Felicitating A.K.M. Zakaria* 21-27.

Chakrabarti, D.K. 1993. *Archaeology of Eastern India Chhotanagpur Plateau and West Bengal.* New Delhi: Munshiram Manoharlal Publishers.

Chakrabarti, D.K. 1993. *Archaeology of Eastern India Chhotanagpur Plateau and West Bengal.* New Delhi: Munshiram Manoharlal Publishers.

Chakrabarti, Parthasarathi and Sanjoy Nag. 2015. *Rivers of West Bengal Changing Scenario.* Kolkata: Department of Science and Technology, Government of West Bengal.

Cole, H. H. 1884. Reports of the Curator of Ancient Monuments in India, Calcutta: Office of the Curator 1595 of Ancient Monuments in India.

Cook, Francis, H. 1989. *The Jewel Net of Indra*, in Nature in Asian Traditions of Thought, Albany, N.Y.: State University of New York Press, pg. 215.

Cunningham, J. D. 1847. Notes on the Antiquities within Bhopal Agency, Journal of the Asiatic Society of Bengal, Vol.16 (2), pp. 739-63.

Chakraborty, S. 2010. "Resource base and consumer sites: Tracing Early Historic Network in Damodar Valley." *Pratna Samiksha Vol.1* 65-81.

Chakraborty, Sharmi. 2010. "Resource Base and Consumer Sites: Tracing Early Historic Network in Damodar Valley." *Pratna Samiksha, A journal of Archaeology, Vo.1* 65-81.

Chakrabarti, D.K. 1995. *The Archaeology of Ancient Indian Cities.* Oxford University Press, Delhi.

Dani, A.H. & Masson, V. ed., 1992. *History of Civilizations of Central Asia Vol. I The dawn of civi- lizaition: earliest times to* 700 *B.*C. Unesco Publishing, Paris.Chakrabarti, D.K. 1992. *The Early Use of Iron in India.* Oxford University Press, Delhi.

Dikshit, K.N. 1969. A Note on the Problem of the Plain Black-and-Red Ware in Northern India, in (Sinha ed., 1969): 48-55.

Dikshit, K.N. l973. The Allahapur Evidence and the Painted Grey Ware Chronology. in (Agrawal & Ghosh ed., 1973): 148-153.

Erdosy, G. 1985. The Origin of Cities in the Ganges Valley. *Journal of Economic and Social History of Orient,* Vol. XXVIII**,** part I: 81-109.

Edelglass, William. 2021. "Buddhism and the Environment". Oxford Research Encyclopedia of Religion. Oxford: Oxford University Press. doi:10.1093/acrefore/9780199340378.013.721

Erdosy, G. 1985. Settlement Archaeology of the Kausambi Region. *Man & Envirionment* IX: 61 80.

Erdosy, G. 1987. Early Historic Cities of Northern India. *South Asian Studies,* 3: 1 23.

Gaur, R.C. l 969. Nature of Pottery Complex of Black- and-Red Ware Phase at Atranjikhera, in (Sinha, 1969): l 12-117.

Gaur, R.C. 1983. *Excavations at Atranjikhera.* Motilal Banarsidas, Delhi.

Gaur, R.C. ed., l 994. *Painted Grey Ware. Proceedings of Seminar 011 Archaeology held at Aligarh Muslim University, Aligarh.* Publication Scheme, Jaipur.

Goswami, K.G. 1990. *Excavations at Bangarh (1938-41).* Kolkata: Ashutosh Museum Memoir No.1, university of Calcutta.

Geiger, W. 2007. The Mahavamsa: The Great Chronicle of Ceylon (Translated to English in 1912), 3rd print, Buddhist Cultural Centre: Sri Lanka, p. 3.

Guha-Thakurta, T. 1998. 'Tales of the Bharhut Stupa: Archaeology in the Colonial and Nationalist Imaginations', in *Paradigms of Indian Architecture - Space and Time in Representation and Design,* G. Tillotson (ed), London, Curzon, , pp. 26–58

Ghosh, R. N. and Majumdar, S. 1991. "Studies in Archaeology: Essays Dedicated to P.C. Dasgupta." In *Geology and Morphostratigraphy of West Bengal: A Database for Archaeological Exploration*, by Asok Datta, 7-40. New Delhi: Books and Books.

Ghosh, Amalananda. 1989. *An Encyclopedia of Indian Archaeology (Ed.); Vol.2.* New Delhi: Munshiram Manoharlal.

Hajra, P.K. 1996. *Flora of India*, Introductory volume, Part 1, Botanical Survey of India, New Delhi.

Inden, Ronald. 1990. *Imagining India*, Oxford, Blackwell.

International Council on Monuments and Sites (ICOMOS). 2016. Work on Connections between Culture and Nature. Retrieved from https://www.icomos.org/en/focus/culture-nature/93567-icomos-work-on-connections-between-culture-and-nature

Joshi, J.P. 1993. *Exacavations at Bhagwanpura 1975-76 and Other Explorations & Excavations 1975-81 in Haryana, Jammu & Kashmir and Punjab.* ASI, New Delhi.

Kielhom, F. 1894. "Dudhpani Rock Inscription of Udayamana." *Epigraphia Indica Vol.2* 343-346.

Kaza Stephanie. 1993. *Planting Seeds of Joy* in Earth and Spirit (ed. Fritz Hull), New York, N.Y.: Continuum, pg. 137

Lal, B.B. 1954. Excavation at Hastinapura and Other Explorations in the Upper Ganga and Sutlej Basins l 950-52. Ancient India, no.10-11: 5151, ASI, New Delhi.

Lal, B. 1992. The Painted Grey Ware Culture of the Iron Age, in (Dani & Masson ed.,1992): 421 440.

Lal, M. 1984. *Settlement History and Rise of Civilisation in Ganga-Yamuna Doab from 1500 B.C. - 300 A.D.* B.R.Publishing Corporation, Delhi.

Leoshko, J. 2003. *Sacred Traces: British Explorations of Buddhism in South Asia*, Aldershot: Ashgate.

Lopez, D.S. (ed.), 1995. *Curators of the Buddha, the study of Buddhism under colonialism*, Chicago: Chicago University Press.

Lorenzen, D. 1982. 'Imperialism and the Historiography of Ancient India, in *India: History and Thought: Essays in Honour of A.L. Basham*, *S.N. Mukherjee* (ed.), Delhi: Subarnarekha.

McFarlane, Stewart. 1980. *Nature and Buddha-nature: The Ecological Dimensions of East Asian Buddhism Critically Considered* (kr.buddhism.org/zenkoan/ stewart_mcfarlane.htm)

Majumdar, Somreeta. 2020. "Archaeological Landscape of The Buddhist Stupa of Bharatpur." *Arnava Vol. IX No.2* 59-65.

Majumdar, N G. 1929. *Inscriptions of Bengal Containing Inscriptions of the Chandras, the Varmans and the Senas, and of Isvaraghosa and Damodara.* Rajshahi.

Malik, S. C. 1975. "Understanding Indian Civilization - A Framework and Enquiry" Shimla: Indian Institute of Advance Study.

Mitra, Rajendra. 1971. *The Sanskrit Buddhist Literature of Nepal.* Calcutta: Sanskrit Pustak Bhandar.

Mcharg, I. 1969. Design with Nature, American Museum of Natural History by the Natural History Press, Double day and company Inc., Garden City, New York.

Marshall, J., Foucher, A., Majumdar, N. G. 1940. The Monuments of Sanchi, London: Probsthain (reprinted 1983, Delhi: Swati Publications).

Narain, A.K. & Roy, TN. 1976. *Excavations at Rajghat Part J.* Banaras Hindu University, Varanasi.

Narain, A.K. & Roy, TN. 1977. *Excavations at Rajghat Part JJ.* Banaras Hindu University, Varanasi.

Narain, A.K. & Roy, TN. 1968. *The Excavations at Prahladpur.* Banaras Hindu University, Varanasi.

Panja, S., 2003. Monuments in a flood zone: "builders" and "recipients" in ancient Varendri, (Eastern India and Bangladesh), p. 505 https://doi.org/10.1017/S0003598X00092553

Panja, S., 1995-96. The Archaeology of "Early Medieval" Settlements in North Bengal- A Preliminary Study, Pratna Samiksha, Vol.4 & 5, p. 140.

Panja, Sheena. 2003. "Monuments in a flood zone: “builders” and “recipients” in ancient Varendri, (Eastern India and Bangladesh)."

Roy, T.N. 1983. *The Ganges Civilization. A Critical Archaeological Study of the Painted Grey Ware and Northern Black Polished Ware Periods of the Ganga Plains of India.* Ramanand Vidya Bhawan, New Delhi.

Roy, T.N. 1986. *A Study of Northern Black Polished Ware Culture. An Iron Age Culture of India.* Ramanand Vidya Bhawan, New Delhi.

Sahay, S. 1969. Origin and Spread of the Northern Black Polished Ware, in (Sinha ed.,1969):146 154.

Schmithausen, Lambert. 1991. *Buddhism and Nature.* International Institute for Buddhist Studies, Tokyo.

Schopen, Gregory. 1987. "Burial Ad Sanctos and the Physical Presence of the Buddha in Early Indian Buddhism- A Study in the Archaeology of Religions." *Religion, Vol.17(2)* 193-225.

Schopen, Gregory. 1997. *The Stupa Cult and the Extant Pali Vinaya- Bones, Stones and Buddhist Monks.* Hawaii: Honolulu Universityof Hawaii Press.

Schopen, G. 1997. Bones, Stones and Buddhist Monks: collected papers on the archaeology, epigraphy and texts of monastic Buddhism in India, Honolulu: University of Hawaii Press. https://doi.org/10.1086/463642

Schumacher, Ernst Friedrich. 1973. *Small is Beautiful: A Study of Economics as if People Mattered*, London: Blond and Briggs, pg. 56.

Sen, Swadhin & Wahid Palash. 2017. "'Oh My River with Deep Water, I am Floating on Your Water, Ever Since My Birth'." In *Non-western Perspectives on Reconfigurations of the Embodiments of Water and landscape with Special Reference to Contemporary Archaeological Discourses*, by Mukherjee Rila. New Delhi: Primus Books.

Sharma, G.R. 1960. *The Excavations at Kausambi (1957-59).* The Department of Ancient History, Culture and Archaeology, University of Allahabad, Allahabad.

Sharma, G.R. 1969. *Excavations at Kausambi 1949-50.* Memoirs of the Archaeological Survey of India, No.74, ASI, New Delhi.

Shaw, J. 2000. ‘The sacred landscape’, in *Buddhist Reliquaries from Ancient India*, M. Willis (ed.), London: The British Museum.

Shaw, Julia. 2007. *Buddhist Landscapes in Central India: Sanchi Hill and Archaeologies of Religious and Social Change, c. third Century BC to Fifth Century AD.* London: The British Association for South Asian Studies; The British Academy.

Shaw, Julia. 2007. Buddhist Landscapes in Central India: Sanchi Hill and Archaeologies of Religious and Social Change, c. third Century BC to Fifth Century AD, London: The British Association for South Asian Studies; The British Academy.

Shaw, J., Sutcliffe, J. V., Smith, L. L., Schwenninger, J. L., & Chauhan, M. S., with contributions by Misra, O. P., Harvey, E. 2007. Ancient Irrigation and Buddhist history in Central India: Optically Stimulated Luminescence and pollen sequences from the Sanchi dams, Asian Perspectives 46 (1), pp. 166-201.

Shaw, J., Sutcliffe, J. V., 2003. Water management, patronage networks and religious change: new evidence from the Sanchi dam complex and counterparts in Gujarat and Sri Lanka, South Asian Studies, 19, pp. 73-104. http://dx.doi.org/10.1080/02666030.2003.9628622

Shaw, Julia. 2005. Ancient Dams and Buddhist Landscapes in the Sanchi area: new evidence on irrigation, land use and monasticism in central India, South Asian Studies, 21, pp. 1-24. https://doi.org/10.1080/02666030.2005.9628641

Shaw, Julia. 2000. The Sacred landscape, in M. Willis, Buddhist Reliquaries from Ancient India, London: British Museum Press, pp. 27-38.

Shimada, A. 2006. 'The Great Railing at Amaravati: An Architectural and Chronological Reconstruction', *Artibus Asiae*, 66(1), pp. 89–141.

Shimoda, M. 1997.*Nehangyo no kenkyu: Daijo kyoten no kenkyuhouhou siron (A study of the Mahāparinirvā]nasūtra with a focus on the methodology of the study of mahayanasutras)*, Tokyo: Shunju sha.

Sinha, B.P. ed. 1969. *Potteries in Ancient India.* The Department of Ancient Indian History & Archaeology, Patna University, Patna.

Sinha, B.P. & B.S. Verma. 1977. *Sonpur Excavations (1956 and 1959-1962).* Directorate of Archaeology and Museums, Bihar, Patna.

Singh, P. 1994. *Excavations at Narhan (1984-89).* Banaras Hindu University, Varanasi.

Sinha, K.K. 1967. *ExcavationsatSravasti, 1959.* Banaras Hindu University, Varanasi.

Silva, Lily De. 2000. *Early Buddhist Attitudes toward Nature," in Dharma Rain: Sources of Buddhist Environmentalism* (ed. Stephanie Kaza and Kenneth Kraft), Boston, Mass.: Shambala Publications, pp. 96-97.

Singh, Rana P.B. 2003. Where the Buddha Walked. A Companion to the Buddhist Places of India. [Pilgrimage & Cosmology Series: 5]. Updated and reprint in 2009. Indica Books, Varanasi.

Sinha, Amita. 2006. *Landscapes in India: Forms and Meanings.* Boulder: University Press of Colorado.

Singh, U., 2004. *The Discovery of Ancient India: Early Archaeologists and the Beginning of Archaeology*, Delhi: Permanent Black.

Swearer, Donald K. 2001. *Principles and Poetry, Places and Stories: The Resources of Buddhist Ecology*, Daedalus, pp. 225-241.

Taddei, M. 2006. 'Recent Archaeological Research in Gandhara: The New Evidence', in Gandhāran Buddhism: Archaeology, Art, Texts, in P. Brancaccio and K. Behrendt (eds), Vancouver: University of British Columbia Press.

Thapar, R. 1993. *From Lineage to State*, Bombay: Oxford University Press, 1984. *Interpreting Early India*, New Delhi: Oxford University Press.

Thakur, N. 1986. A Conservation Policy for India: An Introduction to the Context. Institute of Advanced Architectural Studies, University of York, Conservation studies. York: Unpublished.

Trainor, K. 1997. *Relics Ritual and Representation in Buddhism: Rematerializing the Sri-Lankan Theravada Tradition*, Cambridge: Cambridge University Press.

Trainor, K., 1997. Relics, Ritual and Representation in Buddhism: rematerializing the Sri Lankan Theravada tradition, Cambridge: Cambridge University Press, p. 174. https://doi.org/10.1017/S1356186300016217.

United Nations Educational, Scientific and Cultural Organisation (UNESCO). 2011. *World Heritage Resource Manual: Preparing World Heritage Nominations, 2nd edition,* Paris, France.

Willis, M.D. 2000. (With contributions from J. Cribb and J. Shaw), *Buddhist Reliquaries from Ancient India*, London: The British Museum.

Williams, J. 1998. 'On Viewing Sanchi', *Archives of Asian Art*, 50, pp. 93–8.

Willis, M. 2000. Buddhist Reliquaries from Ancient India, London: British Museum Press.

White, Lynn Jr. 1967. *The Historical Roots of Our Ecological Crisis*, Science 15, pp. 1203-7.

Yang, Bo and Li Shujuan. 2016. *Design with Nature: Ian McHarg's ecological wisdom as actionable and practical knowledge*, Landscape and Urban Planning vol. 155, Science Direct, pp. 21-32.

Further Readings

Ali, Daud. 2003. *Gardens in Early Indian Court Life, Studies in History*, vol. 19, no. 2, pp. 221-52.

Ahir, D.C. 1986. *Buddhist Shrines in India*, Indian Book Centre, Delhi.

Altekar, Anant Sadasiv. 1947. *Banaras and Sarnath: Past and Present*. Banaras Hindu University.

Bosch, F.D.K. 1960. *The Golden Germ: An Introduction to Indian Symbolism*, The Hague, Loutom.

Beal, Samuel. 2003. *Travels of Fah-Hian and Sung-Yun. Buddhist Pilgrims from China to India* (100 A.D. and 518 A.D.), Trubner & Co., London, Rupa & Co., New Delhi.

Behrendt, Kurt. 2009. *Traces of Buddhist Pilgrimage in ancient India*; in. Malville, John M. and Saraswati, B.N. (eds) Pilgrimage- Sacred Landscapes and Self organised Complexity. DK Print world, Delhi for IGNCA: pp. 142-162.

Brown, Robert L. 2009. *Nature as Utopian Space on the Early Stupa-s of India*, in Jason Hawkes and Akira Shimada (eds), Buddhist Stupas in South Asia: Recent Archaelogical, Art-Historical and Historical Perspectives, New Delhi: Oxford University Press, , pp. 63-80.

Chattopadhyaya, B.D. 1987. *Transition to the Early Historical Phase in the Deccam: A Note*, in B.M. Pande and B.D. Chattopadhyaya (eds), Archaeology and History: Essays in Memory of Sri A. Ghosh, Delhi: Agam Kala Prakashan, , vol. 2, pp. 727-32.

Coomaraswamy, A. K., 1971. Yaksas, New Delhi: Munshiram Manoharlal Publishers Pvt Ltd,.

Curtius, Ernst Robert. 1990. *European Literature and the Latin Middle Ages*, Princeton: Princeton University Press.

Coomaraswamy, Ananda. 1935, *Elements of Buddhist Iconography*. Harvard University Press, Cambridge MA.

Cunningham, Alexander. 1871/1996, *The Ancient Geography of India*. Reprinted by Low price Publis., Delhi.

Cunningham, Alexander. 1892, *Mahabodhi or the Great Buddhist Temple under the Bodhi Tree at Buddha-Gaya*. London.

Dhammika, S. 1992/1999. *Middle Land, Middle way. A pilgrim's Guide to the Buddha's India*, Buddhist Publication Society, Kandy (Sri Lanka).

Dehejia, Vidya. 1972. *Early Buddhist Rock Temples*, London: Thames and Hudson.

Dutt. N. and Bajpai, K.D. 1956. Development of Buddhism in Uttar Pradesh. Publication Bureau, Govt. of Uttar Pradesh, Lucknow.

Eliade, M. 1958. *Patterns in Comparative Religion*, trans. from French by R. Sheed, New York: New American Library.

Forbes, Duncan. 1999, *The Buddhist Pilgrimage*. Buddhist Tradition Series 37, Motilal Banarasidass Publ., Delhi.

Gokhale, Sobhana, 1991. *Kanheri Inscriptions*, Pune: Deccan College Postgraduate and Research Institute.

Hall, C. Michael. 2006. *Buddhism, tourism and the middle way*; in Timothy, Dallen J. and Olsen, Daniel H. (eds.) Tourism, Religion and Spiritual Journeys. Routledge, London and New York: 172-185.

Heitzman, James, 1984. *Early Buddhism, Trade and Empire*, in Kenneth A.R. Kennedy and Gregory L. Possehl (eds), Studies in the Archaeology and Palaeoanthropology of South Asia, New Delhi: Oxford & IBH, pp. 121-37.

Huntington, S. L., 1884. *The Art of Ancient India: Buddhist Hindu and Jain*, New York: Weatehrhill.

Humphrey, Milford. Further Dialogues of the Buddha, trans. from Pali by Lord Charmers, 2 vols, London, 1926-27. The collection of Middle Length Sayings (Majjhima-Nikaya), trans. from Pali by I.B. Horner, 3 vols, London: Luzac, 1954-59, rpt., Oxford: Pali Text Society, 1993-1994.

Knox, Robert. 1992. *Amaravati: Buddhist Sculpture from the Buddhist Stupa*, London: Trustees of the British Museum.

Luders, H. 1963. *Bharhut Inscriptions, revised and supplemented* by E. Waldschmit and M.A. Mehendare Corpus Inscriptionum Indicarum, vol. 2-ii, Otacamund: Government Epigraphist for India.

Luis O. Gomes. 1996. *The Land of the Bliss: The Paradise of the Buddha of Measureless Light*, Sanskrit and Chinese Versions of the Sukhavativyuha Sutra, trans. from Sanskrit and Chinese by, Honolulu and Kyoto: University of Hawai'I Press and Higashi Honganji Shinshu Otani Ha.

Malandra, Geri H. 1988. *The Mahabodhi Temple*. Marg (spl. Issue on Bodhgaya), 40 (1): pp. 9-28.

Majjhima Nikaya (ed.) V. Trenckner, 4 vols, London: Henry Frowde, 1885-1925. Dialogues of the Buddha, 4th edn, trans. from Pali by T.W. Rhys Davids and C.A.F. Rhys Davids, 3 vols, London: Luzac & Company, 1956-59.

Marshall, John and Foucher, Alfred. 1983. Monuments of Sanchi, vol. 2, Delhi: Swati Publications, rpt.

Pali Nikaya: The Digha Nikaya (ed.) T.W. Rhys Davids and J.E. Carpenter, 3 vols, London: Pali Text Society, 1890-1911.

Pali Vinaya: The Vinaya Pitakam: One of the Principal Buddhist Holy Scriptures in Pali Language (ed.) H. Oldenberg, 5 vols, London: Williams and Norgate 1879-1881. The Book of the Discipline (Vinana-Pitaka), trans. from Pali by I.B, Horner, 5 vols, London: Luzac & Company, 1949-63.

Ray, H.P. 1986. *Monastery and Guild: Commerce under the Satavahanas*, Delhi: Oxford University Press.

Ray, Himanshu Prabha. 2003. *The Archaeology of Seafaring in Ancient South Asia*, Cambridge: Cambridge University Press.

Roy, Anamika. 1994. *Amaravati Stupa*, New Delhi: Agam Kala Prakashan,

Saddarmapundarika Sutra: The Saddarmapundarika or the Lotus of the True Law, trans. from Sanskrit by H.Kern, Sacred Books of the East, vol. 21, Oxford: Clarendon Press, 1909.

Sukhavativyuha Sutras: In Buddhist Mahanaya Texts, part II, trans. from Sanskrit my M. Muller, Sacred Books of the East, vol. 49, Oxford" Clarendon Press, 1909.

Schlingloff, Dieter. 1988. *Studies in the Ajanta Paintings: Identifications and Interpretations*, Delhi: Ajanta Publications.

Schopen, Gregory. 2006. *The Buddhist "Monastery" and the Indian Garden: Aesthetics, Assimilation, and the Siting of Monastic Establishments*, Journal of the American Oriental Society, vol. 126, no.4, pp. 487-505.

Schopen, Gregory. 2006. *'Burial Ad Sanctos and the Physical Presence of the Buddha in Early Indian Buddhism'*, in idem, Bones, Stones, and Buddhist Monks: Collected Papers on the Archaeology, Epigraphy, and Texts of Monastic Buddhism in India, Honolulu: University of Hawaii Press, pp. 114-47.

Senart, E. 1902-03. *The Inscriptions in the Caves at Karle*, Epigraphia Indica, vol. 7, no. 1, pp. 47-74.

Shaw, Julia. 2004. *Naga Sculptures in Sanchi's Archaeological Landscape: Buddhism, Vaisnavism, and Local Agricultural Cults in Central India, First Century BCE to Fifth Century CE*, Artibus Asiae, vol. 64, no. 1, pp. 5-59.

Shimada, Akira. 1977. *Amaravati Sculptures in the Madras Government Museum*, Madras: Director of Stationery and Printing.

Smith, Brian K. 1994. *Classifying the Universe: The Ancient Indian Varna System and the Origin of Caste*, New York: Oxford University Press.

Sahni, D.R. 1970. *Excavation report of Bairat*, New Delhi: Archaeological Survey of India.

Salomon, R. 1998. *Indian Epigraphy*, New York: Oxford University Press,

Saraya, Dhida, 1999. *(Sri) Dvaravati: the Initial Phase of Siam's History*, Bangkok: Muang Boran Publishing House,

Sarkar, H. 1993. *Studies in Early Buddhist Architecture of India*, New Delhi: Munshiram Manoharlal,

Sarkar, H. and S.P. Nainar. 1972. *Amaravati,* New Delhi: Archaeological Survey of India,

Schopen, Gregory. 1988-9. *On Monks, Nuns and Vulger" Practices*, Artibus Asiae, 49,:153-68.

Schopen, Gregory. 1997. *The Stupa Cult and the Extant Pali Vinaya*, in Gregory Schopen, Bones, Stones and Buddhist Monks, Honolulu: University of Hawaii Press.

Spmathilake, M. 2002. *Ancient Buddhist Mural Paintings of India and Sri Lanka*, Wellampitiya, Godage International Publishers.

Sircar, D.C. 1975. Inscriptions of Asoka, 3rd edn., New Delhi: Government of India.

Sivaramamurti, C. 1956. *Amaravati Sculptures in the Madras Government Museum*, Madras: Government of Tamil Nadu.

Strong, John S. 1983. *The Legend of King Asoka*, Princeton: Princeton University Press.

Sauer, Carl O. 1925. *The morphology of landscape*. University of California Publications in Gepgraphy, 2 (2): pp. 19-54.

Singh, Rana P.B. 2003. Where the Buddha Walked. A Companion to the Buddhist Places of India. (Pilgrimage and Cosmology Series: 5). India Books, Varanasi.

Sinha, Amita. 2006. *Landscapes in India: Forms and Meanings*. University Press of Colorado, Boulder

Taisho Shinsyu Daizokyo: SAT Daizokyo Text Database, Tokyo: The SAT Daizokyo Test Database Committee (updated 1 April 2008), http://21dzk.l.u-tokyo.ac.jp/SAT/index_en.html, accessed on 4 May 2010.

Uttaradhayana sutra: In Jaina Sutras, part II, trans. from Sanskrit by Herman Jacobi, Sacred Books of the East, vol. 45, Delhi: Motilal Banarsidass Publishers Pvt Ltd, rpt 1964.

Walters, J.S. 1997. *Stupa, Story and Empire: Constructions of the Buddha Biography in Early Post-Asokan India*, in J. Schober, ed., Sacred Biography in the Buddhist Traditions of South and Southeast Asia, Honolulu: University of Hawaii Press, pp. 160-92.

1997. *The Advent of Theravada Buddhism to Mainland South-east Asia*, Journal of the International Association of Buddhist Studies, vol. 20, pp.93-108.

1997. *Networks of Power: Maritime History and Archaeology of Early Andhra*, Proceedings of the Andhra Pradesh History Congress, 21st session, pp. 8-16.

1997. *'Two Problems in the History of Indian Buddhism: The Layman/Monk Distinction and the Doctrines of the Transference of Merits'*, in idem, Bones, Stones, and Buddhist Monks: Collected Papers in the Archaeology, Epigraphy, and Texts of Monastic Buddhism in India, Honolulu: University of Hwaii Press, pp. 23-55.

Amit Bhattacharya

17.11.2023