Alexander Follmann

Governing Riverscapes

Urban Environmental Change along the River Yamuna in Delhi, India

Geographie

Franz Steiner Verlag

Megacities and Global Change
Megastädte und globaler Wandel
Band 20

Alexander Follmann
Governing Riverscapes

MEGACITIES AND GLOBAL CHANGE

MEGASTÄDTE UND GLOBALER WANDEL

herausgegeben von

Frauke Kraas, Martin Coy, Peter Herrle und Volker Kreibich

Band 20

Alexander Follmann

Governing Riverscapes

Urban Environmental Change along the River Yamuna in Delhi, India

Franz Steiner Verlag

Umschlagabbildung:
Old Railway Bridge over the Yamuna in New Delhi, India © Alexander Follmann

Bibliografische Information der Deutschen Nationalbibliothek:
Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über <http://dnb.d-nb.de> abrufbar.

Druck: Hubert & Co, Göttingen
Gedruckt auf säurefreiem, alterungsbeständigem Papier.
Printed in Germany.
ISBN 978-3-515-11430-1 (Print)
ISBN 978-3-515-11435-6 (E-Book)

CONTENTS

LIST OF FIGURES 11

LIST OF TABLES 14

LIST OF MAPS 14

GLOSSARY 15

LIST OF ABBREVIATIONS 16

SUMMARY 19

ZUSAMMENFASSUNG 21

PREFACE 23

ACKNOWLEDGEMENTS 25

I INTRODUCTION AND RESEARCH CONTEXT 27

1 Introduction 27

1.1 Delhi: a tale of two cities, but only one river 29
1.2 Change of perspective: from the riverfront to riverscapes 31
1.3 Discourse and urban environmental policy-making 35
1.4 Governance and urban political ecology 36
1.5 Research agenda and questions 37
1.6 Outline of the book 40

2 India's megacities: challenging urban ecologies 41

2.1 Challenges of urbanization in India 42
2.2 Post-liberalization urban India 43
2.3 Making India's cities 'world-class' 46
2.4 India's urban environmental awakening? 47
2.5 Reclaiming India's urban rivers 51

II THEORETICAL REFLECTIONS 55

3 Governing riverscapes: theoretical and conceptual reflections 55

3.1 Governance research 55

3.1.1 Good governance – the normative perspective 57
3.1.2 A (critical) descriptive perspective on governance 58
3.1.3 'Unpacking' governance processes – the analytical perspective 60
3.1.4 Urban governance 61
3.1.5 Environmental governance 62
3.1.6 Urban environmental governance – an analytical approach 63
3.1.7 Participation in urban environmental governance 66

3.2 Urban Political Ecology 67

3.2.1 Introducing UPE 67
3.2.2 Deconstructing social constructions 72
3.2.3 The production of urban environments 75
3.2.4 The urban environment as a hybrid 77
3.2.5 From land- and waterscapes to hybrid riverscapes 81
3.2.6 Riverscapes in neighboring disciplines 84

3.3 Riverscapes as hybrids – a framework for research 86

3.3.1 Hybridity of riverscapes and the interplay of materiality and discourse 87
3.3.2 A UPE-governance approach to study riverscapes 90
3.3.3 Redefining the research questions 91

III METHODOLOGY AND METHODS 93

4 Methodology 93

4.1 Research philosophy 93
4.2 The chosen discourse analytical approach 94
4.3 The argumentative approach to discourse 96

4.3.1 Story-lines and discourse-coalitions 96
4.3.2 Discourse structuration and discourse institutionalization 97

4.4 The application of the argumentative approach in this study 98

5 Methods and fieldwork 100

5.1 Data collection and fieldwork 100

5.1.1 Triangulation of data and analysis 101
5.1.2 Primary data: multi-temporal mapping and observation 101
5.1.3 Primary data: interviews 102
5.1.4 Primary data: Yamuna Future Workshop 107
5.1.5 Secondary data: the text corpora 108

5.2 From data processing to analysis 111
5.3 Reflections on the research process 112

IV SITUATING THE CASE STUDY 115

6 The megacity of Delhi 115
6.1 The physical features of Delhi 115
6.2 The growth of the city 117
6.3 The socio-spatial mosaic of Delhi 120
6.4 The 'world-class' agenda – Delhi as a global city 122

7 Introducing Delhi's riverscapes 123
7.1 The river Yamuna 123
7.2 The river Yamuna in Delhi 125
7.3 Water abstraction and flow 126
7.4 Pollution and environmental degradation 129
7.5 The risk of monsoonal flooding 133
7.6 Interim conclusion: major challenges 135

8 Urban environmental governance: introducing actors and policy debates 137
8.1 Political and administrative organization in India 137
8.2 Delhi's administrative history and current set-up 138
8.3 Urban governance framework: the state actors 139
8.3.1 Agencies on the national level 141
8.3.2 Agencies on the regional level 143
8.3.3 Agencies on the state level 144
8.4 Environmental governance framework: the state actors 144
8.4.1 Agencies on the national and interstate level 146
8.4.2 Agencies on the state level 149
8.5 Overview of the state agencies involved in governing Delhi's riverscapes 149
8.6 India's urban rivers: legal provisions and debates 151
8.7 The courts and the river: overview of selected orders 155
8.8 Environmental NGOs working on the Yamuna 157
8.9 Interim conclusion: a complex urban environmental governance set-up 160

V HISTORICAL-GEOGRAPHICAL INSIGHTS INTO THE MATERIAL AND DISCURSIVE REMAKING OF DELHI'S RIVERSCAPES 163

9 The early remaking of Delhi's riverscapes 163
9.1 From the Mughal period to colonial times 163
9.2 A new riverfront for the imperial capital 170

9.3 The riverfront ideas of the early post-colonial period: the 'recreation plan' 171
9.4 Taming the river for the development of the city 173
9.5 Delhi's riverscapes under the first Master Plan 175
9.6 Interim conclusion 176

10 Channelization and riverfront development – a persistent idea 179
10.1 The emergence of the channelization idea 179
10.2 Learning from the floods of 1978 180
10.3 DDA's plans of the 1980s and 1990s 182
10.4 Channelization in the second Master Plan (MPD-2001) 186
10.5 Land acquisition for channelization 189
10.6 Interim conclusion 192

11 Drafting the Zonal Development Plan 194
11.1 Change of land use for pocket III: the starting point for channelization 194
11.2 Seeking approval for channelization – the draft ZDP of 1998 195
11.3 Negotiating scientific 'facts' and recommendations 199
11.4 The ZDP draft of 2006: proposing 'partial' channelization 201
11.5 'Wasted land' and the 'fear of encroachment' versus 'ecosystem services' 205
11.6 Floodplain zoning: institutionalization or co-optation? 208
11.7 The ZDP draft of 2008: Seeking post-facto approval for developments 210
11.8 Interim conclusion 213

VI THE RECLAMATION OF DELHI'S RIVERSCAPES FOR A WORLD-CLASS CITY IN THE MAKING 215

12 Multi-temporal analysis of land-use change (2001–2014) 215
12.1 Selection of research area for land-use change analysis 215
12.2 Land-use changes 2001–2014 216
12.3 Opening up the River Zone: the urban-mega projects 220

13 'Cleansing' and 'reclaiming' Delhi's riverscapes 223
13.1 Agriculture in Delhi's riverscapes 223
13.1.1 The governance of farming Delhi's riverscapes 224
13.1.2 Reclaiming the land for urban development 226
13.2 Cleansing Delhi's riverscapes from the slums 230
13.2.1 The slum demolitions (2004–2006) 231
13.2.2 'Green' evictions: discursive reasoning and the role of the courts 232
13.2.3 Fuzzy boundaries, legal categories: 300 meters for the river 236

13.2.4 Demolitions, religious structures and the channelization scheme 239
13.2.5 Background rationalities: plans for a riverfront promenade 240

13.3 Remaining residential spaces in Delhi's riverscapes 241
13.4 The effects of simplification: permitting construction beyond 300 meters 244
13.5 Interim conclusion 245

14 The political ecology of embankments and urban mega-projects 247
14.1 The Akshardham Temple Complex 247

14.1.1 An offspring of the channelization scheme 248
14.1.2 The construction of the Akshardham Bund 250
14.1.3 Religious and political prestige – a powerful coalition 250
14.1.4 Objection against the Akshardham Temple 251

14.2 The Commonwealth Games Village 253

14.2.1 The secret 'approval' of the site 253
14.2.2 Remaking environmental clearances 256
14.2.3 Formation of environmental protest: Yamuna Jiye Abhiyaan 258
14.2.4 The Games Village in the courts 262
14.2.5 A new boundary of the river? Multiple readings of the Akshardham Bund 263
14.2.6 The river in between science, politics and time constraints 266
14.2.7 Agency of the river? Drainage problem versus floods 268
14.2.8 Economic (ir)rationalities: the bailout package and corruption 270
14.2.9 Ground realities compared to planning schemes 271

14.3 'Development must take place' and 'leave the river to the experts' 272
14.4 Interim conclusion 274

VII AFTER THE URBAN MEGA-PROJECTS: PURIFYING DELHI'S RIVERSCAPES FOR RESTORATION, CONSERVATION AND BEAUTIFICATION 277

15 'Managing dissent': signs of change 277
15.1 A new authority and a moratorium for the river? 278
15.2 A plan for the river 284
15.3 Interim conclusion 287

16 Redefining the river's boundaries 289

16.1 The model: the Yamuna Biodiversity Park 289
16.2 Scaling up: from the Biodiversity Park to the Biodiversity Zone 290
16.3 Actions on the ground: the Golden Jubilee Park 293
16.4 Evicting the 'green keepers'? An attempt to develop a counter-story line 298
16.5 Remaking the plan: the influence of the NGOs and the courts 301
16.5.1 The evolvement of the Debris Case at the NGT 301
16.5.2 Rezoning the river – DDA's move to redefine the boundaries of the river 307
16.5.3 The action plan for 'Restoration and Conservation' 310
16.5.4 The orders of the NGT: 'Maily se Nirmal Yamuna' 311
16.6 Interim conclusions 315

VIII GOVERNING DELHI'S RIVERSCAPES: A SYNTHESIS 317

17 Reflection and discussion 317
17.1 Revisiting the main planning discourses and story-lines 317
17.1.1 The main discourses and story-lines 318
17.1.2 The persistent story-lines 321
17.1.3 'Planned' versus 'unplanned' encroachment 322
17.1.4 DDA's reluctant planning for the River Zone 324
17.2 The hybridization and purification of Delhi's riverscapes 326
17.3 Urban environmental governance: prevailing insights 330

18 Conclusion 335
18.1 Riverscapes: (mega-)urban challenges and the question of governance 337
18.2 Evaluation of the conceptual approach: do riverscapes make sense? 339

REFERENCES 341

APPENDIX 377

MAPS 385

COLOR PHOTOGRAPHS 392

LIST OF FIGURES

Figure 1: River Zone (Zone O) and research area 30
Figure 2: Ghats along the Yamuna in Delhi (Yamuna Bazaar) 52
Figure 3: Ghats along the Ganga in Benares (Varanasi), Uttar Pradesh 52
Figure 4: Demolished slums, Sabarmati riverfront in Ahmedabad, Gujarat 52
Figure 5: Riverfront slums along the Yamuna in Delhi 52
Figure 6: Sabarmati Riverfront Development Project in Ahmedabad, Gujarat 53
Figure 7: Advertisement for the Sabarmati riverfront project, Ahmedabad 53
Figure 8: Rivers and the spheres of governance 64
Figure 9: The practices of 'hybridization' and 'purification' 79
Figure 10: Hybridity of riverscapes 87
Figure 11: The material and discursive production of hybrid riverscapes 88
Figure 12: The embeddedness of urban environmental governance 90
Figure 13: Overview of the physical features of Delhi 116
Figure 14: The growth of Delhi 119
Figure 15: Schematic map of the Yamuna up to Delhi 128
Figure 16: Discharge of polluted water at Okhla Barrage, South Delhi 131
Figure 17: Polluted water for irrigation, Agra Canal headworks, South Delhi 131
Figure 18: Annual maximum water level at the Old Railway Bridge 133
Figure 19: Government structure of the NCT of Delhi 139
Figure 20: Urban governance framework 140
Figure 21: Environmental governance framework 145
Figure 22: Governance framework for Delhi's riverscapes 161
Figure 23: Delhi's riverscapes ca. 1807 164
Figure 24: Guide bund, Geeta Colony Bridge 188
Figure 25: ITO Barrage 188
Figure 26: DTTDC's plan for channelization and riverfront development (2006) 204
Figure 27: Floodplain Zoning (O-Zone) prepared by DDA 209
Figure 28: Land-use change in the research area by main categories (2001–2014) 219

Figure 29: Metro depot (DMRC) at Shastri Park, East Delhi 221
Figure 30: Information and Technology Park (DMRC) at Shastri Park, East Delhi 221
Figure 31: Planning schemes for 'pocket III' 249
Figure 32: Cross section Akshardham Bund 250
Figure 33: Protest camp 'Yamuna Satyagraha' 259
Figure 34: Tents along the Noida Link Road during flood 269
Figure 35: Flooded construction worker camps next to CWGs-Village 269
Figure 36: Standing water behind the Akshardham Bund 269
Figure 37: Standing water in front of the Akshardham Bund 269
Figure 38: Signage erected during the construction period of the CWGs-Village 272
Figure 39: Construction of Ring Road By-Pass Road near Old Railway Bridge 295
Figure 40: Ring Road By-Pass Road at Geeta Colony Bridge intersection 295
Figure 41: Debris along the Yamuna Pushta Embankment near Geeta Colony .. 302
Figure 42: Debris dumping along guide bund near Yamuna Bank Metro 302
Figure 43: Solid waste recycling near ISBT Bridge, Shastri Park, East Delhi 302
Figure 44: Slums on debris material in front of Shastri Park Metro Depot 302
Figure 45: Public notice boards posted along the embankments 304
Figure 46: Rezoning proposal for River Zone (Zone O) by DDA 307
Figure 47: DTC Millennium Bus Depot 309
Figure 48: 'Land bank' protected by Ring Road By-Pass Road 309
Figure 49: Main discourses and story-lines of Delhi's riverscapes 317
Figure 50: Pollution of the river Yamuna, eastern bank, near CWGs-Village 392
Figure 51:Pollution river Yamuna near ghats, Yamuna Bazar area 392
Figure 52: Riverfront promenade along the river Musi in Hyderabad, Telangana 392
Figure 53: Golden Jubilee Park along the Yamuna 392
Figure 54: Agriculture and temporary settlements of farmers along the Yamuna 393
Figure 55: Plant nursery, Yamuna Bank area 393
Figure 56: Fencing off the river, Kalindi Kunj, South Delhi 393
Figure 57: Okhla Bird Sanctuary, Kalindi Kunj, South Delhi 393
Figure 58: Unauthorized Colony, Jogabai Extension, Kalindi Kunj area 393

Figure 59: Unauthorized Colony, Majnu-Ka-Tila (New Aruna Nagar) 394
Figure 60: Akshardham Temple 394
Figure 61: CWGs-Village Entry Gate 394
Figure 62: Construction work on the Akshardham Bund towards the river.....394
Figure 63: Akshardham Bund and CWGs-Village 394
Figure 64: Farming Bela Estate near Golden Jubilee Park 395
Figure 65: Former construction workers camp near CWGs-Village 395
Figure 66: Yamuna Biodiversity Park Phase I.....395
Figure 67: Yamuna Biodiversity Park Phase II 395
Figure 68: Yamuna Biodiversity Park Phase I Amphitheatre.....395
Figure 69: Yamuna Biodiversity Park Phase I Butterfly Park.....395
Figure 70: Golden Jubilee Park during flood of 2010 396
Figure 71: Golden Jubilee Park 396
Figure 72: Model for the development of Golden Jubilee Park (phase I) 396

LIST OF TABLES

Table 1: Terminology used for discourse analysis 99
Table 2: Overview and types of conducted in-depth interviews 106
Table 3: Population growth NCT of Delhi 1951–2011 118
Table 4: Area and population of the river basin 124
Table 5: Flood discharge and maximum water level during major flood events 135
Table 6: Agencies involved in governing Delhi's riverscapes 150
Table 7: Environmental NGOs working on the Yamuna in Delhi 158
Table 8: Land use in the different stretches of the Yamuna in Delhi 217
Table 9: Land-use change in the research area 2001–2014 218
Table 10: Existing and proposed land use for River Zone (Zone O) 285

LIST OF MAPS

Map 1: Delhi and the river Yamuna 385
Map 2: Land-use change in the research area (north) 2001–2014 386
Map 3: Land-use change in the research area (south) 2001–2014 387
Map 4: Time series (research area) 388
Map 5: The development of the interrelated mega-projects (focus area I) 390
Map 6: Changing land uses: slums and the Golden Jubilee Park (focus area II) 391

GLOSSARY

akhada	a traditional wrestling ground and training center on the riverbank
bāngar	older alluvial soils along rivers, generally safe from floods
bhag	garden, orchard
crore	ten million
dhobi	washerman
ghat	riverside area with a series of steps leading down to the river
headworks	barrage
jamuna par	Trans-Yamuna, East Delhi
jheel	lake
jhuggi jhopdi	huts of the poor, slum (also JJ cluster)
jhuggies	huts of the poor in a slum
khadar / khādir	fertile soils of the low-lying, flood-prone areas along the river
kuccha / kacha houses	houses made of wood, mud and other organic materials
lakh	one hundred thousand
mahābhārata	major Sanskrit epics of ancient India
nadī	river
nallah / nala	stream or drain
Panchayat	local (village) governing body, elected council in rural areas
pandit / panda	Hindu religious scholar and teacher (pundit)
pooja	prayer, worship
pucca houses	solid and permanent houses made of brick, stone and concrete
pushta	bund or embankment, also referred to as riverbank
samādhi	shrine, memorial site

LIST OF ABBREVIATIONS

ANT	actor-network theory
ASL	above sea level
BAPS	Bochasanwasi Shri Akshar Purushottam Swaminarayan
BBMB	Bhakra-Beas Management Board
BCM	billion cubic meter
CGWA	Central Groundwater Authority
CGWB	Central Groundwater Board
CNG	compressed natural gas
CPCB	Central Pollution Control Board
CPWD	Central Public Works Department
CRZ	Coastal Regulation Zone
CSE	Centre for Science and Environment
cusec	cubic feet per second
cumec	cubic meter per second
CWC	Central Water Commission
CWGs	Commonwealth Games
DBU	designated best use
DCB	Delhi Cantonment Board
DDA	Delhi Development Authority
DIT	Delhi Improvement Trust
DJB	Delhi Jal Board
DMRC	Delhi Metro Rail Corporation (in short: Delhi Metro)
DND	Delhi-Noida-Delhi
DPCC	Delhi Pollution Control Committee
DTTDC	Delhi Tourism and Transportation Development Corporation
DUAC	Delhi Urban Arts Commission
DUSIB	Delhi Urban Shelter Improvement Board
EAC	Environmental Appraisal Committee
EIA	Environmental Impact Assessment
FDI	foreign direct investment
GAP	Ganga Action Plan
GDP	Gross Domestic Product
GNCTD	Government of the National Capital Territory
GoI	Government of India
HFL	High Flood Level

HLC	High Level Committee
IAS	Indian Administrative Service
ICT	information communication technology
IFCD	Irrigation and Flood Control Department
INTACH	Indian National Trust for Art and Cultural Heritage
IPCC	Intergovernmental Panel on Climate Change
ITO	Income Tax Office
JJ	Jhuggi jhopdi (JJ-cluster = 'slum')
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
JNU	Jawaharlal Nehru University
L&DO	Land and Development Office
LG	Lieutenant Governor
LIFE	Legal Initiative for Forests and Environment
MCD	Municipal Corporation of Delhi
MoEF	Ministry of Environment and Forests
MoHuPA	Ministry of Housing and Urban Poverty Alleviation
MoU	Memorandum of Understanding
MoUD	Ministry of Urban Development
MoUEPA	Ministry of Urban Employment and Poverty Allevation
MoWR	Ministry of Water Resources
MPD	Master Plan for Delhi
NCRPB	National Capital Region Planning Board
NCT	National Capital Territory
NDA	National Democratic Alliance
NDMC	New Delhi Municipal Corporation
NEERI	National Environmental Engineering Research Institute
NGO	Non-Government Organisation
NGT	National Green Tribunal
NH	National highway
NHF	Natural Heritage First
NOIDA	New Okhla Industrial Development Authority
NRCD	National River Conservation Directory
PIL	Public Interest Litigations
RRZ	River Regulation Zone
PWD	Public Works Department
RTI	Right to Information
SANDRP	South Asia Network for Dams, Rivers and People
SKAD	Sociology of Knowledge Approach to Discourse
SPA	School of Planning and Architecture

STP	Sewage Treatment Plan
TAG	Technical Advisory Group
UN	United Nations
U. P.	Uttar Pradesh
UPE	Urban Political Ecology
UYRB	Upper Yamuna River Board
Rs.	Indian Rupees
WWF	World Wide Fund for Nature
WYC	Western Yamuna Canal
YAP	Yamuna Action Plan
YJA	Yamuna Jiye Abhiyaan
YRDA	Yamuna River Development Authority
YREMC	Yamuna Removal of Encroachments Monitoring Committee
YSC	Yamuna Standing Committee
ZDP	Zonal Development Plan

SUMMARY

The inherent complexity of environmental change along urban rivers in the megacities of the Global South requires a change of perspective going beyond the riverfront. In order to overcome the binary conceptualizations of nature/culture and river/city, this study uses the notion of *riverscapes* as a single terminology referring to the riverine landscape formed by the natural forces of the river and human interventions. By linking a discourse analytical approach with theoretical concepts from governance research and urban political ecology, this study develops the theoretical framework of *riverscapes* to study environmental change along urban rivers.

Interlinked with the opening and liberalization of the Indian economy, the vision to make Delhi a 'world-class' city has transformed the urban landscape of the megacity in manifold ways. The river Yamuna, which divides the city into two parts, was historically degraded to a foul-smelling drain by the city's untreated sewage and was the neglected 'backyard' of the megacity for a long time. The reclamation of the floodplain areas for the planned development of the city has been discussed in Delhi since the late 1970s. For decades, models of European riverfronts dominated the discourses around the river and the urban imaginaries of the planners.

Ecological risks and opposition from environmental groups have prevented large-scale channelization of the river. However, the perception of the river's floodplain as 'wasted land' has transformed it into a pivotal space in the remaking of the city in the twenty-first century. The large-scale slum demolitions and development of urban mega-projects along the banks of the Yamuna are characteristic for dynamic land-use changes in post-liberalization urban India.

The research presented in this book focuses on the multiple city-river relationships and current processes of urban environmental change. The results highlight that dynamic land-use changes and the reclamation of ecologically sensitive spaces are deeply connected to changing discursive framings of the role and function of these socio-ecological hybrids in the remaking of cities. Through analysis of the discourses surrounding Delhi's riverscapes, the study shows how dominant discourses and their associated story-lines have remained persistent over long periods of time and how these discourses have influenced the current processes of urban environmental change and governance.

ZUSAMMENFASSUNG

Für ein besseres Verständnis der Komplexität von urbanen Landnutzungsveränderungen und Umweltproblemen entlang von Flüssen in den Megastädten des Globalen Südens bedarf es empirischer Untersuchungen, die über eine enge räumliche Fokussierung auf die *riverfront* hinausgehen. Hierzu ist es notwendig, die moderne Dichotomie von Natur und Kultur sowie Fluss und Stadt aufzubrechen, um das Fluss-Stadt-Verhältnis neu zu definieren. Diese Studie entwickelt in diesem Kontext ein neues Verständnis für die Erforschung von urbanen Flusslandschaften als sogenannte *riverscapes*. Das theoretische Konzept der *riverscapes* basiert auf einer Verknüpfung von Governance-Forschung und Ansätzen der Urban Political Ecology mit diskursanalytischen Ansätzen.

Im Zuge wirtschaftlicher Liberalisierung sowie fortschreitender Globalisierungsprozesse ist es das Ziel der Stadtentwicklungspolitik, die indische Hauptstadt Delhi in eine „Weltklasse-Stadt" zu verwandeln. Diese ambitionierte Zielsetzung der Stadtentwicklungspolitik verschärft die urbanen Landnutzungskonflikte innerhalb der Megastadt. Ein räumlicher Fokus der Stadterneuerungsmaßnahmen liegt hierbei insbesondere auf der Flussaue der Yamuna, die in der Vergangenheit auf Grund der monsunalen Überschwemmungen sowie der starken Verschmutzung des Flusses städtebaulich unberücksichtigt blieb und im Zuge dessen Raum für Marginalsiedlungen bot. Eine städtebauliche Entwicklung der Uferbereiche nach dem Vorbild westlicher Flüsse wurde bereits seit den späten 1970er Jahren diskutiert, jedoch auf Grund ökologischer Risiken nicht umgesetzt. Eine Eindeichung und Entwicklung von ausgewählten Arealen der Flussaue erfolgte erst im Zuge städtebaulicher Großprojekte nach der Jahrtausendwende. Zusammen mit großflächigen Slumräumungen sind diese Entwicklungen charakteristisch für aktuelle Landnutzungsveränderungen und -konflikte in den indischen Megastädten.

Der Fokus der Untersuchungen liegt auf den vielfältigen Fluss-Stadt Beziehungen und dynamischen Veränderungen in der Flussaue der Yamuna. Die Studie zeigt, dass aktuelle Stadtentwicklungsprojekte eng verknüpft sind mit sich verändernden Stadtentwicklungs- und Umweltschutzdiskursen.

PREFACE

This study was submitted as a doctoral thesis to the Faculty of Mathematics and Natural Sciences of the University of Cologne and was defended on 17th June 2015. Prof. Dr. Boris Braun and Prof. Dr. Frauke Kraas were the reviewers.

ACKNOWLEDGEMENTS

Although it seems impossible to acknowledge everybody who supported me in Delhi and Cologne during the last few years, I would like to thank some key individuals here.

Very special thanks go to my supervisor, Boris Braun, who always encouraged me in my work and gave me all the support a PhD student needs, including a great office environment and plenty of freedom to do my research. I would like to especially thank Boris for the confidence and motivation he gave me through reading and critiquing my drafts. I thank my Indian 'supervisor' N. Sridharan from the School of Planning and Architecture (SPA) in Delhi for the great support provided throughout the years.

I am especially grateful to my interview partners in Delhi. Without their patience and explanations this study would not have been possible. My special thanks goes to Manoj Misra, who welcomed me so many times, introduced me to the farmers along the Yamuna, invited me to court proceedings and conferences, and shared his knowledge on the river with me during multiple hours of discussions. Further, I would like to thank Sudha Mohan for providing additional help and always arranging snacks and drinks for the long talks on the river.

My thanks also goes also to Ravi Agarwal, Manu Bhatnagar, Anupam Mishra, Suresh Rohilla, Diwan Singh, Vikram Soni, and Himanshu Thakkar. All of them have shared their own understandings of the river with me, which have had a lasting effect on my understanding of Delhi's riverscapes. I am grateful for the wonderful talks we had. I further need to thank Rahul Choudhary and Rittwick Dutta from the Legal Initiative for the Environment (LIFE) for digging out all the old court files.

Special reference needs to be given to the late Ramesh C. Trivedi, who explained to me almost everything related to the pollution of the Yamuna. Also to the late Ramaswamy R. Iyer, who helped me enormously to better understand the governance of water and rivers in India. With their deaths, India's rivers have lost important spokesmen. I am grateful for the opportunity to learn from them.

I am further very thankful for the hospitality of my interview partners within the different government departments. A special thank goes to the members of the DDA Landscape Unit, who openly discussed with me their planning schemes for Delhi's riverscapes. I gained the most impressive insights into the everyday changes and governance of Delhi's riverscapes from talks with the farmers (who for their own security shall remain anonymous). I have rarely met friendlier people. Talking to many of them would not have been possible without my translators in the field. I thank Sarandha Jain and Kavita Ramakrishnan for accompanying me on some of the visits and providing this translation

A word of appreciation goes to the German Academic Exchange Service (DAAD) providing the initial scholarship for my time at the SPA in 2009–2010 and the German Academic Scholarship Foundation (Studienstiftung des deutschen

Volkes) for funding my studies for two and a half years (2011–2013). Thanks for institutional support go to the team of Max Mueller Bhavan, and Robin Mallick in particular, who helped to organize the Yamuna Future Workshop in March 2013.

My personal research greatly benefited from the affiliation with the 'Chance2Sustain - Urban Chances, City Growth and the Sustainability Challenge' project. Sincere thanks to Loraine Kennedy and Isa Baud for taking me on-board and inviting me to workshops and conferences and to Véronique Dupont for her inspiring work on Delhi and her thoughtful advice. In Delhi, discussions with Amita Baviskar, Bérénice Bon, Timothy Karpouzoglou, and Awadhendra Sharan have been a source of inspiration. As part of the urban workshop series, organized by the Centre de Sciences Humaines (CSH) and the Centre for Policy Research (CPR), I was able to discuss my work on the river in November 2011 with a larger audience in Delhi. I would like to thank Marie-Hélène Zerah and Partha Mukhopadhyay for inviting me, and the participants for their comments.

A series of discussions with Anna Zimmer over the last few years has influenced my growing interest in Urban Political Ecology and socio-ecological hybrids. Her insightful remarks and sharp feedback helped me enormously. A thousand thanks for the great support. The theoretical concept made major progress based on the valuable comments by Erik Swyngedouw and the other participants during a PhD workshop at the Politecnico di Milano in May 2014. I am grateful to Gloria Pessina for the opportunity to participate.

Heartfelt thanks for all the support also go to the whole team at the Institute of Geography. Special thanks go to Frauke Kraas for her valuable comments on the conceptual framework and the research design, to Regine Spohner and Ulrike Schwedler for preparing the excellent maps, Veronika Selbach for her advice, and Peter Dannenberg for giving me support and time to finish this book. My wonderful colleagues at the institute made long office days enjoyable: thank you Amelie, Annika, Benjamin, Birte, Carsten, Fabian, Franziska, Gerrit, Harald, Holger, Katharina, Madlen, Mareike, Marie, Pamela, Petra, Sebastian, Steffi, Tibor, Tine, and Valerie.

In the final phase, Anna Zimmer, Jürgen Schiemann, Tine Trumpp, Veronika Selbach, Valerie Viehoff, Megha Sud, Lisa-Michéle Bott, Birte Rafflenbeul, and Marie Pahl provided important support in proof reading, as well as Regine Spohner, Benjamin Casper and Benedict Vierneisel in cartography and graphics. Additionally, I thank Hannah Stanley for final proofreading. Special thanks for the wonderful time in Sheikh Sarai B-24 go to my wonderful flat mates and friends Adil, Anna, Dawa, Imran, Karen and Nanu, as well as the Barista group from SDA market, New Delhi.

Finally, the great support of my family deserves my heartfelt thanks. My parents supported me wholeheartedly in all respects. I am also grateful to my siblings and grandparents who were always interested in my work. Lastly, my deepest gratitude to Natalie for all her support and love during the stressful years and long stays abroad. I owe you so much.

I INTRODUCTION AND RESEARCH CONTEXT

1 INTRODUCTION

The megacities of the Global South have emerged as hot spots of global environmental change; both as drivers of this change, as well as experiencing the intense adverse effects (KRAAS 2003, 2007, KRAAS & MERTINS 2014, PARNELL et al. 2007, SINGH 2015, SORENSEN & OKATA 2011). Due to their scale, dynamics and complexity, the largest cities of the world face multiple socio-environmental challenges and their future development is at the center of public debate and scientific research (DAVIS 2006, KRAAS et al. 2014, PARNELL & OLDFIELD 2014, SORENSEN 2011, UN HABITAT 2010).

The dynamic processes of urbanization and associated land-use changes in the megacities of the Global South are driven by a multiplicity of actors embedded in complex global-local relations (HEINRICHS et al. 2012, HOMM 2014). In many cases the governance of megacities in the Global South is characterized by sectoral approaches lacking integrated planning and inter-sectoral coordination (BAUD & DHANALAKSHMI 2007, FARIA et al. 2009, KRAAS & MERTINS 2014, MITTAL et al. 2015). An omnipresent urban informality adds to the multiple challenges for urban governance in many cities of the Global South (ALSAYYAD & ROY 2004, MCFARLANE 2012, MCFARLANE & WAIBEL 2012, ROY 2005, 2009b).

In light of climate change, urban transformations in the megacities of the Global South are intimately linked to the challenge of making cities less vulnerable and more resilient (AßHEUER 2014, AßHEUER & BRAUN 2011, BIRKMANN et al. 2010, GARSCHAGEN 2014, HANSJÜRGENS & HEINRICHS 2014, HORDIJK & BAUD 2011, OTTO-ZIMMERMANN 2011, 2012). Along with specific local challenges of resource overexploitation, environmental degradation and associated health problems ongoing processes of mega-urbanization raise multiple questions of sustainability and socio-environmental justice (AGGARWAL & BUTSCH 2011, RADEMACHER & SIVARAMAKRISHNAN 2013b).

The environmental question is "generally often circumscribed to either rural or threatened 'natural' environments or to 'global' problems", but the central role of the global urbanization process is still under-represented in the environmental debate (SWYNGEDOUW 2004: 9). This neglect of urban nature has been connected to the modern separation of nature and society through which 'the city' has for a long time been considered to be the very antithesis to nature (see among others ANGELO & WACHSMUTH 2014, CHILLA 2005b, HARVEY 1996b, HEYNEN et al. 2006b, KEIL 2003, KEIL & GRAHAM 1998, TREPL 1996). The city, seemingly entirely created by humans, was not considered as a natural ecosystem. As a result, environmental problems in the cities of the Global South have long been largely ignored (HARDOY & SATTERTHWAITE 1991). Only since the turn of the millennium

have urban environmental problems in the Global South, especially air and water pollution, come into increasing focus of both state and non-state actors. As a result, a growing 'urban environmentalism' has resulted in new forms of urban environmental governance (BENTON-SHORT & SHORT 2013, BRAND & THOMAS 2005, FARIA et al. 2009, SHUTKIN 2001, VÉRON 2006, WHITEHEAD 2013).

Within this evolution, the modern city/nature dichotomy is challenged. 'Nature' is to some extent brought back into the city, yet this 'reintroduction of nature' into the urban realm does not follow any consistent narrative, but is rather fragmented in space and time, and often emerges as contradictory and highly politicized. Furthermore, despite a growing recognition of the importance of the urban environment, "a paradoxical form of inaction is the norm when it comes to implementing urban environmental solutions" (SHEPPARD 2006: 299). With regard to environmental conflicts in the cities of the Global South, numerous authors have argued that priority has often been given to ecological issues linked to larger questions of intergenerational equity, climate change and natural resource depletion ('green agenda') over the basic needs of the poor and the multiple challenges of the poverty-environment nexus ('brown agenda') (BARTONE et al. 1994, MCGRANAHAN & SATTERTHWAITE 2000, WATSON 2009).

In this context, the current urban environmental politics and socioecological transformations in India's megacities appear as an especially interesting case. Due to continuing population growth and the multiple effects of economic liberalization, India's megacities have been facing dynamic transformations raising manifold questions of urban sustainability and socio-environmental justice. India's current urbanization process poses multiple challenges for urban environmental governance to balance environmental protection and economic development, and the desires of a growing and increasingly assertive middle class[1] and the basic needs of the urban poor (BAVISKAR 2003, 2011a, DE MELLO-THÉRY et al. 2013, MAWDSLEY 2009, RADEMACHER & SIVARAMAKRISHNAN 2013a, TRUELOVE & MAWDSLEY 2011, VÉRON 2006).

Taking the case study of the river Yamuna in India's capital city Delhi, this study seeks to study these multiple governance challenges by linking questions of urban land-use change and urban redevelopment strategies to questions of river pollution and environmental degradation. City-river relationships reflect larger changes in socio-natural configurations and socioecological transformations (HOLIFIELD & SCHUELKE 2015, RADEMACHER 2011). Or more broadly, as HEIKKILA (2011: 33) frames it: "The manner in which societies interact with 'their' rivers tells us as much or more about themselves as it does about the rivers per se." By analyzing the river-city nexus, this study aims to shed light on the socioecological transformation in urban India beyond the physical space of the river Yamuna in Delhi.

1 Writings on the role of India's (emerging) urban middle class(es) tend to use a vague definition (BROSIUS 2010, ELLIS 2011, FERNANDES 2006, GHERTNER 2011d, MAWDSLEY 2004, SRIVASTAVA 2009). For a more detailed discussion see among others SRIDHARAN (2011).

1.1 Delhi: a tale of two cities, but only one river

Delhi has experienced rapid urbanization since India's Independence in 1947. With a population of approximately 17 million India's capital is today one of the largest megacities in the world. The long history of the city has always been closely connected to the river Yamuna, which is often referred to as the lifeline and the green lung of the city (DDA 2007). The ecologically sensitive river zone is the largest remaining natural feature and a crucial life supporting ecosystem of the megacity. The river Yamuna divides the city of Delhi into two parts, referred to as West Delhi and East Delhi (see Map 1, page 385).

The two parts of the megacity are characterized by distinctly different urban morphologies. The historic cores of the city and all major institutional areas are located in West Delhi. West Delhi is a comparatively 'green' city; especially the central, planned areas of the city which feature large green and recreational spaces. In contrast, East Delhi has largely grown informally and unplanned. The area is characterized by higher densities and generally poorer residential areas (CENSUS OF INDIA 2011a, MISTELBACHER 2005: 25). East Delhi is considerably lacking in terms of infrastructure provisions and adequate open and green spaces. An increasing number of bridges and new metro lines connects both parts of the city today, but the river's remaining 'undeveloped' floodplain is between one and three kilometers wide and still forms a major physical barrier separating the 'two cities'. This dichotomy of West Delhi and East Delhi needs to be taken into account because it influences the city-river relationship and the discourses associated with the river.

The growth of the megacity on both sides of the river has come at a large social and environmental cost. The extraction of the river's freshwater for agriculture and drinking water purposes, and increasing quantities of sewage released by the ever growing city have turned the sacred river, worshipped by Hindus since time immemorial, into a "sewage canal" (CSE 2007). The degradation of the riparian zone to a foul-smelling drain expresses a state of neglect regarding its protection and socio-ecological importance (see Figure 50 and Figure 51, page 392). A World Bank funded study in 2003 suggested that the Yamuna in Delhi "is perhaps the most threatened riverine ecosystem in the world because of the immense anthropogenic pressures on this riparian habitat" (BABU et al. 2003: 1).

The river's ecological importance for the city is acknowledged by several environmental policies and legislations. In the city's Master Plan, the city's central planning body, the Delhi Development Authority (DDA), has defined the River Zone (Zone O) as a special planning zone (see Figure 1). By using capital letters for 'River Zone' the author intends to highlight that this spatial demarcation and its associated planning regulations are defined by the DDA. The demarcation of the 'River Zone' itself is problematic and the policy-making process surrounding it is outlined in this study.