How can southern cities advance towards water sensitivity?

The book showcases how reparative capacities for water sensitive governance are leveraged through informality in the Indian cities of Bhuj and Bhopal

Repairing urban water governance

Neha Mungekar

Repairing Urban Water Governance

Neha Mungekar

Repairing Urban Water Governance

Capacities to enable reparation by leveraging informality
to achieve water sensitive governance in India

Neha Mungekar

The research in this thesis was part of the Water4Change (W4C) programme, supported by the Dutch Research Council (NWO)- (Grant W 07.7019.103) and Indian Government Department of Science & Technology (Grant DST-1429-WRC).

ISBN: 978-94-6522-136-6

Cover artwork: Zeel Sanghvi

Provided by thesis specialist Ridderprint, ridderprint.nl
Printing: Ridderprint
Layout and design: Froukje Frijlink, persoonlijkproefschrift.nl

Repairing Urban Water Governance

Capacities to enable reparation by leveraging informality to achieve water sensitive governance in India

Repareren van stedelijk waterbeheer

Capaciteiten om reparatie mogelijk te maken door informaliteit te benutten voor water-sensitief bestuur in India

Thesis

to obtain the degree of Doctor from the

Erasmus University Rotterdam

by command of the

rector magnificus

Prof.dr.ir. A.J. Schuit

and in accordance with the decision of the Doctorate Board.

The public defence shall be held on

Thursday 24 April 2025 at 15.30 hrs

by

Neha Nandan Mungekar

born in Mumbai, India.

Erasmus University Rotterdam

Doctoral Committee:

Promotor:	Prof.dr. D.A. Loorbach
Other members:	Prof.dr. J. Edelenbos Prof.dr. K. Schwartz Dr. G. Ziervogel
Copromotors:	Dr. K. Hölscher Dr. A.L. Janssen

For Katharina, Derk, and Annelli —the empathetic supervisory committee who showed me how to live repair. This thesis is its written manifestation.

Acknowledgements

I am grateful that this section has no word limit because, as I write it, I realise just how incredibly fortunate I am. The support I have received is not something I need to exaggerate—it simply *is*.

This thesis took a village.

First, I want to acknowledge my therapist(s) and the many versions of myself that endured this journey. *Thank you, me, for not giving up on me.*

I cannot begin to express my gratitude for having the most sincere, empathetic, and intellectually generous supervisors. You were not just mentors—you were my fiercest cheerleaders. You never imposed hierarchies and never made me feel like anything less than an equal. You were always a call away, encouraging me to ask difficult questions, challenge established norms, and carve out my academic path.

You celebrated my victories louder than I did. You reminded me to pause to take care of myself and my family. You taught me that true supervision is not about leading from the front but about standing beside someone—offering quiet strength, unwavering support, and the freedom to explore, question, and grow. I hope to one day embody the kind of mentorship you have shown me.

Derk, thank you for showing me what true humility in academia looks like. Your ability to distil complex ideas into clear, concise thoughts helped me navigate confusion countless times. You exemplify what it means to be a secure scientist—one who invites critique and inspires others to challenge them.

Katharina, if responsibility, accessibility, and care, had a face, it would be yours. You strengthened my academic arguments and checked in on me as a person beyond my research. Your meticulous coordination, sharp writing, and openness—it has been a privilege to learn from you.

Annelli, you grounded this thesis with your decolonial perspective. You reminded me to set boundaries when I pushed myself too hard, and you embraced my work—and me—with such warmth and openness. Hosting my parents for dinner was a kindness I will always cherish. Thank you for seeing me, for accepting my quirks, and for always offering wise counsel.

Though not part of my current committee, I must thank **Uta**, who believed in me before I even saw myself as *PhD material.* Uta, I did it. Thank you for your foresight and faith in me.

Thank you, **Robin**, for guiding me from my WRI days. I hope this thesis honours the confidence you placed in me.

To **Taneha**, my other backbone in this PhD and the Water4Change programme — you believed in my research and empowered me as coordinator. I learned so much just by watching you. From admiring your work in my urban design days to witnessing your leadership firsthand, you showed me what equal, inclusive leadership looks like. Your ability to navigate institutional barriers while lifting others along the way has been one of the most valuable lessons of my PhD.

To Ruchika, thank you for teaching me the art of facilitation with grace and presence. Your ability to hold space for others is something I will always aspire to.

To my entire **Water4Change team**— Abhishek, Gargi, Jignaben, Kanika, Manisha, Navaneeth, Raquel, Sameer, Sreeda, Srishti, Tanya, and Yogesh bhai, Kapshe sir, Mona ma'am, Harikumar sir, Chinni sir, Pranab sir—and the rest, thank you for supporting my fieldwork, for trusting me, and for introducing me to your world. This work would not exist without you.

To the **stakeholders I interviewed**—your stories, trust, and willingness to open up, have shaped this thesis in ways I cannot fully express. Your words stayed with me, and I have done my best to honour them. This research exists because of you.

To my **DRIFT colleagues**—Aniek, Carien, Catherine, Dewi, Floor, Gijs, Giorgia, Igno, Julia, Marieke, Maria, Maryce, PJ, Roel, Samaa, Sandra, Serf, Stephanie, Tineke, and Wouter—and my **PhD tribe**—Ina, Mara, Sophie, and Tessa—you turned my fears of working in academia into friendships I now deeply cherish. Thank you for letting me cry, rant, overanalyse, and celebrate, all in the same breath. I am so lucky to have found you all.

To my **school, architecture, urban design, WRI, IHE, summer schools, conference friends**—Anushree, Kartiki, Kshitija, Lubaina, Meghna, Sahana and Vishal, thank you for believing in me, cheering me on, and walking this journey with me.

To my incredible **paranymphs**, Amani and Emil— **Amani,** for always being just a phone call away, supporting me through both academic and personal struggles. The way you navigate your own challenges has been a lesson in resilience, and your strength has been one of my inspirations to keep going with this thesis. **Emil,** for opening your home, hosting game nights, and offering moments of respite when I needed them most. Your kindness, humour, and unwavering support have made even the toughest days feel lighter. I could not have asked for better people to stand beside me.

Kriti, your enthusiasm and generosity saved my PhD. You introduced me to Bhopal, made sure I connected with the right people and showed me kindness in a way I will never forget. I am so grateful to have found a sister in this process.

Priyank, you have proved that sometimes, a stakeholder can become a true friend. You were there at every stage of this research, reminding me that distance is just a concept. This thesis—and I—are stronger and happier because of you.

Samir, for always seeing this as *our* journey. While I fought my battles to complete this thesis, you stood by my side—helping me with job applications, last minute proofreading, funding proposals, random FAQs, and obliging my countless requests at odd hours—all while fighting your battles. For always showing up and being the unwavering presence in my life—thank you.

To my **soul sisters—Kshama, Mayura, and Zeel**—thank you for proving that distance means nothing when friendship is this strong. **Zeel,** for helping me understand my body and mind long before I understood my research. Thank you for patiently teaching me how to hold a stylus and for transforming this thesis into a graphical narrative. **Mayura,** for being the elder sister I never knew I needed. Your long, therapeutic conversations have been a lifeline. **Kshama,** for being my guardian angel—watching over my mental and physical health and quite literally saving my life on multiple occasions. I am here, whole, because of you.

And finally, to my **parents**, who never let crises—health, pandemics, climate disasters—cast a shadow over my journey. I could complete this PhD so smoothly because you never burdened me with worries. It was a privilege to do this as a pampered daughter. **Nupur**, my sister, my eternal cheerleader, who makes me sound far cooler than I actually am. **Baba,** for always listening to my endless stories. And most of all, **Aai,** whose resilience is the greatest lesson I could ever learn.

Thank you.

Table of Contents

Abbreviations

ACT:	Arid Communities and Technologies
AR:	Action Research
AIILSG:	All India Institute of Local Self-Government
BHADA:	Bhuj Area Development Authority
BMC:	Bhopal Municipal Corporation
BNP:	Bhuj Municipal Council
CAA:	Constitutional Amendment Act
CAG:	Comptroller and Auditor General of India
CEPT:	Centre for Environmental Planning and Technology
CMA:	Catchment Management Agency
CSO:	Civil Society Organisation
DRIFT:	Dutch Research Institute for Transitions
DST:	Department of Science and Technology
DTCP:	Directorate of Town and Country Planning
EU:	European Union
GUIDE:	Gujarat Institute of Desert Ecology
GWP:	Global Water Partnership
GWSSB:	Gujarat Water Supply & Sewerage Board
HIC:	Homes in the City
ICWE:	International Conference on Water and the Environment
IDFC:	Infrastructure Development Finance Company
IITGn:	Indian Institute of Technology Gandhinagar
IUWM:	Integrated Urban Water Management
IWA:	International Water Association
IWRM:	Integrated water Resource Management
JSSS:	Jalsrot Sneh Samvardhan Samiti
KMVS:	Kutch Mahila Vikas Sanghathan
KPMG:	Klynveld Peat Marwick Goerdeler
LDA:	Lake Development Authority
MANIT:	Maulana Azad National Institute of Technology
MII:	Modern Infrastructure Ideal
MoWR:	Ministry of Water Resources
NGO:	Non-Governmental Organisation
NWO:	Dutch Research Council (Nederlandse Organisatie voor Wetenschappelijk Onderzoek)
NWP:	National Water Policy
OECD:	Organisation for Economic Co-operation and Development
PHED:	Public Health Engineering Department
POPs:	Persistent Organic Pollutants
RBO:	River Basin Organisation

SDG:	Sustainable Development Goal
SPV:	Special Purpose Vehicles
SUWM:	Sustainable Urban Water Management
TM:	Transition Management
ULB:	Urban Local Body
UN:	United Nations
UNCED:	UN Conference on Environment and Development
UWM:	Urban Water Management
W4C:	Water4Change
WHO:	World Health Organization
WSC:	Water Sensitive City
WSUD:	Water Sensitive Urban Design
WUA:	Water User Association
WWC:	Water Wise City

Photo narratives

Photographs

Figures

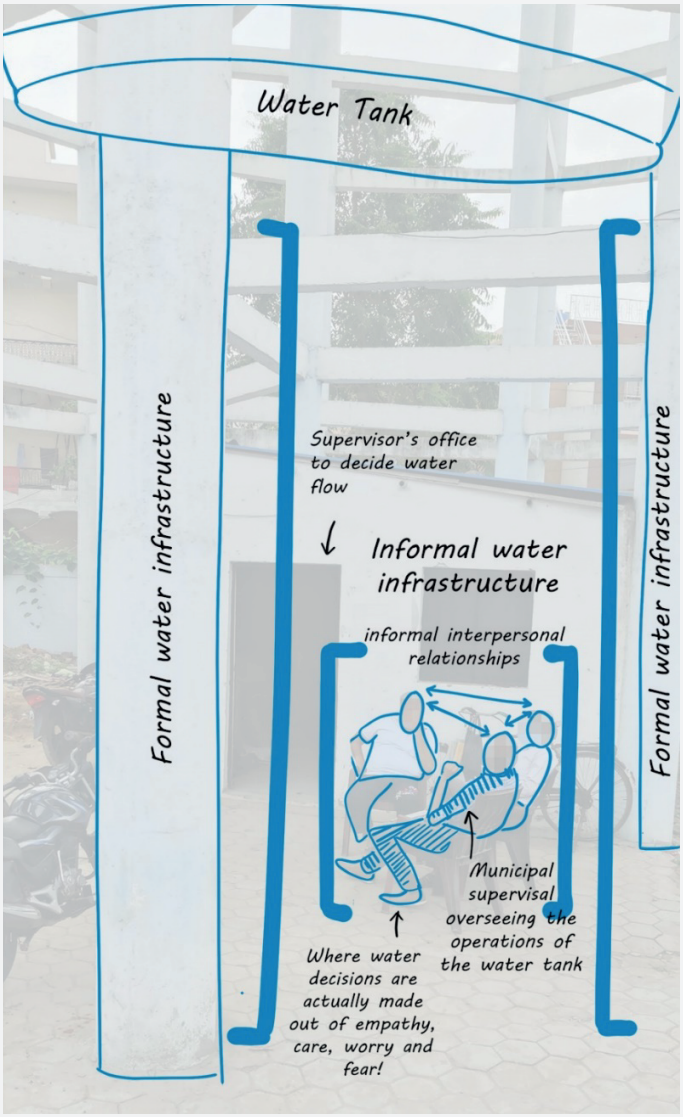
Tables

1

Informality as a lever for repairing water governance in Indian cities: The introduction

Photo Narrative 1: The water 'infrastructure'

I want to start the story of this thesis with a seemingly nonchalant photograph that, at first glance, portrays the solid and masculine legs of overhead water tanks and three men, one of whom is a water tank supervisor, having a relaxed discussion beneath the towering water storage apparatus. While it appears that the tanks operate autonomously through some grand technocratic mechanism and that the supervisor's role is merely to keep a check on its nuts and bolts, the reality is far more intricate.



What is actually unfolding at this moment is the water tank supervisor and two residents strengthening their relationship. This familiarity is a two-way street, allowing the residents to benefit from their affinity with the supervisor during times of dire water scarcity. In turn, the supervisor gains a cushion of solidarity. When water distribution faces delays, the residents, understanding the supervisor's challenges, respond with more understanding and forgiveness. This thesis delves into the rituals and interactions beyond the formal rules and mandates that have the power to repair the system. It explores the complexities of informal water governance in India, advocating for a systemic approach to address these challenges.

In this introductory chapter, I begin by outlining the persistent water challenges faced by Indian cities, alongside the various efforts aimed at addressing these issues. I then explore how the Water Sensitive City (WSC) approach—especially prominent in the Global North and henceforth referred to as 'water sensitivity'—has been proposed as a holistic solution to water challenges. Achieving water sensitivity, however, necessitates a fundamental shift in governance approaches. Stemming from Northern debates, transformative urban governance is conceptualised as a normative approach to navigate radical change in cities towards sustainability.

I acknowledge the need to reshape existing urban governance structures in India. However, in contexts like India, where exploitative colonial systems persist and continue to perpetuate inequities, transformative governance that lacks alignment with post-colonial justice goals risks exacerbating harm. I therefore argue that a *reparative* approach—one more attuned to the post-colonial context—is better suited to addressing contemporary water challenges. Grounded in the principles of restorative justice, reparative governance seeks to facilitate genuine transformation by considering the historical and social intricacies that exacerbate governance challenges in post-colonial contexts such as India.

In this context, I examine whether informality— a key mode through which urban governance is exercised in India—can mobilise reparation. Informality, often exercised through hybrid formal-informal governance arrangements in deregulated settings, holds significant potential for reparation, which forms the core focus of my thesis.

The chapter concludes by underscoring the need to develop capacities for reparative governance to achieve water sensitivity in urban India, and how informality may support this.

1.1. The need to transform towards water sensitivity

1.1.1. Charting the Currents: Unpacking persistent urban water challenges

Indian cities find themselves entangled in a web of daunting water-related challenges, including recurrent droughts, devastating floods, and widespread contamination, a scenario that paints a grim picture of the country's urban water management struggles (OECD, 2012). The situation is further illuminated by alarming figures: 163 million individuals lack access to clean drinking water, and an additional 210 million are deprived of basic sanitation facilities (Briscoe & Malik, 2006). The situation is exacerbated by the intermittent nature of water supply, which often limits access to just a few hours a day, and by the contamination of nearly 70% of the country's water sources (Murty & Kumar, 2011). Flooding, which affects approximately 7.5 million hectares of land annually, highlights the magnitude of India's water-related challenges (IDFC, 2011). These conditions reveal the acute water challenges faced by residents in urban Indian, characterised by scarcity (too little), excess (too much), and pollution (too dirty).

Furthermore, it is crucial to examine these challenges through the lens of unequal access, benefits, and the distribution of risks, thus adding 'too unequal' to the list. This inequity was

formally acknowledged at the 2023 UN Water Conference, which called for a shift towards viewing water challenges through a justice-oriented framework, recognising the uneven distribution of water-related burdens across different segments of society.

In urban India, especially secondary[1] cities, significant water challenges arise due to rapid urbanisation and slower infrastructure growth (Biswas & Kris, 2013; Krishnamurthy et al., 2016). The unique position of secondary cities, coupled with limited resources and increased demand, makes them especially susceptible to water scarcity, pollution, and disasters like floods, highlighting the persistence of these challenges (Marais & Cloete, 2017; Pathirana et al., 2018).

These persistent challenges underscore the limitations of conventional, compartmentalised approaches to urban water management. To effectively tackle issues of scarcity, excess, pollution, and inequity, there is a need for a shift towards integrated, holistic frameworks that address the interconnected nature of these water crises.

In the following section, I will further explore how integrated water management approaches—and more specifically, water sensitivity—offer the potential to reshape urban water governance in India to address these persistent water challenges.

1.1.2. Promise of water sensitivity: Shifting urban water management approaches

The socio-political complexities of water management in urban India have prompted a gradual shift towards Integrated Water Resources Management (IWRM). While India's policy documents have increasingly moved away from the Modern Infrastructure Ideal (MII) to endorse IWRM principles (Ministry of Water Resources, 2002, 2012), practices on the ground still largely reflect MII's influence. Today, cities across India continue to seek an effective approach to address their persistent water challenges

Globally, water management has undergone a progressive shift, beginning with the widespread recognition of MII by academia, international bodies, practitioners, and financial institutions (Bichai & Flamini, 2017). Emerging in the late 19th century, MII advocated for large-scale, centralised infrastructure systems optimised through technological advancements to drive economic growth and efficiency, with a strong emphasis on controlling natural processes for human benefit. This model dominated water service sectors, focusing on universal access to potable water through a single centralised system (Gnadl, 2017).

However, the inefficiencies of MII, including its sectoral focus, infrastructure-heavy approach, and lack of stakeholder participation (Bichai & Flamini, 2017; Kösters et al., 2020) prompted global organisations such as the Global Water Partnership (GWP, 2000), the United Nations at the 2002 World Summit on Sustainable Development (Johannesburg Summit, 2002), and the

1 The secondary cities are classified as per their function and relation to first-tier cities (provision of supportive services) than merely by population size (Roberts 2014).

European Union's Water Framework Directive (EU, 2000) to adopt IWRM. IWRM promotes a more holistic, decentralised, and integrated approach to water management, advocating for inclusive governance (Giordano & Shah, 2014). This approach gained traction with its inclusion in Agenda 21 at the 1992 UN Conference on Environment and Development (UNCED) and related discussions at the Dublin conference the same year (ICWE, 1992; UNCED, 1992). IWRM represents a suite of methods aimed at sustainable water management, including the development of comprehensive water policies, management at the river basin scale, defining water rights, implementing pricing mechanisms for water allocation, and fostering participatory governance (Giordano & Shah, 2014; Shah & Van Koppen, 2006).

As recognition of the complexity of urban water challenges grew, so did the thinking around water management and governance. Bichai & Flamini (2017) note a shift from IWRM to addressing the unreliability and safety concerns of urban water services, leading to the rise of Integrated Urban Water Management (IUWM) and Sustainable Urban Water Management (SUWM). Initially focused on engineering solutions, by the late 2000s, the scope had expanded to include urban planning and design through Water Sensitive Urban Design (WSUD), which aimed for a more holistic, cyclic approach to urban water management, including stormwater (Bichai & Flamini, 2017). WSC emerged from WSUD, incorporating principles of natural flow restoration and interdisciplinary collaboration, marking a significant shift by engaging fields like sociology and political science to enhance participatory water management (Wong & Brown, 2009). The approach of Waterwise City (WWC), introduced in 2016, further bridged the gap between the water sector and academia, addressing broader challenges (IWA, 2016). While these approaches originated in Global North[2] countries (Fletcher et al., 2015), they are now being explored in the Global South.

The evolution of urban water management approaches has transcended technical innovation to deeply engage with the institutional and socio-ecological dimensions of urban water systems. This progression has moved from fragmented water resource management (IWRM), unsustainable urban water services (IUWM/SUWM), and stormwater mismanagement (WSUD) to calls for inclusive, adaptable water management amidst prevailing uncertainties (WSC), culminating in efforts to bridge gaps between decision-makers, academia, and users (WWC) (Bichai & Flamini, 2017). Specifically, WSC advocates for integrated management across the water cycle, harmonising water supply, sanitation, and stormwater drainage into a holistic system to address emerging challenges (Fletcher et al., 2015; Mguni et al., 2022).

2 In this thesis, 'Global North' and 'Global South' (also known as Northern and Southern countries) denote the relative socioeconomic progress of nations, not their physical placement on the globe. Countries classified under the Global North exhibit advanced socioeconomic development, including regions like Western Europe, the United States, Canada, Australia, and Japan. In contrast, the Global South encompasses nations with moderate to low socioeconomic advancement, covering vast areas of Latin America, Africa, the Middle East, and South-East Asia. It's important to note that the concept of the Global South is also aligned with what is often termed the 'majority world', highlighting the demographic significance of these regions in global context.

WSC also aligns with nature based solutions and the United Nations' Sustainable Development Goals (SDGs), promoting a resilient water future (Bichai & Flamini, 2017; Mguni et al., 2022; Zevenbergen et al., 2018). The water sensitivity goals intersect with critical areas such as food security, energy efficiency, and climate resilience (Barron et al., 2017), underpinning its influence on broader urban objectives, including prosperity, sustainability, resilience, and liveability (Brown et al., 2018; Wong & Brown, 2009).

At its heart, water sensitivity embodies a transformative view of water—as a fundamental element of life and a catalyst for positive change beyond its role as a mere utility. This approach integrates essential values like environmental stewardship, equitable access, ecological restoration, and sustainability, vital for addressing water security, flood management, and public health (Bichai & Flamini, 2017; Wong & Brown, 2009).

This thesis examines how Indian secondary cities can transition towards water sensitivity, a shift that will require substantial changes in urban governance. Scholars highlight that water sensitivity calls for different forms of governance that protect the intrinsic value of water in institutional frameworks, engage stakeholders and enable place-based water management (Mguni et al., 2022; Wong & Brown, 2009).

1.2. Challenges and barriers to transforming urban governance towards water sensitivity in India

Peter Mollinga's provocative question, *'Why is the* (India's) *water sector a hard nut to crack?'* (Mollinga, 2008, p. 6), captures the deeply rooted challenges in reforming water governance. While there is a strong consensus on the critical role of water in sustaining livelihoods and promoting socio-economic prosperity, implementing meaningful reform remains elusive. As Mollinga suggests, this paradox is less about a lack of solutions and more about the unique defensiveness within India's governance system, where the water bureaucracy resists incorporating new social, economic, and environmental demands. This resistance is not merely procedural; it reflects an embedded socio-political context that prioritises control and continuity over adaptive reform. Inspired by this, I examine the specific challenges within India's urban water sector, where historical and social layers further complicate governance. Zwarteveen et al. (2017) reinforce that water governance is not just about managing resources but also involves navigating the contested terrain of distribution, authority, and expertise among diverse actors. With this in mind, I explore the structural and institutional barriers in Indian cities that complicate the transition toward water-sensitive governance.

In the following section, I begin by explaining three characteristics of the Indian urban water governance (section 1.2.1). Then, I specifically explore the barriers within this governance context that hinder transformative change (section 1.2.2).

1.2.1. Water governance challenges in India

During my research, I identified three prominent challenges in urban water governance in Indian cities: the power imbalance between states and cities, the gap between legal frameworks and their implementation, and the dominance of technocratic approaches in water management. I elaborate on these challenges below.

A) Powerless cities and a dominant state structure

In India, cities lack the power to effectively govern water resources, as water governance remains primarily a state subject, granting substantial legislative and policy-making authority to state governments (Iyer, 1994; Narain, 2000). This structure positions state-led organisations, such as the irrigation department, at the top of decision-making hierarchies, resulting in a top-down governance model. Urban and local entities, despite their crucial operational roles, are often side-lined, navigating predetermined paths that reinforce a hierarchical and fragmented governance system—a legacy of colonial water management practices (Jacob, 2019; Kumar & Ballabh, 2000).

Although the 74th Constitutional Amendment Act (CAA) aimed to empower Urban Local Bodies (ULBs), the actual devolution of powers has been slow and largely symbolic. Without financial autonomy or sufficient human resources, local entities remain dependent on higher levels of government, undermining their ability to implement localised water governance (Bajpai & Kothari, 2020; Jacob, 2019; Narain, 2000; Water Aid, 2018). This scenario ignores the capacity of local governance structures, such as women's groups, neighbourhood organisations, and fishermen's groups, which historically played a significant role in water resource management. New governance approaches often marginalise or overlap these local institutions, reducing community control and engagement (Narain, 2000; Thatte, 2018). Additionally, weak local governance mechanisms hinder effective local data management, which is crucial for addressing contextual water management issues (Kumar & Ballabh, 2000). Gender norms further restrict meaningful participation, side-lining gender-specific concerns in water governance (Joshi, 2011; World Bank, 2017).

B) Challenges of formal governance

Though designed with good intentions, the formal governance structures are often constrained by top-down, procedure-driven frameworks that fail to resonate with local contexts. Policies intended to bring about change frequently clash with local norms and realities, as Funder & Marani (2015) observe, resulting in implementation gaps and a lack of engagement from the very communities they aim to serve. Nikhil Anand (2017) further critiques this by highlighting the bureaucratic barriers that permeate Indian formal water governance, such as protracted administrative processes and inaccessible documentation, alienating the populations most needing effective water governance. These barriers foster distrust in formal institutions, undermining efforts to foster collaborative and inclusive approaches to reparative governance (Burt & Ray, 2014).

The limitation in implementing formal policies on the ground is also due to unclear reporting lines within water sector institutions, which weakens accountability(Thatte, 2018; Water Aid, 2018). This disconnect between formal regulations and practical implementation reveals a critical gap in effective water governance. The fragmented nature of regulatory tools and their piecemeal applications diminish their overall effectiveness (Kumar, 2018; Pandit & Biswas, 2019; Thatte, 2018). Moreover, the complacent language in policy documents, such as the National Water Policy (NWP) 2012's use of 'should be' rather than 'will be,' dilutes accountability and further widens the implementation gap (Pandit & Biswas, 2019).

C) Over-reliance on technocratic solutions

Despite the ratification of IWRM in India's National Water Policy, water governance continues to rely heavily on technocratic solutions, perpetuating the legacy of the MII (Mollinga, 2008). While these approaches may occasionally be supported by participatory methods, the dominant focus remains on engineering-centric solutions, which elevate the role of engineers above other actors in the decision-making process. This imbalance reflects how India frames and prioritises water challenges, often side-lining the involvement of local communities, social scientists, and other critical actors.

This technocratic bias reinforces top-down governance practices, continuing the legacy of colonial water management, where decisions about water resources were made without meaningful input from those most affected (D'Souza, 2002; Unnikrishnan et al., 2020). By favouring technical expertise and rigid frameworks, current water governance arrangements in India struggle to accommodate the complex, multi-dimensional nature of water issues. This approach limits the ability to adopt transdisciplinary, holistic, and inclusive methods that are essential for addressing persistent water challenges (Kumar, 2018; McKenzie & Ray, 2009; Pandit & Biswas, 2019; World Bank, 1999).

1.2.2. Challenges in 'transforming' water governance

A substantial body of academic research, including reports and policy documents, underscores the need for transformation in Indian urban water governance. A recurring theme within this literature is that transformative approaches, often promoted by global organisations from the Global North, fall short of addressing the complex and context-specific demands of Indian water management. This disconnect highlights an urgent need for more tailored and meaningful reforms (Mihir Shah Committee, 2016; Pandit & Biswas, 2019; Sankhe et al., 2010). These externally driven approaches frequently conflict with the specific governance challenges identified in the previous section. Although intended to promote integration and participatory practices, such models are often imposed with minimal adaptation to local needs and complexities. More often than not, they serve donor interests rather than genuinely addressing the specific demands of local water governance (Denby et al., 2016; Giordano & Shah, 2014; Mehta et al., 2016; Shah & van Koppen, 2016). Consequently, these approaches are often viewed as aspirational goals rather than practical tools for effecting meaningful improvements in water management and addressing critical governance challenges.

For instance, the National Water Policy's endorsement of IWRM was intended to promote a more unified approach to water governance by reimagining the roles of actors and institutions (Ministry of Water Resources, 2002, 2012). However, this aspiration for integration has largely yet to be fulfilled. Studies reveal that IWRM, despite its ratification in India's national water policy documents, has struggled to bring about the transformative changes in water governance it was designed to achieve (ref). Its implementation has been largely tokenistic, failing to reshape actor coalitions, foster participatory and collaborative cultures, or establish meaningful connections with other sectoral policies (Giordano & Shah, 2014; Pandit & Biswas, 2019; Shah & van Koppen, 2016). These shortcomings are rooted in the legacy of the MII, which continues to dominate water management practices.

Based on this research, I have identified four critical aspects that have hindered the effective application of IWRM in Southern contexts. These aspects, outlined below, offer specific areas for consideration in the ongoing research towards achieving water sensitivity:

A) Challenges of accountability and transparency

Establishing non-hierarchical governance structures, as promoted by IWRM, has often led to gaps in accountability and transparency, both of which are essential for building trust and confidence in water institutions (Frewer, 2003). Agrawal & Ribot (1999) highlight that decentralisation efforts frequently fail to empower local actors unless they are made downwardly accountable to their constituents. The creation of decentralised bodies, such as Catchment Management Agencies (CMAs) and Water User Associations (WUAs), often operating alongside existing government institutions, raises questions about who holds ultimate responsibility for water-related challenges (Denby et al., 2016). This parallel governance structure creates ambiguity and confusion regarding who is accountable for resolving issues, undermining trust in institutions and slowing the process of meaningful water governance reforms.

B) Elusiveness of integration within stratified governance context

The concept of integration, which is central to IWRM, often proves elusive when applied in the context of Indian cities. While the IWRM framework advocates for the holistic management of water resources, its practical implementation has introduced a new lexicon and mandates a radical shift in operational practices. However, this aspiration for integration frequently overlooks existing bureaucratic structures and fragmented governance frameworks, where different departments manage water, sanitation, and urban planning in isolation (Denby et al., 2016). In India, these silos are deeply entrenched, and the lack of coordination between municipal authorities, state governments, and other actors creates significant barriers to achieving true integration.

Moreover, as with the Smart Cities Mission, where the introduction of Special Purpose Vehicles (SPVs) to ease coordination has been criticised for adding layers of complexity to urban governance (Maurya & Biswas, 2019), IWRM's attempt to impose integrated approaches within a fragmented governance environment faces similar hurdles. Rapid urbanisation and local political

dynamics often exacerbate these challenges, leading to adverse outcomes in settings that lack a culture of collaboration (Mguni et al., 2015). While integration remains a key goal, it is crucial for these frameworks to align with the realities of local governance and foster contextually relevant strategies that enable true collaboration across sectors.

C) Dismissing local governance arrangements

Urban Water Management (UWM) approaches often promote the creation of new governance bodies like WUAs and River Basin Organisations (RBOs). However, in post-colonial societies, there is a strong tradition of communities self-organising to address infrastructure and service gaps, following established social norms. It is imperative for these approaches to critically assess and recognise the scalability of such pragmatic, indigenous configurations rather than disqualifying them based on Northern benchmarks (Giordano & Shah, 2014; Mguni et al., 2015). The dominance of Northern approaches further risks centralising power with the state and influential actors, thereby replicating colonial exclusionary practices (Mehta et al., 2016).

D) Ignoring historical injustices

A significant oversight of IWRM is its failure to address the deep-seated historical complexities and injustices that have shaped water governance in India. The colonial era left lasting legacies on the country's waterscapes, with the British prioritising large-scale irrigation systems and centralised control over water resources to serve colonial interests. This created a highly centralised, technocratic approach to water management, disregarding local knowledge systems and practices that had historically sustained India's diverse communities (D'Souza, 2006). In many cases, this has reinforced existing power dynamics, with marginalised communities continuing to be excluded from decision-making processes (Mehta et al., 2016). By failing to acknowledge and address these colonial scars, IWRM risks perpetuating the very disparities it seeks to resolve (Denby et al., 2016; Mehta et al., 2016).

These insights from the literature highlight the challenges that emerge when frameworks like IWRM are imposed without sufficient consideration of local contexts, historical legacies, and existing governance structures. The tokenistic application of IWRM and failure to adequately address accountability, transparency, and collaboration, has limited its effectiveness in Indian cities. Rather than forcing local realities into rigid, external models, there is a pressing need for a more grounded approach that respects and harnesses the transformative governance practices already present in these regions. Therefore, my study pivots towards exploring India's unique mode of transformation—*reparation*—which leverages informal governance structures and processes, henceforth referred to as *informality*. This inquiry aims to bridge the divide between imported approaches and the lived experiences of local communities, endeavouring to decipher a governance model that is truly inclusive and effective.

1.3. Reparation as mode for transformation towards water sensitivity

The shift toward water sensitivity in India's resource-constrained and socio-politically complex context demands a transformative approach that goes beyond infrastructural overhauls. Reparation emerges as a critical mode of transformation—one that directly addresses entrenched inequities and power imbalances within the existing system. Without such an adaptation, there is a risk that introducing new value systems could inadvertently reinforce existing hierarchies and inequalities, exacerbating the very issues they seek to resolve (Giordano & Shah, 2014). Scholars have shown how reparative governance functions as a transformative approach across sectors, interrogating and decolonising conventional approaches to facilitate meaningful change (Broto et al., 2021; Cadieux et al., 2019; Perry, 2020; Wahby, 2021). This approach calls for a re-examination of institutional and epistemic boundaries, integrating diverse knowledge systems and centring the lived experiences of Global South communities (Escobar, 2015). Such a shift requires moving beyond Global North-centric narratives of urban transformation, which often rely on technocratic solutions, toward approaches that empower local communities, affirm their agency, and honour their unique relationships with water (Ghosh & Arora, 2021). My study examines reparation as an incremental, iterative, and contextually grounded approach, aiming to foster transformation in urban water governance.

In the following sections, I first describe reparation and explore how various scholarly perspectives understand repair, its intersections with restorative justice, and its roots in Indian transformative practices, drawing on Hindi lexicons (section 1.3.1). I then discuss the implications of reparation for water sensitivity and outline the characteristics of reparative governance (section 1.3.2).

1.3.1. Towards understanding of repair

Reparation focuses on repairing the historical and contemporary wounds within the social fabric to facilitate meaningful change (Broto et al., 2021; Cadieux et al., 2019; Perry, 2020; Wahby, 2021). This approach emerges as a crucial dimension of transformation in Global South contexts, particularly in the domains of climate finance, gender, and social innovation (Broto et al., 2021; Cadieux et al., 2019; Perry, 2020; Wahby, 2021). However, the literature presents two distinct interpretations of repair. The first, often viewed through a maintenance lens, focuses on restoring systems to their original state or capacity (Henke, 2017; Houston, 2017). This approach serves as a quick technical and infrastructural fix, addressing breakdowns or failures without altering the larger system and thereby preserving the status quo. The second interpretation frames repair as a transformative process. In this context, repair is not merely a technical intervention but a deeply political and social process that addresses the colonial extractive practices embedded within urban water systems. It seeks to foster long-term, intergenerational healing (Bhan, 2019; Broto et al., 2021; Cadieux et al., 2019; Durbach, 2016; Webber et al., 2022).

Empirical narratives often relegate repair to a reactionary or survivalist tactic, overshadowing its strategic potential for sustainable transformation (Anand, 2017; Ranganathan, 2014). However,

evidence also points to its capacity for fostering long-term reparation and addressing deep-seated injustices (Durbach, 2016; Wahby, 2021). Given its roots in unique socio-political, cultural, and historical landscapes, particularly in the Global South, repair manifests as an intuitive strategy for adaptation. This seemingly mundane view possesses the underlying power to engage with and navigate local socio-political norms resistant to change.

While reparation shares many key elements with a broader concept of transformation—such as fostering inclusive and flexible approaches, enhancing adaptive capacity, and building resilience to absorb shocks (Folke et al., 2005, 2010) - it goes further. While transformation often stresses multi-level governance and institutional reform (Chaffin et al., 2014, 2016), reparation requires a more nuanced approach that addresses past harms and works towards equitable outcomes, beyond mere structural shifts.

A. Intersecting with restorative Justice

In the Global South, where historical wounds from colonial injustices and complex social stratifications (caste, class, religion, gender, age) persist, restorative justice becomes a key driver of transformation. This perspective acknowledges and confronts the long-standing inequities shaping our current realities. Restorative justice aims to address these injustices, deliver resolution, and facilitate healing (T. Forsyth & McDermott, 2022; Hill et al., 2019; McCauley & Heffron, 2018; Vasilescu, 2022). Scholars such as M. Forsyth et al. (2022) and McCauley & Heffron (2018) suggest that addressing these injustices is crucial for enabling collective healing. Pursuing transformation requires a keen awareness of historical inequities to avoid perpetuating or amplifying them. Moreover, as a post-colonial nation, India continues to exhibit internal colonialism through bureaucratic, caste, and class hierarchies and the persistence of colonial knowledge frameworks that marginalise indigenous practices (Dey, 2019; Sultana, 2023). It is, therefore, crucial to underpin transformation with restorative justice, demonstrating a conscious effort to confront colonial legacies and established hierarchies, while considering future long-term sustainability and resilience.

At the core of mobilising reparation is the examination of how principles of restorative justice have been, or are being, addressed. Environmental restorative justice extends beyond human stakeholders to include ecosystems and non-human entities (M. Forsyth et al., 2022). It involves mitigative and adaptive strategies to build stronger relationships, foster institutional trust, and enhance our capacity for engaging in difficult conversations (M. Forsyth et al., 2022; Vasilescu, 2022). Reparation entails addressing historical harms, restoring social equity, and healing relationships damaged by discriminatory policies, all in pursuit of inclusive and adaptive water-sensitive outcomes. Central to reparation is the collaborative development of measures that prevent or repair harm, with consent from all affected parties.

B. Mobilising reparation towards water sensitivity

Reparation honours traditional practices while integrating new innovations, all within the context of local customs and histories. In the Indian context, scholars like Bhan (2019) highlight the

complexity and uncertainty of social landscapes, advocating for a flexible, iterative approach—what he describes as a 'two steps forward, one step back' process. This makes the pursuit of reparation evolutionary and deeply rooted in local realities. Complementing this, reparation also embraces nimbler innovations, allowing for rapid learning and adjustments to social innovations, demonstrating sensitivity to both local and global dynamics (Broto et al., 2021; Ureta, 2014). This ensures that transformation remains adaptive, responsive, and aligned with the specific needs of diverse communities in India.

Reparation demonstrates how smaller acts of mending could enable a paradigm shift, rather than creating a theoretical construct of a paradigm shift and then forcibly implementing or adapting it on the ground. This dilemma resonates with Carstensen's (2011) dichotomy of the 'paradigm man' versus the 'bricoleur.' Carstensen elucidates how bricoleurs, grounded in the pragmatism of existing ideas and resources, creatively repurpose, and reinterpret them to navigate and mend the gaps in governance, crafting iterative and incremental routes towards transformation. This bricolage becomes particularly salient in settings marked by fragmented governance, resource constraints, and entrenched social hierarchies.

The inherent uncertainties in water management require actors to embrace resilience, prioritising adaptation to disaster impacts over more predictable objectives like carbon emission reduction. This adaptability calls for frameworks flexible enough to manage the uncertainties inherent in this sector (Dewulf et al., 2020; Nastar et al., 2018). In this context, reparation emerges not merely as a practice but as an ideology—embracing the ebb and flow of progress and retreat amidst uncertainty. It embodies a philosophy of action that, while moving forward, occasionally pauses to regroup, reassess, and then advance with renewed vigour, thereby embodying a transformative trajectory that simultaneously fortifies resilience within these geographies (Bhan, 2019).

C. Spectrum of repair guided by Hindi lexicons

In exploring the concept of contextually grounding repair, I further delved into the Hindi language to understand the different typologies of repairs. Language offers a rich lexicon that captures the diverse dimensions of repair, blending epistemological diversity with practices deeply embedded in specific cultural contexts. In Hindi, repair is expressed through terms like *Marammat* (मरम्मत) for restoring to original, *Rafu karna* (रफ़ू करना) for patching up (Bhan, 2022), *Dosh rahit* (दोष-रहित) for correcting flaws, and *Sudharna* (सुधारना) for improving or bettering. Each term signifies a slightly distinct approach to repair, ranging from restoration to its original state to co-creating a future that harmonises old and new elements.

These concepts highlight the varied temporalities and degrees of change inherent in repair, embedded within socio-ecological contexts and shaped by socio-material hybridity and agency. The diversity in repair practices emphasises that reparation is not merely about correction or overhaul; it represents a spectrum of nuances, guided by local constraints and opportunities. In this research, I advocate for a reparation approach that aligns with *Sudharna* or *Rafu karna,*

aiming for a water-sensitive future that addresses the legacy of old colonial extractive policies through an intergenerational lens.

1.3.2. Characteristics of reparative governance

In this section, I explore reparative governance through two key perspectives, grounded in the works of Gautam Bhan (2019) and Nikhil Anand (2017). These authors frame reparation not merely as a response to infrastructural challenges but as a holistic mode of transformative governance that acknowledges and addresses the socio-political dimensions of water systems in the Global South. Reparative governance involves actor groups, practices, and structures that centre on repurposing and revisiting dismissed functionalities, encouraging community-driven solutions, and fostering frugal social cultures within resource-constrained environments. Reparative governance also actively addresses technocratic hegemonies by including diverse voices and knowledge systems. This governance mode is characterised by iterative and adaptive processes, demonstrating flexibility, and is ultimately defined by acts of care and healing through inclusive decision-making.

A. Feasibility in reparative governance

Reparative governance, as a transformative approach, is rooted in feasibility, particularly relevant in resource-constrained settings like urban India's water governance. It focuses on what can realistically be achieved within existing structures, on practical methods to address the fragmentation of urban water governance, and on integrating these efforts into social and ecological contexts. This approach underscores that meaningful transformation in urban water governance must emerge from a deep understanding of local conditions rather than relying solely on infrastructure upgrades. Gautam Bhan (2019) illustrates the layered meaning of repair, differentiating it from building, constructing, or even upgrading:

> *"Repair suggests a particular assemblage of practices. First, repair emphasises the need to restore immediate function over the need for substantive material improvement. Second, it is located in an immediate material lifeworld where what can be quickly accessed and easily used is more likely to be chosen as the 'right' material for the job. Third, it does not presuppose any actors. Everyone can, should, and generally does, repair in some form – there are no particular professionals whose 'sector', 'domain' or 'practice' is repair. Those practitioners with reputation or experience have knowledge that can be accessed – it is not seen as distant, formal, or external expertise. Fourth, repair can hence be seen as a mode of practice that draws upon forms of public and proximate knowledge. This does not mean that this knowledge is not complex, but that it is available in a variety of contexts and can be accessed from a variety of people. Put simply: One can quickly find out what needs to be done, and someone who knows how to do it. Fifth, repair suggests not just actions but a sensibility, one that sees materials in a constant cycle of use and reuse by the same actors and in the same setting over a long time period."*

Bhan's concept of reparation underscores reparative governance as an accessible and practical form of transformation that optimises local materials, knowledge systems, and community capabilities. Governance here is understood as an adaptive, context-sensitive process that works within available resources to engage local stakeholders in the ongoing upkeep and improvement of water systems. By focusing on feasibility, reparative governance reveals characteristics that are responsive, frugal, local, and accessible, as elaborated below:

1. **Pragmatic reparation**: Reparative governance, as Bhan describes, prioritises the reparation of essential functions without exhaustive infrastructure overhauls, a crucial element in settings where resources are limited. This governance model embodies adaptability, focusing on real-world possibilities rather than idealised outcomes.

2. **Community-specific vocabulary and shared knowledge**: Rather than depending on specialised external expertise, reparative governance values local, publicly available knowledge and in their language. It empowers communities to participate directly in governance, transforming water governance into a collective responsibility accessible to all, rather than a domain for select professionals.

3. **Sustainable cycles of use and reuse**: Bhan's concept of repair incorporates a continuous cycle of reuse and resourcefulness, recognising materials as part of an enduring governance process. This model acknowledges that governance in resource-limited settings often demands iterative, sustainable practices that reflect the socio-economic realities of the Global South.

This focus on feasibility showcases reparative governance as an adaptive and grounded mode of governance transformation that operates through a deep understanding of local conditions rather than an over-reliance on new infrastructure.

B. Social-technological-ecological convergence in reparative governance

Reparative governance is anchored in an understanding that water systems involve not only technical infrastructure but also social and ecological dimensions, aligning with the theoretical foundations of transformative governance as articulated by Chaffin et al. (2016), Folke et al. (2010) and Hölscher & Frantzeskaki (2020). The literature review uncovers an empirical narrative that centres on 'fixing,' 'mending,' and 'healing,' particularly in the Global South. Through an ethnographic lens, Nikhil Anand's *Hydraulic City* (2017) illustrates the complex nature of repair work, which involves much more than the technical task of patching up leaks:

> *"Fixing leaks is hard, necessary, time-consuming work. With most of the city's network underground, water leaking from a pipe presents both material and social challenges. Engineers use their management skills not so much as authoritarian rulers but as compromised experts, subjectified by the situations of the politics, labour, and materials of the city's water infrastructure. To ensure that the system continues to function, they need to negotiate with not only the city's pipes but also its water, residents, municipal employees, and range of social actors that are connected to the city's pipes in a variety of ways. Thus, far from being a mechanical process, leakage repair makes visible the sociological and technical work that engineers are required to perform as they deploy their ingenuity and improvisational skill to manage the problem (Latour, 1996, p. 33)…*
>
> *…This everyday work of fixing water connections drew my attention to the contingency, improvisation and social/material mediation Patankar and other engineers frequently employed to maintain the water network in working condition. To govern water pipes effectively required not only a (very contested) metis for repair and recovery (Latour 1996, Scott 1998) but also an understanding of how to handle the uncertainties and difficulties affiliated with the city's water infrastructure. As Patankar and his and his workers struggled to locate the leak, they were required to deal with both restive political subjects and the challenges presented by the water network – the opacity of water and earth, as well as the pipe's network's corrosions, containments, and concealments."*

Anand's ethnographic work in *Hydraulic City* (2017) illustrates how reparation within water governance encompasses a complex interplay of social, technological, and ecological factors. In this example, reparative governance transcends physical repairs by integrating community relationships and socio-political dynamics, making governance itself a more inclusive and socially responsive system. Anand's depiction highlights several key governance characteristics of mediation, healing, and iterative processes, especially in uncertain complex environments, as elaborated below:

1. **Social mediation of technical challenges**: In reparative governance, engineers and officials operate as mediators, engaging with both the material infrastructure and the social dynamics surrounding it. In Anand's work, engineers are not merely technicians but facilitators of community relationships, working collaboratively within governance systems that involve both people and technology.

2. **Iterative Governance**: Reparative governance operates through iterative, real-time adaptations, recognising that governance must be flexible to manage the complexities and uncertainties of urban water systems. This mode of governance takes incremental, pragmatic steps that advance transformation in manageable increments, reflecting a governance system that is resilient and adaptable.

3. **Healing through inclusive governance**: Reparative governance goes beyond traditional governance structures by engaging those typically excluded from decision-making. This inclusion fosters cultures of healing and allyship, redefining governance as a means to restore not only infrastructure but also community trust, social cohesion, and equity.

In Anand's analysis, reparative governance in water systems is characterised by a flexible, adaptive, and inclusive governance process that transcends mere infrastructural repair. Engineers, like Patankar in *Hydraulic City*, take on roles as community mediators who balance the technical and social aspects of water governance, embodying a mode of governance that is integrated, sociological, and responsive to the lived realities of the communities it serves.

In considering governance arrangements that can facilitate reparation, it is essential to recognise the role of informality in such contexts. In the following section, I explore how informality operates within these systems, offering innovative and context-sensitive pathways that foster reparative governance and help to mobilise reparation towards water sensitivity.

1.4. Can informality enable reparative governance towards water sensitivity in Indian cities?

In exploring governance arrangements that can support reparative governance, I hypothesise that recognising the role of informality is crucial. I study informality as a flexible, hybrid practice that emerges within and alongside formal systems, where actors coproduce service arrangements to address gaps and navigate socio-political constraints. Rather than existing as a separate or residual sector, informality represents a dynamic continuum in which state and non-state actors engage with varying degrees of legitimacy, creating a meshwork of activities essential for inclusive urban service delivery (Ahlers et al., 2014; McFarlane, 2012; Roy, 2005; Schwartz et al., 2015; Wahby, 2021).

Building on this understanding, I first examine the utility of informality (section 1.4.1), particularly in the Global South, for addressing deficiencies within formal governance structures and the governance challenges noted in section 1.2.1. I then explore how informality can contribute to reparative governance, with a focus on its multifaceted characteristics that may be harnessed for the implementation of policies and programmes (section 1.4.2), while also acknowledging its limitations, further discussed in section (1.4.3). Although informality can facilitate reparative efforts, its fluid and ambiguous nature presents challenges in conceptualisation and operationalisation. To address this, I propose using the lens of governance capacity, which

facilitates a deeper examination of informality's role in advancing reparative governance (section 1.4.4).

1.4.1. Role of informality in addressing limitations of formal governance

Formal governance frameworks, particularly in Southern countries like India, often prove inadequate in mobilising reparation due to their rigid structures and overly technocratic orientations.

Scholars such as Zwarteveen (2017) and Hartley & Kuecker (2021) build on this critique by challenging the technocratic mindset that dominates formal water governance structures, particularly in India (Mollinga, 2008). By prioritising engineering and technical solutions, formal governance often reduces water management to a purely mechanical issue, overlooking the socio-political complexities that underlie water crises. This reductionist approach neglects the relational aspects of water governance, where questions of power, access, and justice are deeply embedded and thus prevents formal systems from effectively addressing the multifaceted challenges that reparation seeks to resolve.

Moreover, even when formal water governance frameworks advocate for transformative change, they often introduce new actors and institutions without sufficiently dismantling the existing power structures perpetuating exclusion. Giordano & Shah (2014) note that these changes frequently introduce new value systems that exacerbate, rather than alleviate, existing inequalities. The unintended consequences of such interventions reveal the limitations of formal governance in orchestrating meaningful transformation.

In contrast, reparative governance necessitates a more malleable and adaptable approach — one capable of navigating the intricacies of local contexts, histories, and community dynamics. Ananya Roy (2005) describes these intertwined issues as 'unplannable,' underscoring the inability of formal governance systems to anticipate or address persistent water-related challenges. Formal governance, with its procedural inflexibility, is ill-suited for reparation. Reparation requires governance that is not only responsive to immediate technical needs but also deeply attuned to the social and historical complexities of the context. Formal systems often lack this nuanced, adaptive capacity, rendering them inadequate for meaningfully mobilising reparation.

In this context, informal governance emerges not merely as an alternative but as a necessary complement to formal structures. The interplay between informality and formality in water management reveals a co-constitutive relationship essential for reparative governance. My research further explores whether and how informality can enable the kind of iterative, bottom-up processes that foster trust, inclusion, and, ultimately, reparation.

1.4.2. Unpacking the role of informality for enabling reparation

The study of informal governance has evolved beyond the simplistic binary of formal versus informal, where it was once confined to illegal spaces, labour, or organisational processes.

Scholars have reconceptualised informality as a distinct mode of governance, one that not only adapts but thrives in the face of the limitations of formal structures, particularly in complex socio-political contexts like urban water governance (Ahlers et al., 2014; Burt & Ray, 2014; Cawood et al., 2022; Kooy, 2014; Misra, 2014; Roy, 2005; Schwartz et al., 2015). Informality is no longer viewed merely as a set of practices filling gaps left by formal governance; rather, it is understood as an adaptive mode of governance that navigates the intricate socio-political landscapes of water management (Ahlers et al., 2014; Peloso & Morinville, 2014; Schwartz et al., 2015).

Within urban water governance, informality operates as a hybrid practice, blending the efforts of communities, private entities, and state actors within flexible governance models (Cawood et al., 2022; McFarlane, 2019; Misra, 2014; Wahby, 2021). These hybrid arrangements blur the rigid boundaries between formal and informal systems, allowing governance to adapt to socio-political and economic pressures. The literature extensively documents how informality, as an organising logic, facilitates the realisation and optimisation of service delivery (Ahlers et al., 2014; Roy, 2005; Schwartz et al., 2015). It enables flexibility and immediacy in policy implementation and addresses bureaucratic delays (Anand, 2011). Informality, in this sense, facilitates the governance of water by creating spaces where local actors can work together, navigating the constraints imposed by formal structures while addressing the lived realities of resource-constrained environments (Funder & Marani, 2015; Kooy, 2014; Wahby, 2021). This approach, represented by grassroots entrepreneurs, resembles the 'tentacles' of large-scale utilities, weaving through and exploiting the blurred boundaries of water governance and land politics (Ranganathan, 2014). This interplay allows actors to navigate regulatory gaps and build authority within complex, layered urban systems.

Roy's (2005) framing of 'calculated informality' is particularly pertinent in this context. In contexts where formal governance frameworks are too rigid or disconnected from local needs, actors within these systems intentionally diverge from their prescribed roles. This strategic adaptation enables the co-production of governance solutions that better align with local contexts. Rather than being characterised by an absence of regulation, informality thrives in deregulated spaces. These spaces serve as 'zones of exception', where regulations are selectively enforced or suspended, allowing actors to recalibrate their roles and functions (Kooy, 2014; Ranganathan, 2014; Roy, 2009). These deregulated spaces facilitate the emergence of informal practices, as they provide the latitude for actors to innovate and adapt governance structures to suit local contingencies, thereby circumventing the inflexibilities of formal planning. By transcending rigid formal mandates, these actors create new, context-specific governance practices that are grounded in the everyday realities of water management (Burt & Ray, 2014).

The transformative potential of informality lies in its capacity to facilitate inclusive and adaptive governance arrangements. The blending of formal and informal practices—what Ahlers et al. (2014) describe as 'co-production'—challenges the binary divide between legality and informality. This co-production not only allows marginalised communities to engage in governance processes

but also reconfigures power relations that traditionally exclude them. Informality, therefore, becomes a means of redistributing governance authority, enabling more context-sensitive approaches to water management that respond directly to the needs of those most affected by water scarcity and mismanagement.

Moreover, as discussed by Mayaux et al. (2022), by mobilising bricolage towards reparation, informality demonstrates its capacity to bring about deep societal change by creatively piecing together existing social norms, technologies, and institutional arrangements to address complex challenges. In urban water governance, bricolage is not simply a patchwork of solutions; it is an iterative, evolving process that redefines governance practices from the ground up. Informal actors, working within the constraints of their environments, weave together formal and informal elements to develop governance structures that are both resilient and adaptive to local conditions. It can potentially engage marginalised groups in governance processes by dismantling hierarchical structures and introducing flexible, context-sensitive approaches to water governance.

Additionally, the multi-scalar nature of informality underscores its relevance across different levels of governance (van Koppen & Schreiner, 2019; Ziervogel et al., 2019). Informality is not confined to localised practices; rather, it operates across multiple scales, from local to regional, and can influence broader governance frameworks. As informal practices gain traction and legitimacy, they have the potential to not just influence but reshape formal governance structures, creating new pathways for addressing systemic challenges in water management (van Koppen & Schreiner, 2019). This multi-scalar adaptability is essential in contexts where formal systems are too rigid to accommodate the complexities of local realities.

Finally, informality has significant implications for socio-ecological sustainability. Informal practices, deeply embedded in local knowledge and traditions, allow communities to develop governance models that are better suited to the socio-ecological realities of their environments (Kemerink-Seyoum et al., 2019; Yudiatmaja et al., 2020). This adaptability fosters sustainable approaches to water management that align with both the ecological and social needs of the community. Therefore, informality addresses immediate governance challenges and promotes long-term sustainability by integrating local values and practices into water management.

In summary, informality needs to be recognised as organising logic by which actors overcome the limitations of the rigid formal systems and as a potential opportunity to address the complexities of water-related challenges in Global South cities. By fostering adaptive, inclusive, and context-sensitive governance arrangements, informality enables the co-production of governance solutions grounded in local realities. The capacity of informality to reshape power relations, facilitate multi-scalar governance, and promote socio-ecological sustainability demonstrates its potential to serve as an enabling mechanism towards reparation.

1.4.3. Limitations of informality

Despite these positive aspects, informality also brings inherent challenges such as limited accountability, the perpetuation of inequality, and rent-seeking behaviours (Funder & Marani, 2015; Ranganathan, 2014). These characteristics highlight the dual nature of informality, enabling service delivery and contributing to governance issues. This section shifts the focus towards understanding how informality is operationalised to effect reparative change while acknowledging its limitations. The limitations of informality in facilitating long-term reparative change include:

A) Reproduction of inequalities

While informality can reconfigure power dynamics and foster inclusive governance, it can also reproduce or exacerbate existing inequalities. In such cases, local elites within the informal governance structure use these spaces to consolidate their control, prioritising their interests over those of the broader community. This selective engagement often leads to resources and decision-making remaining concentrated among those already privileged, entrenching social hierarchies and excluding marginalised communities (Ahlers et al., 2014; Funder & Marani, 2015; Ranganathan, 2014).

B) Limited environmental sustainability

The reparative potential of informality is often constrained by its short-term, pragmatic focus. Informal practices may prioritise immediate, practical outcomes over long-term sustainability. This is particularly evident in cases where informal governance facilitates activities like resource extraction, which may deliver short-term socio-economic benefits but lead to environmental degradation in the long run (Kooy, 2014; Ranganathan, 2014).

C) Dependence on formal structures

Despite its adaptability and flexibility, informality often depends on formal governance structures for legitimacy and sustainability. Without the backing of formal regulations and institutions, informal practices may struggle to scale up or achieve long-term change. The absence of formal support can limit the impact of informality, making it difficult to institutionalise successful informal practices and ensure their sustainability (Kösters et al., 2020).

D) Potential for co-option

Informal governance processes can be co-opted by powerful actors, including state institutions or private interests, to advance their agendas. Such co-option risks diluting the transformative potential of informality, turning it into a mechanism that reinforces existing power dynamics and perpetuates the status quo rather than challenging or transforming governance systems (Ranganathan, 2014).

While informality has the potential to drive reparative governance—particularly by including marginalised groups and fostering innovative governance practices—it also presents inherent limitations. These challenges need to be carefully navigated to ensure that informality supports

long-lasting, equitable, and sustainable governance solutions rather than reinforcing existing issues. Furthermore, the study of informality highlights a significant gap in the conceptualisation and operationalisation of reparative efforts. This gap necessitates a lens that can aid in understanding the activities of urban governance actors as they work towards enabling reparative governance. To address this, the following section introduces the lens of 'governance capacity,' which focuses on the actions through which urban governance actors enact informality and establish the conditions necessary to advance reparative governance.

1.4.4. A governance capacity lens on informality's contribution to reparative governance

The fluid and plural nature of informality presents challenges in developing a structured framework to effectively capture its agency (Ahlers et al., 2014). Scholars have employed governance capacity as an emergent property of governance systems, in order to study how actors interact with, and thus change or reinforce the institutional contexts that shapes urban governance (Hölscher et al., 2019, 2023). Governance capacity thus allows me to focus on the activities by which urban governance actors enact informality and establish conditions that can enable reparative governance. Hölscher et al. (2019) define governance capacities as the collective abilities of actors to mobilise resources, innovate, and alter structural governance conditions, encompassing formal and informal institutions, social networks, financial resources, and knowledge. In urban water governance, these capacities reflect actors' ability to mobilise resources, innovate within institutional frameworks, and adapt to emerging challenges.

By analysing governance through this capacity-focused perspective, I gain insight into the mechanisms that underpin informal practices, such as the ability to organise, innovate, and remain flexible. This capacity-based approach allows for an examination of how informal practices address the rigidities of formal structures while aligning with broader goals of social justice, equity, and environmental sustainability. Through their engagement in everyday governance practices, actors influence processes and outcomes that contribute to reparation by fostering collaboration and locally driven solutions in resource-constrained environments. This approach highlights how actors strategically navigate formal constraints to achieve reparative outcomes, reconfiguring urban water systems with conditions for collaborative, democratic, and locally-led solutions. By examining this perspective, I explore the micro-politics and everyday actions of actors, understanding how their plural social identities and relationships influence governance processes, either enabling or hindering reparation.

Moreover, the governance capacity lens facilitates the investigation of actors' agency by uncovering both the conscious and subconscious motivations that drive their actions. Drawing on Latour's (2007) theorisation of agency, I recognise that actions within these capacities are often non-linear, ranging from intentional to subconscious motivations. Understanding this complexity is essential in decolonising traditional governance approaches that impose rigid structures misaligned with local realities (Cleaver, 2002). This reinforces the importance of recognising varied worldviews within informality, as actors operate within hybrid governance models that blend formal and informal elements.

The governance capacity lens helps to unpack the potential and limitations of informality to move beyond merely filling gaps left by formal governance. It can reveal informality's role as a strategic mode of governance that reconfigures relationships between state and non-state actors, challenges rigid legal boundaries, and offers innovative solutions to water governance challenges. By focusing on governance capacities, I aim to explore how informality can be harnessed as catalysts for social justice and environmental sustainability. This approach provides a nuanced understanding of the formal-informal interplay and its potential to facilitate reparation and transformation within urban water governance.

Furthermore, acknowledging the socio-political power dynamics that shape urban governance, it is essential to consider the conditions under which informality is reparative. The governance capacity perspective allows investigation of these conditions, examining how actors leverage their capacities to disrupt entrenched power structures and foster inclusive, adaptive practices. When applied to water sensitivity, this perspective highlights how actors can introduce new practices that prioritise ecosystem services and community engagement, offering a pathway towards more resilient, sustainable urban water systems.

1.5. Research objective and the thesis

1.5.1. Research objectives

To summarise, the central aim of this study is to explore whether and how informality can facilitate reparative governance to achieve water sensitivity in India's secondary cities. This aim is pursued against the backdrop of the critical urgency faced by these cities, which experience rapid urban growth yet contend with limited resources, as development efforts and resources are often directed towards primary cities. This disparity underscores the acute need for innovative governance solutions, highlighting the role of informality in addressing formal governance limitations. This study thus contributes to a nuanced understanding of how informality operates in these urban contexts, considering both the unique challenges and the opportunities for advancing water sensitivity goals.

This research addresses an important gap in both the conceptualisation and methodological examination of the nuanced role of informality in reparative urban water governance, particularly within the context of achieving water sensitivity. While informality is recognised as a pervasive element in urban governance, its potential to transform sustainable and resilient water management practices remains underexplored. First, it is essential to conceptualise the capacities required for reparative governance and understand how informality relates to these capacities.

Second, there is a lack of methodological approaches to examine, assess, and intentionally leverage informality to support reparative governance capacities. Methodological challenges include the transient nature of informal practices, difficulties in documenting sensitive or illicit activities, and the need for adaptive research methods. Furthermore, proactively mobilising

informality to foster transformative spaces and nurture governance capacities necessitates methods that are both flexible and sensitive.

By addressing these gaps, this research aims to illuminate both the potentials and pitfalls of informality and explore how it can be operationalised within urban governance capacities to enable reparative governance. The lens of governance capacities offers a heuristic for examining informality's role in reparative governance.

This research seeks to cultivate a comprehensive understanding of reparation. It leverages locally accessible knowledge and resources for change management, enhancing the feasibility and sustainability of interventions. Central to this endeavour are two supplementary objectives: firstly, devising a methodology to evaluate existing capacities for repair; and secondly, adapting transformative spaces to nurture governance capacities that enable repair.

To dissect this, the key objectives include:

a) Crafting a conceptual framework to identify and operationalise capacities for reparative governance leveraged through informality;

b) Conducting a comparative qualitative case study of informal water governance in two secondary cities—Bhuj and Bhopal—by employing ethnographic methods augmented by photographic techniques to illuminate capacities at work, and

c) Designing and facilitating workshops in these cities aimed at nurturing reparative capacities.

In this study, I have deliberately avoided directly comparing or attempting to fit the governance capacities and transformative cultures of the Global North to India's distinct Southern context. Instead, I have engaged with Northern discourses to evaluate their feasibility and theorise how capacities might be operationalised through informality and mobilised for repair in India. This nuanced approach allows for a critical examination of capacities that enable reparation, enhancing our understanding of water-sensitive governance in the Indian context.

Through semi-structured interviews and ethnographic observations, this research documents the manifestation of informality. Identifying the underlying intent of these capacities, however, is challenging, often obscured by societal norms and unintentional actions (Latour, 2007). To address this, I have employed visual ethnography to reveal the normalised yet overlooked rationales behind these actions, enabling a comparative analysis across different cities.

Moreover, this research elucidates how the conceptualisation of informality and reparation aids in adapting transformative spaces, acting as procedural tools to facilitate reparation. The creation of these spaces offers a conducive environment where informality is not just acknowledged but celebrated, paving the way for a collective vision of what repair entails.

1.5.2. Research Questions

Guided by the identified research gaps and the objectives of this thesis, my primary question is as follows:

To what extent and in what ways can informality contribute to the development of governance capacities that can facilitate reparation to achieve water sensitivity in secondary Indian cities?

Sub-Research Questions

1. How can capacities for reparative urban water governance, supported by informality, be conceptualised??

2. How are capacities for reparative urban water governance mobilised through informality in secondary Indian cities?

3. What methods facilitate the identification and nurturing of governance capacities to enable reparation?

1.5.3. Outline of the dissertation

The study is structured into five distinct sections: 1) Introductory Section, 2) Conceptual Section, 3) Analytical Section, 4) Action Research Section, and 5) Reflexive Section. This organisation allows for a detailed exploration of concepts, analysis, action research, and reflective insights, providing a coherent framework for understanding and addressing water governance issues.

Part 1: Introductory Section

Chapter 1 explores the complexities of informality in India, advocating for a systemic approach to addressing these challenges. It introduces 'Repair' as an indigenous method for transformation. It presents the lens of 'governance capacity,' focusing on the actions through which urban governance actors enact informality to establish conditions necessary for advancing reparative governance.

Chapter 2 presents a dual-focused research methodology, combining analytical and action research to examine 'reparation' and nurture capacities, leveraging informality toward water sensitivity.

Chapter 3 introduces an innovative methodological approach by adopting visual ethnography to explore the informal practices that play a crucial role in water governance. This chapter navigates the ethical and methodological dilemmas inherent in this research by developing five photographic routines.

Part 2: Conceptual Section
Chapter 4 discusses the iterative development of a capacities framework for reparative urban water governance, refined through literature, fieldwork, and workshops. Field observations and workshop feedback were pivotal in evolving the framework to address the complexities and dynamics of reparative urban water governance better, emphasising flexibility and responsiveness. This chapter details the framework, highlighting the importance of emotional intelligence and collective vision in navigating the socio-political-ecological complexities in Indian secondary cities and addressing historical injustices through transformative governance.

Part 3: Analytical Section
Chapter 5 critically examines the role of governance capacities in enabling reparation, leveraged through informality, to achieve water sensitivity in the face of increasing challenges in the Global South, with a focus on Bhopal and Bhuj.

Part 4: Action Research Section
Chapter 6 introduces a novel approach to adapting transformative spaces through informality, challenging technocratic hegemony and nurturing capacities for water-sensitive governance in Indian cities.

Intermezzo A supports Chapter 6 by highlighting the outputs of the pathway-repairing workshop, emphasising the nurturing of reparative capacities to support these outcomes.

Part 5: Reflexive Section – Discussion and Conclusion
Chapter 7 revisits the conceptualisation of capacities for reparative urban water governance and discusses capacity gaps. It underscores the role of these capacities in facilitating reparation and contributing to water sensitivity, outlining the development of transformative spaces and their implications for sustainable urban water management. This chapter also suggests directions for further research and acknowledges the study's limitations.

1.5.4. How to engage with this thesis

In this thesis, to enhance the textual analysis and vividly capture the essence of informality, I have employed photography as a crucial tool for expression and investigation. Through a selection of meticulously chosen images, layered with annotations to unravel the complexity of informality, this work embarks on a visual exploration into the depths of Bhopal and Bhuj. These images allow readers to visually navigate these cities, offering a direct glimpse into the lived realities of informality. Far from mere illustrations, these photographs are narratives in themselves, beckoning readers to connect with the material in a deeply intuitive and impactful manner.

Thus, the thesis aims to narrow the divide between theoretical academic discourse and the palpable intricacies of urban governance, enriching our understanding of the Bhopal and Bhuj case studies. It is my hope that this integration of imagery will open doors for readers

from diverse backgrounds to join the conversation, encouraging a broader and more inclusive discussion about the role of informality in repairing urban water governance.

References

Agrawal, A., & Ribot, J. (1999). Accountability in Decentralization: A Framework with South Asian and West African Cases. *The Journal of Developing Areas*, *33*(4), 473–502. http://www.jstor.org/stable/4192885

Ahlers, R., Cleaver, F., Rusca, M., & Schwartz, K. (2014). Informal space in the urban waterscape: Disaggregation and co-production of water services. *Water Alternatives*, *7*(1), 1–14.

Anand, N. (2011). Pressure: The politechnics of water supply in Mumbai. *Cultural Anthropology*, *26*(4), 542–564.

Anand, N. (2017). *Hydraulic City: Water and the Infrastructures of Citizenship in Mumbai* (2017th ed.). Oxford University Press. https://doi.org/10.1215/9780822373599

Bajpai, S., & Kothari, A. (2020). Towards decentralised urban governance: the case of Bhuj city, Kachchh (India). *Kalpavriksh. Pune*.

Barron, N. J., Kuller, M., Yasmin, T., Castonguay, A. C., Copa, V., Duncan-Horner, E., Gimelli, F. M., Jamali, B., Nielsen, J. S., Ng, K., Novalia, W., Shen, P. F., Conn, R. J., Brown, R., & Deletic, A. (2017). Towards water sensitive cities in Asia: An interdisciplinary journey. *Water Science and Technology*, *76*(5), 1150–1157. https://doi.org/10.2166/wst.2017.287

Bhan, G. (2019). Notes on a Southern urban practice. *Environment and Urbanization*, *31*(2), 639–654. https://doi.org/10.1177/0956247818815792

Bhan, G. (2022). WORKSHOP 1: What does it mean to repair a city? (17th February 2022). In N. Millington (Ed.), *Webseries - Reparative Urbanism: Informality, infrastructural repurposing, and collective life in the wake of the pandemic*.

Bichai, F., & Flamini, A. C. (2017). The Water-Sensitive City: Implications of an urban water management paradigm and its globalization. *Wiley Interdisciplinary Reviews: Water, 5(3)* (December 2017), 1–9. https://doi.org/10.1002/wat2.1276

Biswas, A. K., & Kris, H. (2013). Why India's Secondary Cities Are the Future. *UBM‟s Future Cities, The Global Community for 21st Century City Decision Makers, Thursday*.

Briscoe, J., & Malik, R. P. S. (2006). *India's water economy: Bracing for a turbulent future*. Oxford University Press and World Bank.

Broto, V. C., Westman, L., & Huang, P. (2021). Reparative innovation for urban climate adaptation. *Journal of the British Academy*, *9*(s9), 205–218.

Brown, R., Rogers, B. C., & Werbeloff, L. (2018). A framework to guide transitions to water sensitive cities. *Urban Sustainability Transitions: Australian Cases-International Perspectives*, 129–148.

Burt, Z., & Ray, I. (2014). Storage and non-payment: Persistent informalities within the formal water supply of Hubli-Dharwad, India. *Water Alternatives*, *7*(1), 106–120.

Cadieux, K. V., Carpenter, S., Liebman, A., Blumberg, R., & Upadhyay, B. (2019). Reparation ecologies: Regimes of repair in populist agroecology. *Annals of the American Association of Geographers*, *109*(2), 644–660.

Carstensen, M. B. (2011). Paradigm man vs. the bricoleur: Bricolage as an alternative vision of agency in ideational change. *European Political Science Review*, *3*(1), 147–167. https://doi.org/10.1017/S1755773910000342

Cawood, S., Wahby, N., & Ferrara, L. N. (2022). Hybridity in Practice: Responding to Water Insecurity in São Paulo, Dhaka and Cairo. *Water Alternatives*, *15*(3), 688–708.

Chaffin, B. C., Garmestani, A. S., Gunderson, L. H., Benson, M. H., Angeler, D. G., Arnold, C. A. (Tony), Cosens, B., Craig, R. K., Ruhl, J. B., & Allen, C. R. (2016). Transformative Environmental Governance. *Annual Review of Environment and Resources*, *41*(1), 399–423. https://doi.org/10.1146/annurev-environ-110615-085817

Chaffin, B. C., Gosnell, H., & Cosens, B. A. (2014). A decade of adaptive governance scholarship. *Ecology and Society*, *19*(3), 1–13. https://doi.org/10.5751/ES-06824-190356

Cleaver, F. (2002). Reinventing institutions: Bricolage and the social embeddedness of natural resource management. *The European Journal of Development Research*, *14*(2), 11–30. https://doi.org/10.4324/9780203045886

Denby, K., Movik, S., Mehta, L., & van Koppen, B. (2016). The 'trickle down' of IWRM: A case study of local-level realities in the Inkomati Water Management Area, South Africa. *Water Alternatives*, *6*(3), 473–492.

Dewulf, A., Klenk, N., Wyborn, C., & Lemos, M. C. (2020). Usable environmental knowledge from the perspective of decision-making: the logics of consequentiality, appropriateness, and meaningfulness. *Current Opinion in Environmental Sustainability*, *42*, 1–6. https://doi.org/https://doi.org/10.1016/j.cosust.2019.10.003

Dey, D. (2019). India: The context of its current internal colonialism. *Shifting Forms of Continental Colonialism: Unfinished Struggles and Tensions*, 249–272.

D'Souza, R. (2002). Colonialism, Capitalism and Nature: Debating the Origins of Mahanadi Delta's Hydraulic Crisis (1803-1928). *Economic and Political Weekly*, 1261–1272.

D'Souza, R. (2006). Water in British India: the making of a 'colonial hydrology.' *History Compass*, *4*(4), 621–628.

Durbach, A. (2016). Towards reparative transformation: Revisiting the impact of violence against women in a post-TRC South Africa. *International Journal of Transitional Justice*, *10*(3), 366–387.

Escobar, A. (2015). Degrowth, postdevelopment, and transitions: a preliminary conversation. *Sustainability Science*, *10*(3), 451–462. https://doi.org/10.1007/s11625-015-0297-5

EU. (2000). *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy*. Official Journal of European Communities L 327 1 72.

Fletcher, T. D., Shuster, W., Hunt, W. F., Ashley, R., Butler, D., Arthur, S., Trowsdale, S., Barraud, S., Semadeni-Davies, A., Bertrand-Krajewski, J. L., Mikkelsen, P. S., Rivard, G., Uhl, M., Dagenais, D., & Viklander, M. (2015). SUDS, LID, BMPs, WSUD and more – The evolution and application of terminology surrounding urban drainage. *Urban Water Journal*, *12*(7), 525–542. https://doi.org/10.1080/1573062X.2014.916314

Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience Thinking. *Ecology and Society*, *15*(4). http://www.jstor.org/stable/26268226

Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive Governance of Social-Ecological Systems. *Annual Review of Environment and Resources*, *30*(1), 441–473. https://doi.org/10.1146/annurev.energy.30.050504.144511

Forsyth, M., Pali, B., & Tepper, F. (2022). Environmental restorative justice: An introduction and an invitation. In B. Pali, M. Forsyth, & F. Tepper (Eds.), *The Palgrave Handbook of Environmental Restorative Justice* (pp. 1–23). Springer. https://doi.org/10.1007/978-3-031-04223-2

Forsyth, T., & McDermott, C. L. (2022). When climate justice goes wrong: Maladaptation and deep co-production in transformative environmental science and policy. *Political Geography*, *98*, 102691. https://doi.org/https://doi.org/10.1016/j.polgeo.2022.102691

Frewer, L. J. (2003). Trust, transparency, and social context: Implications for social amplification of risk. *The Social Amplification of Risk*, *123*, 131–137.

Funder, M., & Marani, M. (2015). Local bureaucrats as bricoleurs. The everyday implementation practices of county environment officers in rural Kenya. *International Journal of the Commons*, *9*(1), 87–106. https://doi.org/10.18352/ijc.526

Ghosh, B., & Arora, S. (2021). Smart as (un) democratic? The making of a smart city imaginary in Kolkata, India. *Environment and Planning C: Politics and Space*, *40*(1), 318–339.

Giordano, M., & Shah, T. (2014). From IWRM back to integrated water resources management. *International Journal of Water Resources Development*, *30*(3), 364–376. https://doi.org/10.1080/07900627.2013.851521

Gnadl, M. (2017). The importance of effective urban water management-a case study on water provision, its governance system and stakeholders' belief-systems in Surabaya, Indonesia. *Amsterdam: Universiteit van Amsterdam Graduate School of Social Science*.

GWP. (2000). *Integrated Water Resources Management*. Global Water Partnership (GWP) Technical Advisory Committee, Background Paper No.4.

Hartley, K., & Kuecker, G. (2021). Deconstructing masculinity in water governance. *Water International*, *46*(5), 671–676. https://doi.org/10.1080/02508060.2021.1953830

Henke, C. R. (2017). The sustainable University: Repair as maintenance and transformation. *Continent*, *6*(1), 40–45.

Hill, G., Kolmes, S., Humphreys, M., McLain, R., & Jones, E. T. (2019). Using decision support tools in multistakeholder environmental planning: restorative justice and subbasin planning in the Columbia River Basin. *Journal of Environmental Studies and Sciences*, *9*(2), 170–186. https://doi.org/10.1007/s13412-019-00548-x

Hölscher, K., & Frantzeskaki, N. (2020). *Transformative Climate Governance. A capacities perspective to systematize, evaluate and guide climate action* (K. Holscher & N. Frantzeskaki, Eds.). Palgrave Macmillan. http://sgc.ca.gov/programs/tcc/docs/20180530-Fact-Sheet-TCC.pdf

Hölscher, K., Frantzeskaki, N., Collier, M. J., Connop, S., Kooijman, E. D., Lodder, M., McQuaid, S., Vandergert, P., Xidous, D., Bešlagić, L., Dick, G., Dumitru, A., Dziubała, A., Fletcher, I., Adank, C. G.-E., Vázquez, M. G., Madajczyk, N., Malekkidou, E., Mavroudi, M., … Vos, P. (2023). Strategies for mainstreaming nature-based solutions in urban governance capacities in ten European cities. *Npj Urban Sustainability*, *3*(1), 54. https://doi.org/10.1038/s42949-023-00134-9

Hölscher, K., Frantzeskaki, N., McPhearson, T., & Loorbach, D. (2019). Tales of transforming cities: Transformative climate governance capacities in New York City, US and Rotterdam, Netherlands. *Journal of Environmental Management*, *231*, 843–857.

Houston, L. (2017). The timeliness of repair. *Continent*, *6*(1), 51–55.

ICWE. (1992). The Dublin statement on water and sustainable development. *International Conference on Water and the Environment*.

IDFC. (2011). *India Infrastructure report water: Policy and performance for sustainable development*. Oxford University Press and IDFC.

IWA. (2016). *The IWA principles for water wise cities-for urban stakeholders to develop a shared vision and act towards sustainable urban water in resilient and liveable cities*. International Water Association.

Iyer, R. R. (1994). Federalism and water resources. *Economic and Political Weekly*, 733–736.

Jacob, N. (2019). Local Governance and Participative Water Management in Urban Contexts. In G. Chadha & A. B. Pandya (Eds.), *Water Governance and Management in India. Issues and Perspectives. Volume 1* (pp. 137–167). Springer.

Johannesburg Summit. (2002). *World Summit on Sustainable Development*. https://www.johannesburgsummit.org/

Joshi, D. (2011). Caste, Gender and the Rhetoric of Reform in India's Drinking Water Sector. *Economic and Political Weekly*, *46*(18), 56–63. http://www.jstor.org/stable/41152344

Kemerink-Seyoum, J. S., Chitata, T., Domínguez Guzmán, C., Silva-Novoa Sanchez, L. M., & Zwarteveen, M. Z. (2019). Attention to sociotechnical tinkering with irrigation infrastructure as a way to rethink water governance. *Water*, *11*(8), 1670.

Kooy, M. (2014). Developing Informality : The Production of Jakarta ' s Urban Waterscape. *Water Alternatives*, *7*(1), 35–53.

Kösters, M., Bichai, F., & Schwartz, K. (2020). Institutional inertia: challenges in urban water management on the path towards a water-sensitive Surabaya, Indonesia. *International Journal of Water Resources Development*, *36*(1), 50–68. https://doi.org/10.1080/07900627.2019.1662378

Krishnamurthy, R., Mishra, R., & Desouza, K. C. (2016). City profile: Pune, India. *Cities*, *53*, 98–109. https://doi.org/https://doi.org/10.1016/j.cities.2016.01.011

Kumar, M. D. (2018). Water management in India: The multiplicity of views and solutions. *International Journal of Water Resources Development*, *34*(1), 1–15. https://doi.org/10.1080/07900627.2017.1351333

Kumar, M. D., & Ballabh, V. (2000). *Water management problems and challenges in India: An analytical review* (Issue 140).

Latour, B. (1996). *Aramis, or the Love of Technology*. Harvard University Press.

Latour, B. (2007). *Reassembling the social: An introduction to actor-network-theory*. Oup Oxford.

Marais, L., & Cloete, J. (2017). The role of secondary cities in managing urbanisation in South Africa. *Development Southern Africa*, *34*(2), 182–195.

Maurya, K. K., & Biswas, A. (2019). The Rationale of SPV in Indian Smart City Development. *SMARTGREENS 2019: Proceedings of the 8th International Conference on Smart Cities and Green ICT Systems May 3-5, 2019*, 143–150. https://doi.org/https://doi.org/10.5220/0007726701430150

Mayaux, P.-L., Dajani, M., Cleaver, F., Naouri, M., Kuper, M., & Hartani, T. (2022). Explaining societal change through bricolage: Transformations in regimes of water governance. *Environment and Planning E: Nature and Space*, *6*(4), 2654–2677. https://doi.org/10.1177/25148486221143666

McCauley, D., & Heffron, R. (2018). Just transition: Integrating climate, energy and environmental justice. *Energy Policy*, *119*, 1–7. https://doi.org/https://doi.org/10.1016/j.enpol.2018.04.014

McFarlane, C. (2012). Rethinking Informality: Politics, Crisis, and the City. *Planning Theory and Practice*, *13*(1), 89–108. https://doi.org/10.1080/14649357.2012.649951

McFarlane, C. (2019). Thinking with and beyond the informal–formal relation in urban thought. *Urban Studies*, *56*(3), 620–623. https://doi.org/10.1177/0042098018810603

McKenzie, D., & Ray, I. (2009). Urban water supply in India: status, reform options and possible lessons. *Water Policy*, *11*(4), 442–460. https://doi.org/10.2166/wp.2009.056

Mehta, L., Movik, S., Bolding, A., Derman, B., & Manzungu, E. (2016). Introduction to the special issue–flows and practices: The politics of Integrated Water Resources Management (IWRM) in southern Africa. *Water Alternatives*, *9*(3), 389–411. https://www.water-alternatives.org/index.php/alldoc/articles/vol9/v9issue3/337-a9-3-1/file

Mguni, P., Abrams, A., Herslund, L. B., Carden, K., Fell, J., Armitage, N., & Dollie, A. (2022). Towards water resilience through Nature-based Solutions in the Global South? Scoping the prevailing conditions for Water Sensitive Design in Cape Town and Johannesburg. *Environmental Science & Policy*, *136*, 147–156. https://doi.org/https://doi.org/10.1016/j.envsci.2022.05.020

Mguni, P., Herslund, L., & Jensen, M. B. (2015). Green infrastructure for flood-risk management in Dar es Salaam and Copenhagen: exploring the potential for transitions towards sustainable urban water management. *Water Policy*, *17*(1), 126–142. https://doi.org/10.2166/wp.2014.047

Mihir Shah Committee. (2016). *A 21st Century Institutional Architecture for India's Water Reforms. Report submitted by the Committee on Restructuring the CWC and CGWB*. *July*, 146. http://wrmin.nic.in/writereaddata/Report_on_Restructuring_CWC_CGWB.pdf

Ministry of Water Resources. (2002). *National Water Policy*. Government of India. http://mowr.gov.in/sites/default/files/nwp20025617515534_1.pdf

Ministry of Water Resources. (2012). *National Water Policy*. Government of India. http://mowr.gov.in/sites/default/files/NWP2012Eng6495132651_1.pdf

Misra, K. (2014). From formal-informal to emergent formalisation: Fluidities in the production of urban waterscapes. *Water Alternatives*, *7*(1), 15–34. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896861480&partnerID=40&md5=6486d2b5315d3670b6b8c6e02c41b463

Mollinga, P. P. (2008). The water resources policy process in India: Centralisation, polarisation and new demands on governance. *Governance of Water: Institutional Alternatives and Political Economy*, 339–370.

Murty, M. N., & Kumar, S. (2011). Water Pollution in India. An Economic Appraisal. In *India Infrastructure Report 2011. Water: Policy and Performance for Sustainable Development* (First, pp. 285–298). Oxford university Press. http://www.idfc.com/pdf/report/2011/Chp-19-Water-Pollution-in-India-An-Economic-Appraisal.pdf

Narain, V. (2000). India's water crisis: the challenges of governance. *Water Policy*, *2*(6), 433–444. https://doi.org/https://doi.org/10.1016/S1366-7017(00)00018-0

Nastar, M., Abbas, S., Aponte Rivero, C., Jenkins, S., & Kooy, M. (2018). The emancipatory promise of participatory water governance for the urban poor: Reflections on the transition management approach in the cities of Dodowa, Ghana and Arusha, Tanzania. *African Studies*, *77*(4), 504–525. https://doi.org/10.1080/00020184.2018.1459287

OECD. (2012). Water. In *OECD Environmental Outlook to 2050*. OECD Publishing. https://doi.org/https://doi-org.eur.idm.oclc.org/10.1787/9789264122246-en

Pandit, C., & Biswas, A. K. (2019). India's National Water Policy: 'feel good' document, nothing more. *International Journal of Water Resources Development*, *35*(6), 1015–1028. https://doi.org/10.1080/07900627.2019.1576509

Pathirana, A., Radhakrishnan, M., Quan, N. H., & Zevenbergen, C. (2018). Managing urban water systems with significant adaptation deficits—unified framework for secondary cities: part I—conceptual framework. *Climatic Change*, *149*(1), 43–56. https://doi.org/10.1007/s10584-017-1953-9

Peloso, M., & Morinville, C. (2014). "Chasing for Water": Everyday Practices of Water Access in Peri-Urban Ashaiman, Ghana. *Water Alternatives*, *7*(1).

Perry, K. (2020). Realising climate reparations: Towards a global climate stabilization fund and resilience fund programme for loss and damage in marginalised and former colonised societies. *Available at SSRN 3561121*.

Ranganathan, M. (2014). "Mafias" in the waterscape: Urban informality and everyday public authority in Bangalore. *Water Alternatives*, *7*(1), 89–105.

Roy, A. (2005). Urban informality: Toward an epistemology of planning. *Journal of the American Planning Association*, *71*(2), 147–158. https://doi.org/10.1080/01944360508976689

Roy, A. (2009). Why India cannot plan its cities: Informality, insurgence and the idiom of urbanization. *Planning Theory*, *8*(1), 76–87. https://doi.org/10.1177/1473095208099299

Sankhe, S., Vittal, I., Dobbs, R., Mohan, A., Gulati, A., Ablett, J., Gupta, S., Kim, A., Paul, S., & Sanghvi, A. (2010). *India's urban awakening: Building inclusive cities, sustaining economic growth*. McKinsey Global Institute Mumbai.

Schwartz, K., Tutusaus Luque, M., Rusca, M., & Ahlers, R. (2015). (In)formality: the meshwork of water service provisioning. *WIREs Water, 2*(1), 31–36. https://doi.org/https://doi.org/10.1002/wat2.1056

Shah, T., & Van Koppen, B. (2006). Is India ripe for integrated water resources management? Fitting water policy to national development context. *Economic and Political Weekly*, 3413–3421.

Shah, T., & van Koppen, B. (2016). *The Precept and Practice of Integrated Water Resources Management (IWRM) in India BT - Indian Water Policy at the Crossroads: Resources, Technology and Reforms* (V. Narain & A. Narayanamoorthy, Eds.; pp. 15–33). Springer International Publishing. https://doi.org/10.1007/978-3-319-25184-4_2

Sultana, F. (2023). Decolonizing Climate Coloniality. In R. Solnit & T. Y. Lutunatabua (Eds.), *Not Too Late: Changing the Climate Story from Despair to Possibility* (pp. 58–65). Haymarket Books.

Thatte, C. D. (2018). Water resources development in India. *International Journal of Water Resources Development*, *34*(1), 16–27. https://doi.org/10.1080/07900627.2017.1364987

UNCED. (1992). Rio declaration on environment and development: Agenda 21. *United Nations Conference on Environment and Development*.

Unnikrishnan, H., B., M., Nagendra, H., & Castán Broto, V. (2020). Water governance and the colonial urban project: the Dharmambudhi lake in Bengaluru, India. *Urban Geography*, 1–26. https://doi.org/10.1080/02723638.2019.1709756

Ureta, S. (2014). Normalizing Transantiago: On the challenges (and limits) of repairing infrastructures. *Social Studies of Science*, *44*(3), 368–392.

van Koppen, B., & Schreiner, B. (2019). Viewpoint–A hybrid approach to statutory water law to support smallholder farmer-led irrigation development FLID in Sub-Saharan Africa. *Water Alternatives*, *12*(1), 146–155.

Vasilescu, C. M. (2022). Participatory Governance and Restorative Justice: What Potential Blending in Environmental Policymaking? In B. Pali, M. Forsyth, & F. Tepper (Eds.), *The Palgrave Handbook of Environmental Restorative Justice* (pp. 171–200). Springer. https://doi.org/10.1007/978-3-031-04223-2

Wahby, N. M. (2021). Urban informality and the state: Repairing Cairo's waters through Gehood Zateya. *Environment and Planning E: Nature and Space*, *4*(3), 696–717. https://doi.org/10.1177/25148486211025262

Water Aid. (2018). *State of Urban Water Supply in India*.

Webber, S., Nelson, S., Millington, N., Bryant, G., & Bigger, P. (2022). Financing Reparative Climate Infrastructures: Capital Switching, Repair, and Decommodification. *Antipode*, *54*(3), 934–958.

Wong, T. H. F., & Brown, R. (2009). The water sensitive city: Principles for practice. *Water Science and Technology*, *60*(3), 673–682. https://doi.org/10.2166/wst.2009.436

World Bank. (1999). *Inter-Sectoral Water Allocation Planning and Management*.

World Bank. (2017). *Ebbs and Flows: Analyzing Gender and Social Inclusion Issues in India's Urban Water Supply and Sanitation Sector*. World Bank.

Yudiatmaja, W. E., Yudithia, Samnuzulsari, T., Suyito, & Edison. (2020). Social capital of local communities in the water resources management: an insight from Kepulauan Riau. *IOP Conference Series: Materials Science and Engineering*, *771*(1), 12067. https://doi.org/10.1088/1757-899X/771/1/012067

Zevenbergen, C., Fu, D., & Pathirana, A. (2018). Transitioning to Sponge Cities: Challenges and Opportunities to Address Urban Water Problems in China. In *Water* (Vol. 10, Issue 9). https://doi.org/10.3390/w10091230

Ziervogel, G., Satyal, P., Basu, R., Mensah, A., Singh, C., Hegga, S., & Abu, T. Z. (2019). Vertical integration for climate change adaptation in the water sector: lessons from decentralisation in Africa and India. *Regional Environmental Change*, *19*(8), 2729–2743. https://doi.org/10.1007/s10113-019-01571-y

Zwarteveen, M. (2017). Hydrocracies, Engineers and Power: Questioning Masculinities in Water. *Engineering Studies*, *9*(2), 78–94. https://doi.org/10.1080/19378629.2017.1358730

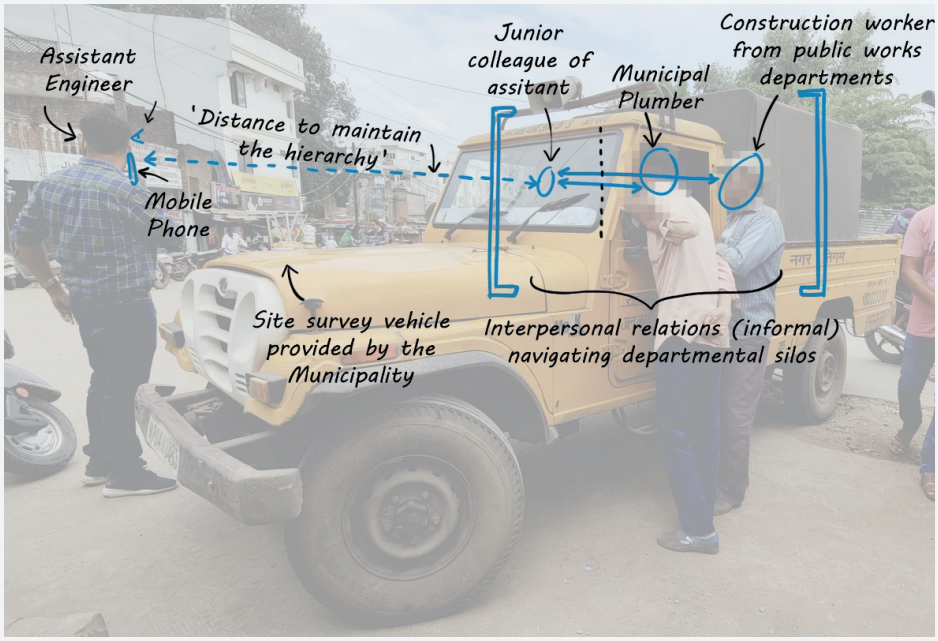
Zwarteveen, M., Kemerink-Seyoum, J. S., Kooy, M., Evers, J., Guerrero, T. A., Batubara, B., Biza, A., Boakye-Ansah, A., Faber, S., Cabrera Flamini, A., Cuadrado-Quesada, G., Fantini, E., Gupta, J., Hasan, S., ter Horst, R., Jamali, H., Jaspers, F., Obani, P., Schwartz, K., … Wesselink, A. (2017). Engaging with the politics of water governance. *Wiley Interdisciplinary Reviews: Water*, *4*(6), e1245. https://doi.org/10.1002/wat2.1245

2

Methodology about performing the study

Photo Narrative 2: Mending silos through friendships

Although formal governance structures aim to streamline the organisation, they often create silos that impede cross-departmental coordination and complicate bureaucratic processes. Factors such as seniority, social norms, financial vulnerabilities, and rigid organisational hierarchies contribute to these silos, making the execution of bureaucratic functions particularly challenging. Despite various efforts to address these issues, they persist. However, during my observations, I saw how an assistant engineer leveraged the personal 'friendships' of his junior staff to navigate these obstacles.



While accompanying a municipal engineer and his team on a leakage inspection visit with the state department, I noticed a stark contrast in the interactions between junior and senior staff. The juniors greeted each other warmly, while the seniors maintained a noticeable distance, reflecting the hierarchical divide between state and city departments. This formality often leads to rivalries, further delaying the process of securing permissions. When I asked how they manage to work around these delays, a junior staff member explained that tasks like 'file circulation' for permissions are typically assigned to junior staff, who then directly call their counterparts in the receiving department.
Despite the clear hierarchical distance, the camaraderie among junior staff members helped bridge the gap and mitigate the delays caused by formalities. This ethnographic observation revealed the relational dynamics at play, demonstrating both the social distance created by formal structures and the informal networks that help mitigate it.

2.1. Introduction

In order to truly understand how a transformative approach can be decolonised—particularly through the lens of informality—it is essential to critically examine the methodological frameworks that underpin such studies. This chapter elaborates on the research methodology I have employed, which is grounded in decolonial theory and praxis. Rather than merely adapting existing methods, I have sought to develop an approach that actively interrogates colonial structures of knowledge production, offering a means to understand and reconfigure power dynamics in water governance.

As a decolonial scholar, I see science not as a neutral or universal pursuit but as one deeply embedded in historical, cultural, and political contexts. My methods, therefore, reflect this view, aiming to dismantle the hegemonic frameworks that often marginalise local knowledges and perspectives. Through this nuanced approach, I seek to uncover the layered interactions and power structures that sustain coloniality, while also foregrounding subaltern voices and knowledges that are crucial to a reparative understanding of water governance, comprehensively.

I begin by discussing the imperative of decolonising transformative studies and methodologies, arguing that this perspective enables a more profound understanding of how coloniality shapes water governance. This ontological shift offers insights into the exercising of reparative governance structures. In the subsequent section, I introduce the case studies and situate them within the context of the Water4Change (W4C) programme, providing a deeper understanding of the socio-political and cultural dynamics at play. In the following subchapter, I outline the specific methods employed to investigate and nurture capacities for plural, embedded forms of reparative water governance. Finally, I critically reflect on my own positionality throughout the research process, as decolonial methodologies necessitate self-awareness and reflexivity. I demonstrate how my positionality influenced the study, shaping both the inquiry and the interpretation of findings.

2.1.1. Need to decolonise transformative methodologies

Research, as Thambinathan & Kinsella (2021) argue, has long functioned as a mechanism of power, allowing those conducting it to control narratives while marginalising the voices of those being studied. This dynamic is rooted in colonial structures, which have led to exploitative practices that objectify indigenous communities (Sinclair, 2003). When I examined the literature on informality and transformation, I observed how this scholarship often reduces non-Western practices to deviations from the norm, rather than engaging with them as valid forms of knowledge. This reflects a broader problem: the dominance of Western governance frameworks, which are often treated as universal, leaving little room to question why informality is so prevalent in contexts like India.

This dominance of Western knowledge systems is a relic of colonialism and continues to shape transition research in the Global South. As Ghosh et al. (2021) highlight, many postcolonial

societies have adopted Western modernisation models, often at the expense of their own diverse epistemologies. This has led to social exclusion and ecological degradation, further entrenching the idea that Western science and governance models are superior. Thus, the need to decolonise research becomes critical - moving away from frameworks that suppress local worldviews and embracing the rich plurality of knowledge systems that exist in these regions. This insight ties into Escobar's (2015) critique of modern science, which privileges rational, materialist approaches while marginalising non-Western ontologies. Therefore, decolonising research methodologies is not simply an academic exercise but a necessary step toward shifting power away from hegemonic knowledge systems and towards more inclusive, plural ways of knowing.

In many cases, transitions in the Global South require rethinking the role of power and inequality, which are deeply embedded in both formal institutions and informal practices (Ghosh et al., 2021). The imposition of Western frameworks often conceals these dynamics, leading to incomplete or superficial understandings of what transformation truly requires. If left unchallenged, even transformative research risks reproducing these colonial dynamics. Scholars also argue that respecting Indigenous and non-Western perspectives involves fully integrating these worldviews into research rather than adding them as afterthoughts or exotic deviations from the norm (D'Souza, 2002, 2006). In sum, decolonial research approach support fostering more ethical, reflexive, and context-sensitive research practices that recognise the complexities of local knowledge and power dynamics in transformative studies.

2.2. Research paradigm

2.2.1. Looking at science around water governance through a decolonial lens

In my doctoral research, I have adopted a decolonial perspective that is essential for understanding water governance transformation. This approach has guided me to respect cultural contexts more deeply and avoiding the risk of perpetuating systemic inequities that Western scientific hegemonies have often imposed. I have learned that, as a researcher, it is crucial to step away from any tendency to claim a morally superior position and instead engage with local knowledge and practices on their terms, acknowledging my biases along the way.

For instance, Gandy (2006) discusses how colonial sanitation projects in urban spaces created harsh physical conditions that disrupted previously communal ways of life, pushing societies towards individualistic behaviours. These interventions were introduced as 'solutions,' assuming that the living conditions of underprivileged communities were inherently unsanitary, with Western infrastructure positioned as the necessary remedy. This perspective underscores how colonial approaches have traditionally separated the 'social' from the 'ecological,' treating them as distinct, interacting entities (Mesle, 2008; West et al., 2020). In contrast, I have been working to understand how a decolonial lens asks us to consider a more relational way of thinking—emphasising ongoing processes and connections between humans and the environment (Ghosh et al., 2021).

I have applied this relational approach in my own transformative research, where I now see humans and nature as interconnected, hybrid systems (Liu et al., 2007). For example, British colonial water management in India treated water as a resource to be controlled, often disregarding its spiritual and communal significance (D'Souza, 2002, 2006). This technocratic view remains in India's policies, framed as 'internationally compliant' programs. However, I have realised that this perspective does not align with the worldviews of many communities where water is seen as a sacred and integrated part of daily life as seen in photo narratives 3 and 4. Instead of idealising these traditional views, I have been tried to recognise how they offer important insights into the dynamic relationships between people and the environment, guiding us toward more sustainable transformations (Clark & Dickson, 2003).

Through this reflection, I have asked myself whose standards and values are being prioritised in water governance, and I have learned to question the assumptions behind dominant narratives. This process has helped me better understand how Indians perceive and govern water. I have been cautious about exploitative research practices (Sinclair, 2003), working to rethink what transformation truly means in this context. By bringing a decolonial lens into my work, I have tried to integrate both my lived experiences and those of others, creating space for a more critical examination of the values underpinning transformative processes.

In sum, I have explored how a decolonial perspective encourages me to view human-nature relationships as dynamic, holistic connections where we are all intertwined. This approach has also prompted me to be self-reflective, continuously questioning my evolving positionality throughout the research process as advocated by decolonial scholars Datta (2018) and Thambinathan & Kinsella (2021). Rather than seeking certainty, embracing ambiguity is a vital part of this journey, allowing me to navigate the complex social and political landscape of water governance with care. In Chapter 3, I delve into the performative role I have taken on as a researcher, using visual ethnography to decode the subconscious motivations and practices around water governance. I have often adjusted my framework as I learned more, trying to align it better with the informal, collaborative logic of India. Further, this positionality encourages me to be cognisant of the potential ripples created by my work and to humbly engage with the unknown complexities of ever-evolving natural arrangements rather than aggressively attempting to unravel every mystery, as suggested by Gillard et al. (2016) and Horlings et al. (2020). This learning guided me in designing and facilitating transformative spaces, as elaborated in Chapter 6, where I strive to develop a 'safe-enough' space where actors can speak about governance challenges openly without feeling threatened or needing to protect their image.

This process has informed my understanding of transformation, which I now conceptualise as perceive it as repair. I study it as an incremental, nonlinear progress stated through a two-step forward, one-step back approach described by Bhan (2019). This helps me recognise that improvisation and nuanced tinkering can constitute innovation without necessitating radical novelty. Additionally, I understand collective efforts as a delicate balance, where individuals maintain one foot in their established roles while cautiously venturing into new collaborative

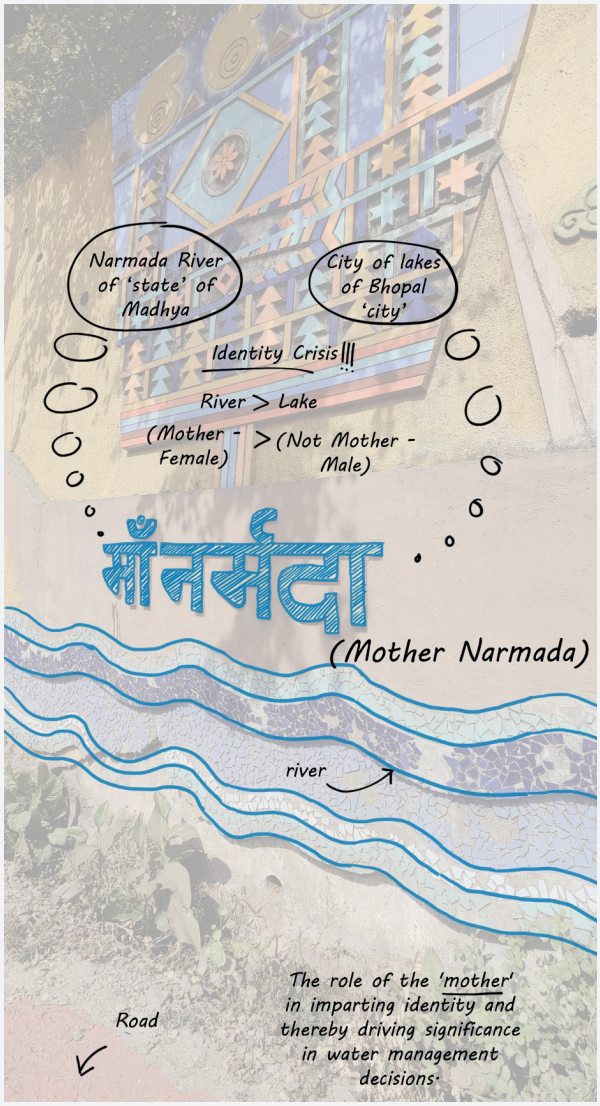
spaces, attuned to the inherent risks and vulnerabilities. This viewpoint enables me to discern the pluralities and precariousness associated with these evolving roles.

This viewpoint informs my strategy for interacting with diverse knowledge systems in the subsequent section.

Photo Narrative 3: 'Mother': River Narmada

In Bhopal, I encountered a mural that celebrates 'Mother (River) Narmada,' paradoxically positioned to face Upper Lake. This mural deeply resonated with the sentiments expressed by residents during my interviews. Although Bhopal prides itself on its identity as the 'City of Lakes,' those residents who receive water from the Narmada River perceive themselves as incredibly privileged. The attribution of 'Mother' and the reverence for the Narmada, one of the country's most significant rivers, underscores its importance over the city's lakes.

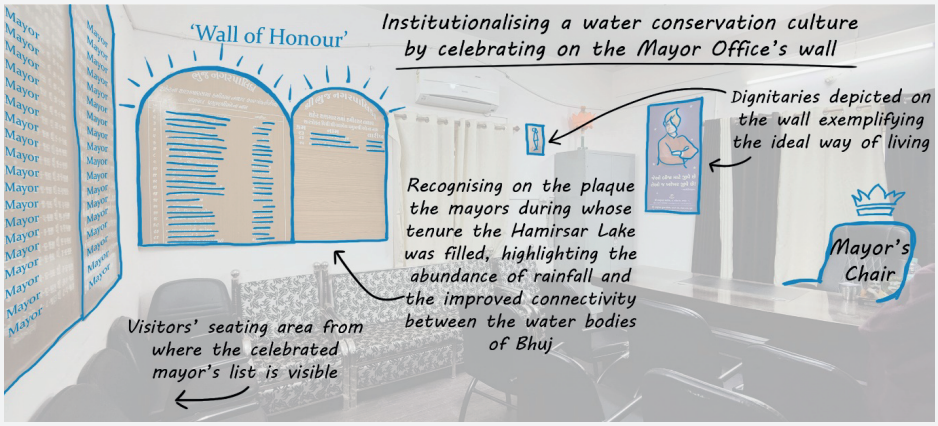
The reverence for rivers like the Narmada is deeply rooted in Hindu mythology, where rivers are often personified as nurturing, life-giving maternal figures. This association, drawn from sacred texts such as the Skanda Purana, positions rivers as vital, flowing entities, symbolising fertility and spiritual cleansing



In contrast, lakes, which are more static, do not hold the same spiritual and cultural significance and are often symbolised as masculine. As a result, the cultural veneration of the Narmada transcends into water management decisions, revealing a preference for augmenting the city's connection to the maternal Narmada over the restoration and self-sufficiency of its masculine lakes.
This dynamic illustrates the intricate interplay between cultural reverence and practical governance, where the symbolic maternal identity of the Narmada shapes both public sentiment and policy priorities, often at the expense of local water bodies.

Photo Narrative 4: Celebrating the filling of the lake

Bhuj, an arid city that experiences scanty rainfall, holds a unique celebration on the day its main lake, Hamirsar, is filled. The citizens gather around the lake's periphery to witness this significant event. It is considered such an honour that the day is declared a public holiday. The name of the mayor during whose tenure the lake is filled is inscribed on the walls of the municipal office. This 'wall of honour' proudly displays the names of mayors and other dignitaries who have overseen this momentous occasion.



These rituals transcend the utilitarian view of the lake and rainfall as mere resources. Rather than being solely valued for its practical benefits, water in Bhuj holds a deep spiritual and symbolic significance. The filling of Hamirsar Lake is seen as a sacred event that represents the community's collective prosperity and well-being. In many Indian traditions, water bodies are revered as sources of life and spiritual nourishment, often personified and celebrated in ways that emphasise their connection to the divine. The act of a lake filling is not just about resource replenishment; it is a symbol of abundance, balance, and the community's alignment with nature's rhythms.

This spiritual connection to water reflects a belief in the sacredness of natural elements, where the environment is intertwined with cultural identity and spiritual practice. The event is more than a celebration of rainfall—it is a celebration of the community's harmony with the environment, reflecting a holistic understanding of life where water is revered for its utility and role in maintaining the cosmic and societal balance. As in many cultures where water is viewed as divine, these practices in Bhuj elevate the lake beyond its material function, embodying a spiritual reverence that shapes how urban water governance is perceived and enacted.

2.2.2. Exploring knowledge systems through a decolonial lens

In my research on reparative water governance, I engage with knowledge production through a decolonial perspective, which prompts me to re-examine whose voices are heard and whose experiences are marginalised. Working within this perspective, I seek to uncover the multiple, often overlooked, layers of knowledge that inform urban water governance in Indian cities. As Smith (2021) suggests, researchers seeking to challenge entrenched power structures must not only accurately document the relevant facts, but also effectively communicate their findings in a respectful and compelling manner. This resonates deeply with my research, as the aim is to document water governance practices and engage with the lived experiences and cultural contexts that shape them. In this instance, the researcher adopts a performative role, striving for emancipatory outcomes rather than merely observing phenomena from a distance (Barreiros & Moreira, 2019; Samuel & Ortiz, 2021).

Drawing on the insights of Ghosh et al. (2021), I adopt participatory approaches that acknowledge the complexities inherent in water governance. This perspective encourages me to move beyond rigid, top-down methodologies and embrace the nuanced, context-specific performative approaches that support providing space to dismissed knowledge frames. Rather than treating communities as passive research subjects, the decolonial approach encourages me to engage them as active partners in the co-production of knowledge, prioritising values such as justice, human rights, and equality (Smith, 2021).

In the context of water governance, knowledge cannot be understood in isolation from the social and ecological dynamics that shape it. I am particularly attentive to how socio-ecological linkages are reflected in local water practices. I focus to uncover the social constructs, personal narratives, and contextual factors that colour urban water governance in both cities. This perspective reveals the multiplicity of perspectives and understanding of shared meanings, values, and vested interests of actors inherent in these practices. By interrogating rational choice assumptions, the lens helps to see behavioural complexities and boundary fuzziness resulting from social identities, power relationships, and broader political and geographical factors (Samuel & Ortiz, 2021; Smith, 2021).

My approach to understanding these dynamics is also shaped by a critical evaluation of power relations. Decolonial frameworks urge us to challenge the dominant narratives that portray water governance as a neutral, technical domain. Instead, I explore how knowledge systems reflect and reproduce historical power structures, particularly those rooted in colonialism. Specific forms of knowledge—often legitimised by Western scientific paradigms—are privileged over local, experiential, and indigenous ways of knowing (Thambinathan & Kinsella, 2021). This critical stance allows me to question the assumptions underpinning dominant governance models and highlight alternative forms of knowledge more aligned with the lived realities of those most affected by water scarcity and mismanagement.

I also investigate how hegemonic knowledge is reproduced in examining these power structures and knowledge systems. My methods are attuned to materiality, recognising various forms of coloniality and resistance mechanisms relevant to this study (Kaika, 2004a; Tinsley, 2021). This approach allows me to understand the structure and subjectivity of human experiences, addressing the effects of power and the relationship between knowledge systems and the material world. By exploring how subconscious traits, past experiences, and vulnerabilities influence decision-making, I can better understand the nuances of urban water governance in Southern contexts.

Reflexivity plays a crucial role in my research process. I constantly question my positionality and how my background, assumptions, and methodological choices influence the research (Datta, 2018; Thambinathan & Kinsella, 2021). This reflexive approach ensures that I remain mindful of the power dynamics at play, not just in water governance but in the research process itself. It prompts me to stay open to the insights and critiques of those with whom I collaborate, recognising that knowledge production is a shared and iterative process.

Practically, this approach has led me to employ a range of qualitative methods, including visual ethnography, which will be further detailed later. These methods allow for a layered understanding of water governance and its relationship with local knowledge systems, capturing informal and often invisible practices at the community level. Ghosh et al. (2021) encourage a focus on everyday struggles and local dynamics, which can reveal the symbolic and cultural meanings associated with water that are typically absent from formal governance discourses. By integrating these perspectives, I aim to offer a more comprehensive understanding of water governance that elevates voices and practices often marginalised in mainstream policy discussions.

By participating in knowledge creation, rather than remaining a distant observer, I am better equipped to differentiate between reality and representation. This capability is crucial for understanding the lived experiences of subaltern groups, where crises form an integral part of their everyday lives. This perspective is evident in its refusal to trivialise or universalise crises solely through the lens of scientific objectivity. For example, the physical impact is indiscriminate when floods occur, but the lived experience varies widely. Some farmers may welcome floodwaters for their fertility, while others face devastating losses. Decolonial methods allow us to acknowledge these varied experiences and the complex interplay of factors such as socio-economic status, historical marginalisation, and access to resources that shape how individuals and communities cope with such crises. This perspective resists the reduction of these experiences to mere anomalies, seeking instead to expose the underlying structures and discourses that shape them. It reveals not only binary forms of oppression and resistance but also the varied expressions of power and their meanings (Boehmer, 1995).

This approach is particularly relevant for understanding what 'repair' looks like in this context, offering a nuanced view of vulnerability and resilience. It helps to assess the multiple interpretations of repair, which may differ significantly from the more rigid frameworks.

2.3. The case studies: Bhuj and Bhopal

In this section, I introduce the case studies—Bhuj and Bhopal—and situate them within the context of the Water4Change (W4C) research programme, offering a deeper understanding of the socio-political and cultural dynamics at play.

2.3.1. About W4C

Before delving into the two cities, it is essential to introduce the W4C programme, which provided the funding for this PhD research. The W4C programme is a collaborative research initiative launched by the Government of India and co-funded by India's Department of Science and Technology (DST) and the Dutch Research Council (NWO) from Nov 2019 to March 2025. This programme addresses the intricate challenges urban water systems pose in rapidly expanding secondary cities in India. Specifically, W4C aims to develop an integrative water-sensitive design framework and toolbox through collaborative efforts with Bhopal, Bhuj, and Kozhikode stakeholders. While the W4C programme partnered with three cities—Bhopal, Bhuj, and Kozhikode—I chose Bhuj and Bhopal for detailed examination. The decision to concentrate on these two cities, rather than including all three, was based on practical considerations. Conducting an in-depth ethnographic study within the six-month research period was more feasible with two case studies. Additionally, language played a critical role in this selection. The primary spoken language in Kozhikode is Malayalam, which I do not speak, whereas in Bhopal and Bhuj, Hindi and Gujarati are the predominant languages, both of which I am proficient in. This linguistic familiarity enabled me to conduct ethnographic research without reliance on a translator, thereby ensuring a deeper engagement with the local context and preserving the nuances of communication.

Though Bhuj and Bhopal are secondary cities, they present distinct physiographical features and face differing water-related challenges. Bhuj contends with issues like water scarcity and salinity ingress, while Bhopal faces water contamination despite a perceived sufficiency of supply. These distinct challenges create varying degrees of urgency and lead to different operational approaches in addressing them. Despite these differences, the governance limitations and challenges present in both cities provide a common ground for comparison. The contrasting issues and the role of capacities, supported by informality, offer valuable insights for developing a comparative methodology. The strategic selection of Bhopal and Bhuj as case studies allows for a deeper exploration of how informality can repair water governance challenges in India's secondary cities, and to what extent. Their unique positions within the urban landscape make them especially relevant for this research.

2.3.2. About Bhuj and Bhopal

Bhopal and Bhuj are categorised as secondary cities, a concept initially defined by UN-Habitat based on population size (UN-Habitat, 1996). In South Asia, the definition has evolved to emphasise socio-economic impacts and relational significance (Kalwar et al., 2020; Marais & Cloete, 2017). Secondary cities are crucial in reducing urban pressure on primary cities, lessening regional disparities, and stimulating rural economies (Cities Alliance, 2019; Rondinelli, 1983). Their strategic locations and proximity to regional markets enable them to facilitate the flow of goods, services, and resources, fostering deconcentration and improved living standards (Biswas & Kris, 2013; Kalwar et al., 2019). While this has resulted in rapid expansion of populations, it has outpaced infrastructure growth, exacerbating water management challenges. These cities face severe risks of water resource depletion, contamination, and susceptibility to natural disasters like floods.

Figure 1: *Location of Bhuj and Bhopal cities in India. Map Courtesy: www.alamy.com*

In India, secondary cities like Bhopal and Bhuj are important regional players but need help in infrastructure development and water management (Biswas & Kris, 2013). Challenges in these areas are exacerbated by a governance model that often incapacitates local governments, effectively hindering their ability to address such issues (Jacob, 2019). Although the 74th CAA aimed to empower cities with more autonomy and institutional support, its implementation has been inadequate. The envisaged powers and institutions remain underdeveloped, limiting their impact on urban management (Jha & Vaidya, 2011). Ward Committees, intended to enhance citizen engagement and decentralise governance, have primarily become symbolic, offering little beyond advisory opinions and needing more financial autonomy (Bajpai & Kothari, 2020; Jha & Vaidya, 2011). This systemic issue complicates the management and governance of resources, particularly water.

Moving to their specific characteristics, Bhopal, the capital of Madhya Pradesh and a significantly larger city than Bhuj, is home to over 2.4 million people and boasts 18 significant water reservoirs. The Upper Lake provides about 25% of the city's water supply, but rapid urban expansion has led to water scarcity.

Bhopal, the capital of Madhya Pradesh, is a significantly larger city than Bhuj, home to over 2.4 million people (CAG India, 2021; DTCP Madhya Pradesh, 2020). The city boasts 18 major water reservoirs, with the Upper Lake providing approximately 25% of its water supply (Burvey et al., 2017). However, rapid urban expansion has led to water scarcity, prompting authorities to source water from distant locations (Everard et al., 2020). Despite these efforts, Bhopal continues to face challenges related to flooding risks and severe water quality issues. Bhopal struggles with water quality issues, including turbidity, faecal coliform, and flooding risks (CAG India, 2021; Kamat, 2019; Pani et al., 2014). Additionally, the Union Carbide pesticide plant leak has contaminated the water supply with hazardous chemicals, exceeding WHO guidelines (Häberli & Toogood, 2009; Johnson et al., 2009; Wadwekar & Pandey, 2021). Notably, the perception of water sufficiency persists in Bhopal, reflecting a lack of academic attention and public awareness, ultimately impacting the city's water policy and governance (Everard et al., 2020).

In contrast, Bhuj, a semi-arid secondary city near India's border, has experienced rapid population growth, nearly doubling to 188,236 by 2011, straining existing infrastructure (van der Meulen et al., 2023). Traditionally, Bhuj managed its water needs through local practices suited to its unique hydrogeology. However, population growth necessitated the expansion of piped networks connected to the Narmada Canal, leading to over-extraction and aquifer salinity ingress (Sheth & Iyer, 2021; van der Meulen et al., 2023). Despite facing frequent natural disasters and limited national support, Bhuj's residents have demonstrated resilience by independently organising resources, including efforts to revive aquifers (Sheth & Iyer, 2021). However, government approaches focusing on increasing external water supplies underscore governance complexities.

In Bhuj, the *Bhuj Nagar Palika* (Municipal Council) oversees water supply operations but lacks autonomy, adhering to directives from the state capital, Gandhinagar, perpetuating a centralised governance model (Bajpai & Kothari, 2020). Similarly, in Bhopal, the transition of water supply management to the Bhopal Nagar Nigam (Municipal Corporation) is complicated by influence from the state's Public Health Engineering Department (PHED), highlighting centralisation issues (CAG India, 2021).

Amid escalating water challenges and rigid top-down governance structures, hybrid informal water governance arrangements have emerged, providing innovative solutions. In Bhuj, Civil Society Organisations (CSOs) like Homes in the City (HIC) collaborate with municipal authorities on water management initiatives (Bajpai & Kothari, 2020). Although informal, citizen-led efforts in rainwater harvesting, groundwater recharge, and lake rejuvenation receive tacit municipal support. In Bhopal, CSOs improve water access and address water contamination issues, albeit with limited recognition from municipal authorities. The efforts of CSOs in Bhuj are often

thwarted by state directives and partisan agendas, undermining community-led governance (Bajpai & Kothari, 2020).

Despite efforts to empower municipalities through decentralisation, the intended governance model often falls short in practice. Ward Committees, established to enhance citizen engagement, have yet to achieve significant results, underscoring the need for greater financial autonomy and institutional support for effective governance (Bajpai & Kothari, 2020). I, therefore, look into how informality supports formal governance arrangements, making Bhuj and Bhopal compelling case studies for exploring the dynamics of informality within the governance framework of secondary cities.

Why compare case studies?

Comparative case study research offers a nuanced approach to understanding how informality operates within specific contexts. In my research, the extended case-study method does not seek to generalise but to reveal distinct vantage points, showing how informality is practiced similarly or differently across cases. By comparing Bhopal and Bhuj, I engage with a bounded context where informal governance processes and structures become the primary units of analysis. These cases served not merely as examples but as instrumental tools that validate and refine the conceptual framework, helping to sharpen the theoretical lenses.

Conducting fieldwork across two geographically distinct sites—Bhopal and Bhuj—not only provided contrasting knowledge points but also facilitated a critical reframing of each case in light of the other (Marcus & Fischer, 2014). What may have appeared subtle or mundane in one context became a crucial theme when viewed through the lens of the other, revealing the underlying politics of everyday life (Pierides, 2010).

The contrast between Bhopal and Bhuj presented a rich terrain for analysis. Bhuj emerged as a site of more effective practices, showcasing resilience and adaptability in water governance, while Bhopal highlighted systemic shortcomings, exposing the tensions between repair and reparation. These contrasting narratives did not weaken the framework but instead clarified and redefined theoretical understandings. In particular, the identification of negative cases—such as Bhopal's struggles—enabled a rethinking of theory. Rather than being side-lined, these negative experiences enriched the analysis, lending greater theoretical precision and insight (Brecht, 1974; Marion, 2002; Timmermans & Tavory, 2012).

Through comparison, differential patterns began to emerge. These variations offered diverse heuristics and theoretical frames, allowing me to revisit the cases with fresh eyes and, in doing so, to challenge initial assumptions. This process of 'defamiliarisation' (Marion, 2002) or 'alienation' (Brecht, 1974) became a key tool in ethnographic inquiry, helping to decode the meaning-making processes embedded in the everyday politics of informal governance. To guard against biased interpretation, I employed the strategy of 'saturation,' (Marion, 2002; Schmid et al., 2017) postponing analysis and distancing myself from immediate conclusions. This allowed

for a more critical observation of seemingly mundane or insignificant patterns, which, upon further reflection, revealed deeper causal relationships.

Although some ethnographers critique the reductive nature of comparison (Hage, 2005; Marcus, 1995), I argue that this method was particularly effective when investigating grey practices, unspoken meanings, and subconscious motivations. The comparative approach allowed for a layered understanding of informality—one that revealed its complexity, rather than simplifying it.

2.4. Research process: Desk, analytical and action research

My research process was inherently flexible and adaptive, influenced by external factors such as the pandemic, elections, funding delays, and internal challenges like communication and coordination within the research team. Although I delineated three stages—framework development, analytical inquiry, and action research—the process was not linear. Each stage informed the others, resulting in a dynamic, iterative approach that adapted to changing conditions and emerging insights.

2.4.1. Iteratively developing the reparative governance capacities framework

The initial phase of my research centred on developing a conceptual framework to examine and nurture capacities to enable reparation. This process commenced during the COVID-19 lockdown in the Netherlands, when I conducted extensive desk research, drawing upon literature from both the Global North (Bettini et al., 2016; Frick-Trzebitzky, 2017; Hölscher et al., 2019; Koop et al., 2017; Wolfram, 2016) and Global South (Bhan, 2019; Chattaraj, 2019; Funder & Marani, 2015; Haapala et al., 2016; Koshy et al., 2022; Mayaux et al., 2022; Mguni et al., 2022; Nastar et al., 2018; Yasmin et al., 2019). My goal was to develop a framework capable of acknowledging the complexities of informality, particularly in the context of reparative water governance in India. While the initial framework heavily relied on theoretical constructs originating in the Global North, I remained cognisant of the need to adapt —or *'Indianise'*—these concepts to better reflect the socio-political realities of the field.

The initial framework was theoretical and developed in isolation during lockdown. However, following the easing of travel restrictions in August 2021, I began fieldwork in India. This period marked a significant shift in the research process. Exposure to Indian scholarship, mainly through local academic conferences and in-person interviews, introduced me to new terminologies and conceptual frameworks grounded in local understandings of transformation. This research phase underscored the importance of acknowledging historical injustices—particularly those related to colonialism and social stratification. The framework thus evolved to integrate these insights, positioning ethical and respectful transformation as contingent upon addressing these past injustices. Chapter 4 provides a detailed discussion of how this iterative process shaped the final framework.

2.4.2. Analytical exploration with ethnographic techniques: Investigating capacities for repair

The second stage of my research focused on exploring the concept of 'repair' within informal water governance structures in Bhuj and Bhopal. Through an analytical lens, I examined how historical contexts, forms of knowledge, and socio-ecological interactions contributed to mobilising capacities for reparation. My inquiry centred on understanding how the process of repair was enacted, how the capacities required for this process were mobilised through informal governance, and how the socio-historical context shaped these processes.

The decolonial approach I adopted proved crucial in this phase, providing a methodological lens to observe visible actions and underlying motivations. This approach allowed me to recognise that repair cannot be generalised and must be responsive to local histories and contexts. It further highlighted the importance of language and local terminologies, offering nuanced insights into how transformation was understood and operationalised by different communities. These observations informed a critical understanding of the role of capacities in enabling reparation.

2.4.3. Action research: Nurturing transformative capacities

The third and final stage of the research involved action research, which sought to create spaces for nurturing reparative governance capacities. Drawing on (Bradbury et al., 2019), I approached action research as a participatory and collaborative process that integrates reflection and action to address social and environmental challenges. My role as an action researcher was to facilitate the development of 'transformative spaces,' designed to support nurturing governance capacities for water sensitivity.

These transformative spaces were rooted in the Indian logic of engagement, fostering dialogue and mutual learning among stakeholders. Rather than imposing predefined solutions, the aim was to create environments where participants could co-create pathways for change. The decolonial perspective guided the distribution of power within these spaces, ensuring that all voices were heard, and that power was shared equitably. As Thambinathan & Kinsella (2021) argue, decolonial approaches encourage the creation of safe spaces for honest dialogue and critical inquiry, where power dynamics can be re-examined and transformed.

The action research process focused on fostering incremental change, recognising that meaningful transformation requires not only the development of capacities but also shifts in the underlying power structures perpetuating inequities. In these transformative spaces, diverse perspectives could converge to co-create solutions, focusing on nurturing the capacities necessary for sustained improvements in governance arrangements. Section 2.5.2 provides a more detailed explanation of how these spaces were facilitated and the outcomes they produced.

Steps	*What activities did I do?*	*Corresponding Chapter*
Conceptual Framework *(2020-2024)*	Review of relevant literature both pertaining to Global North and South scholarships	Chapter 1 – Introduction, Chapter 4 – On Conceptual Framework
	Development of draft framework before leaving for fieldwork	
	Revision of the Framework after returning from the fieldwork	
	Revision of the Framework after conducting the workshops	
Fieldwork in Bhopal and Bhuj *(2021-2022)*	Knowledge gathering by speaking and observing actors and their practices in governing water, Interviews conducted between 09/2021- 6/2022	Chapter 2, 3 – On Methodology
	Analysis	Chapter 5 – Comparative analysis of Capacities mobilised for reparation
Workshops *(2022-2023)*	Problem framing, Visioning, Pathways repairing, Pathways detailing workshops conducted between February 2022 – March 2023.	Chapter 6 – Adapting Transformative Spaces
	Analysis	Chapter 6 and Intermezzo on Analysis of the workshop results

Table 1: *Overview of research process*

2.5. Data collection and analysis

In this section, I outline the data collection and analysis methods across two distinct research stages: analytical research conducted in the field and action research in a workshop setting.

2.5.1. Analytical research - Qualitative comparative visual ethnography

A. Method

I perceive water governance as a complex interplay of *factual* tenants such as hydrogeological, ecological, and engineered systems, each governed by technical, calculative logic. However, these systems are also supported by socially constructed, *value-laden* knowledge that reflects diverse perspectives and interpreted truths (Easton, 2010). Decision-making processes in water governance often reveal internal colonialism, manifesting in hierarchies and technological hegemonies. This highlights the importance of understanding the deeper structures that drive decisions.

To explore these dynamics, I employed a comparative ethnographic approach, to observe and document water governance practices in action across two case study cities: Bhopal and Bhuj. This causal analysis enabled me to decipher how water governance is performed, under what conditions it succeeds or fails, and the extent to which these practices facilitate reparative transitions.

B. Ethnography

Given the hybrid nature of water governance practices—encompassing both formal and informal elements—I chose ethnography as my method. Ethnography allows for the detailed study of social processes, enabling me to examine individual and collective behaviour in everyday settings (Burawoy, 1998). I conducted 64 semi-structured interviews (32 in Bhopal, 32 in Bhuj) with thick descriptions (Ponterotto, 2006), both visually and textually, and recorded 10 observation notes (7 in Bhopal, 3 in Bhuj). In my ethnographic study, I comprehensively documented the profiles of research participants—both individuals and spaces—using textual descriptions, photographs, and sketches. I triangulated the information by cross-referencing interview data, observations, and photographic narratives, drawing from secondary literature, field notes, and visual documentation to inform my analysis. I also referred to the grey literature I received from the interviewees, which further helped ground my research.

The interviews covered a wide array of stakeholders, including national and state government officials, municipal officers, representatives of NGOs and CSOs, private sector actors, and academicians and residents. This range provided a comprehensive view of each city's water governance ecosystem. The objectives of the interviews were to:

1. Identify the real and formally stated issues actors were addressing.
2. Understand the measures taken and capacities manifested.
3. Assess whether the efforts were reparative or merely reactive.
4. Explore how the actors were situated within the broader water governance system.

Photograph 1: *Interviewing alone and in group.*

The complete interview and observation guide is available in Appendix.

The interview locations were carefully selected to reflect participants' work environments and comfort levels, ranging from formal office settings to more informal spaces, such as areas adjacent to their workplaces, relevant to their professional roles. In response to the pandemic, some interviews were conducted online. This flexible approach encouraged open and reflective dialogue. Participants often began with politically correct, objective responses about their roles and challenges. Still, over time, the conversations delved into more detailed discussions about how they navigated these challenges and redefined their roles and capacities.

Ethnographic narratives provided insight into what actors did and the social milieu in which they operated, constructed, and negotiated. However, I acknowledge that these narratives are subjective and potentially biased, presenting a limited picture that may validate their roles while justifying any wrongdoings. This process revealed their vulnerabilities and guilt. The professional and personal agency of the same actor often presented competing and contradicting profiles. To demystify prevailing phenomena and conditions, I cross-referenced primary ethnographic observations with information from other participants and follow-up observations.

This ethnographic approach also situated water governance practices within their social-ecological spatial dynamics, which serve as a foundation for informal practices (Fairbanks, 2012). Overall, this method elucidated the translations and appropriations of formal mandates and accepted practices at specific places and times, identifying loopholes, fine lines, areas of competition, conflicts, and decline (Peck, 2001).

	Interviewees	*Details*	*Nos.*	*Interview period*
Bhopal Interviews – 32 **Observation Notes - 7**	Local City Government	Bhopal Municipal Corporation (BMC) - Engineers from different seniority, Water tank supervisor Smart City	8	09 – 12/ 2021 02-2022 06 - 2022
	National And State Government	Town and Country Planning Dept. MPUDC	3	
	NGOs and CSOs	World Resources Institute (WRI India), WWF, All India Institute of Local Self-Government (AIILSG), Sambhavna Trust, Bhopal Citizen Forum, Water Aid, Aarambh	7	
	Residents	Local representatives, General male water consumer, General female water consumer, Victims of water contamination	5	
	Educational Institute	School of Planning and Architecture Bhopal	1	
	Private Organisations	Hotel owner, Urban Planning Consultants (KPMG), Private water service providers	5	
	Politicians	MLA, Councillors	3	
Bhuj Interviews – 32 **Observation Notes - 3**	Local City Government –	Bhuj Municipal Council (BNP) - (Engineers from different seniority – Water supply, storm water), Water tank supervisor	6	12-2021 to 1-2022
	National And State Government	Gujarat Water Supply & Sewerage Board (GWSSB), Bhuj Area Development Authority (BHADA)	3	
	NGOs and CSOs	Arid Communities and Technologies (ACT) - Directors and Associates, Homes in the City (HIC), Jalsrot Sneh Samvardhan Samiti (JSSS), Kutch Mahila Vikas Sanghathan (KMVS), Bhujal Jankar, Urban Setu, Principals Association	9	
	Residents	Local champions, Female water consumer,	5	
	Educational Institute	Gujarat Institute of Desert Ecology (GUIDE)	1	
	Private Organisations	Developers + Private water service providers	4	
	Politicians	Mayor, Chairman, Councillors,	4	

Table 2: *Detailed list of interviewees (Fieldwork)*

Visual Ethnography

While ethnography provided clarity and a rich record, it sometimes introduced delays in capturing observations. To overcome this, I incorporated photographic methods, which provided an immediate visual record, allowing for live analysis alongside textual notes. Beyond documenting what was visible, photographic methods helped uncover unconscious behaviours

and conditions shaping governance practices. Verbal justifications for actions were supplemented with photographs, offering insight into non-verbal cues and underlying causalities. Digital photo ethnography enabled me to investigate these dynamics, illustrating emotions and providing visual support for the interviews (Harper, 1987).

Rather than merely collecting graphic data, visual ethnography co-produced narratives with informants based on their positions, claims, and conditions (Collier & Collier, 1986; Harper, 1987; Pink, 2013). This approach focused on seeing, knowing, and representing (Pink, 2013), unmasking distinctive forms of repair in different geographies through informal governance processes and structures.

However, I encountered three dilemmas while mapping informal governance within urban water governance: 1) the difficulty of documenting transient oral narratives, 2) the discrepancies between verbal accounts and observed practices and 3) ethical concerns associated with documenting illicit activities. To address these dilemmas, I coupled ethnographic approaches with photographic methods. I outlined five routines of conducting visual ethnography, applied in the cities of Bhuj and Bhopal, to shed light on how various actors enact informality in addressing the gaps and transforming urban water governance. These routines served as a photographic praxis to critically engage with human and non-human actors in these locales. Through these routines, in Chapter 3, I illustrated how informality results in two types of repairs: reactive and reparative. Reactive repair serves as a temporary measure to restore the status quo. In contrast, reparative repair aims at fostering long-term change, illustrating the dynamic ways in which informality contributes to repairing the intricacies of water governance in India.

This methodology helped to address the three dilemmas. To address the first dilemma of documenting transient oral narratives, visual ethnography became a powerful tool to capture unspoken markers often lost in verbal accounts. Second, I cross-referenced observations with other participants to resolve discrepancies between oral accounts and actions, and the photographic process helped identify overlooked elements. Third, I managed ethical concerns regarding illicit activities by maintaining a level of ‘distance’ (Rose, 1997). Determining the extent of immersion, mainly when covering sensitive topics like illicit water pumps and knowing when to withdraw, was essential. I opted to respect the users’ oral accounts, documenting their approaches through the less conspicuous medium – the smartphone. This approach was validated when local authorities acknowledged their awareness of these illicit measures, resolving my moral dilemma.

Building on these strategies, I employed immersive ethnography, practising ‘being there’ (Roncoli et al., 2009) for three months in each city to situate myself as an insider and gain the trust necessary to reflect on and understand the vulnerabilities and conditions of the actors involved. This method allowed me to delve into the mundane, often overlooked aspects that drive motivations for repair. In tandem with this immersive approach, I used the rear mirror technique (Wamsiedel, 2017), which provided a safe distance from moral dilemmas related

to observing illegal activities. This technique enabled a degree of autonomy and a time lag, allowing me to process the present phenomenon while simultaneously interpreting its broader implications. It also heightened my awareness of unspoken social markers—such as subservience, obedience, fear, pride, and respect—which helped me capture critical moments and their meanings through photographs. These methodological strategies added layers of complexity, but they were essential in navigating the ethical and practical tensions inherent in the research, ultimately enabling a comprehensive understanding of the dynamics at play.

Photographic methods, when incorporated with ethnography, provided a nuanced understanding of these dynamics. Integrating photographs and interview notes enriched the textual analysis, serving as meaningful 'codes' within qualitative coding software like ATLAS.ti. Additionally, as a trained documentary photographer and former photojournalist, I was acutely aware of the ethical implications of my work. Photographs were taken with full consent, using a One Plus 9 mobile camera with a wide-angle lens to minimise participant discomfort. Care was taken to avoid 'photo voyeurism' and 'poverty porn,' and I prioritised consent, halting recordings when necessary and ensuring participants were comfortable with the photographs captured.

This methodological trajectory built trust and peeled back layers of political correctness, revealing the nuanced operations of informality in governance. Through this comparative ethnographic lens, my analysis of Bhuj and Bhopal went beyond cataloguing divergent practices to critically examine each city's governance strategies, contrasting them against one another.

Data analysis

Data analysis occurred in two phases: during fieldwork and afterwards. Ethnography's reflective process guided the analysis, grounded in a conceptual framework initially drawn from Global North secondary literature. This framework provided a loose guide, allowing flexibility for the fieldwork to inform and fine-tune it in line with abductive analysis (Timmermans & Tavory, 2012).

Abductive analysis balances creating new theories and recalibrating old hypotheses, avoiding the rigid fitting of results into predetermined boxes. Despite its iterative nature, abductive analysis narrows theoretical leads, refining the framework to build future resilience by acknowledging past and present phenomena. ATLAS.Ti software was used to code thick textual descriptions and photographs simultaneously.

Using ATLAS.Ti, I analysed patterns and themes in the data, correlating them with different capacity dimensions discussed in Chapter 4, Table 4 and 5. These patterns transcended both cities, demonstrating how reparative efforts took shape in Bhopal and Bhuj. For instance, while Bhuj's efforts were rooted in its water heritage and local pride, Bhopal emphasised report-based and policy-driven knowledge. This contrast highlighted how cultural landscapes influenced reparative efforts.

In summary, the comparative ethnographic approach and digital photo ethnography provided a comprehensive understanding of water governance in Bhuj and Bhopal. This method illuminated the complexities of informal governance processes and structures, offering a rich, nuanced perspective on how these practices operate and evolve within different social and ecological contexts.

In addition, this dissertation includes photo narratives in which I annotate my analysis to convey what I observed at the moment each photo was taken and how these observations deepened my understanding of informality. The choice to display both the original photographs and their annotated versions side by side is intentional, encouraging critical reflection from the reader. This dual presentation invites an exploration of the layering within each image, prompting readers to contemplate the informality at play and assess its potential role in enabling reparative processes.

The research adhered to the Netherlands Code of Conduct for Research Integrity and received approval from the Research Ethics Review Committee of Erasmus University, Rotterdam. All data listing and storage followed guidelines to ensure integrity and accessibility without sharing personal information publicly

2.5.2. Action research – Designing and facilitating workshops

Photograph 2: *Facilitating in a W4C workshop*

Method

W4C program aimed to conduct a series of four workshops, from February 2022 to March 2023, based on Transition Management (TM) steps – system analysis and problem structuring, envisioning, pathways development, experimentation, and monitoring (Nevens et al., 2013). The

initial workshops began shortly after I had completed my fieldwork. In the first two workshops—focused on problem framing and visioning—I participated as a core team member, facilitating and adapting the workshops to align with the program's objectives. During these initial sessions, I observed limitations within transformative spaces that were modelled on Dutch values of collaboration. Over the course of the year, drawing on insights from my fieldwork, relevant literature, and the experience of these initial workshops, I was able to reconceptualise the approach to better reflect themes of informality and reparative transformation. This enabled me to design the subsequent.

This phase required me to trust my research while remaining humble and open to changes shaped by the action research process. My role extended beyond merely developing transformative spaces to actively facilitating them (Photograph 2). I recognised the significance of relational and emotional aspects of learning, essential for genuine transformation (Bradbury et al., 2019). My commitment to critical reflection as an action researcher led me to adapt the transition arena within the TM framework, expanding its scope as a transformative space (Pereira et al., 2020), as explained in Chapter 6. TM aims to shift societal behaviour and structures toward sustainability by fostering collaborative exploration and enabling transformative change (Loorbach, 2010a; Wittmayer & Loorbach, 2016). This approach bridges the gaps between knowledge, action, and policy (Frantzeskaki et al., 2018), adopting a transdisciplinary approach involving researchers, policymakers, citizens, NGOs, and other stakeholders.

We adapted the TM transition arena tool (Loorbach, 2010a), a structured process to create a transformative space for deliberating, envisioning, and strategising systemic change. To broaden the transition arena, we infused it with less structured, experimental techniques in line with a transformative space (Pereira et al., 2020), where participants engage in reflexive and collaborative processes that challenge existing power structures and worldviews. The aim was to foster participants' capacities for social change, encouraging participants to question, rethink, and transform existing practices, norms, and institutions.

Most existing designs for transformative spaces are rooted in sustainability and resilience frameworks developed in Northern Europe (McCrory et al., 2020; Pereira et al., 2020). As a result, facilitation within these spaces often reflects Northern European decision-making cultures, which do not always consider the hierarchical governance structures and the reluctance of Indian actors to openly acknowledge incompetence or the limitations of current practices. This realisation inspired me to adapt the transformative spaces to align with Indian cultural ethics, resulting in the 'Repair' model. This model respects local dynamics and addresses the specific challenges and needs of Indian governance contexts.

I drew upon informal governance structures, particularly deliberative processes within deregulated states, where actors can freely discuss and innovate within feasible means. This approach helped shape transformative spaces that included historically excluded actors, thus fostering repair. These spaces aimed to serve as platforms for mending, improvising, navigating,

dismantling, and providing stability. Transformative spaces informed by the 'repair' logic balance innovation with traditional wisdom, fostering solutions that respect local heritage while addressing inequalities stemming from gender, social hierarchy, religion, and caste politics.

As discussed in Chapter 6, the scholarship on informality enabling repair provided three key parameters for situating transformative spaces within the complex socio-political contexts of the Global South: 1) cultivating confidence to challenge regressive structures, 2) nurturing frugality and creativity, and 3) instilling faith in transition processes. The deregulated context of informality also inspired me to design these spaces as food fairs and classrooms, fostering honest discussions and reflections. These parameters were central to designing transformative spaces and nurturing the capacities detailed in Chapter 6 and the Intermezzo.

As previously discussed, I spearheaded the design of the repair workshops based on Indian collaborative values. The initial workshops on problem framing and envisioning, held in the respective cities, laid the groundwork for the pathway development workshops, which integrated the previously identified visions and challenges to formulate actionable strategies. Reflecting on these two workshops, my focus was on fostering a collaborative working environment. However, public collaboration can exacerbate problems if democratic decision-making cultures are either absent or interpreted differently in these regions. This was particularly relevant given the mixed success of such engagements in the past (Prasad et al., 2023a).

I designed the workshops with an aim to promote accountability, challenge regressive structures, encourage adaptability and creativity, and instil confidence in the transition pathways. The design also addressed implementation barriers related to governance and procedural complexities, which are often overlooked due to habituation. The workshops facilitated open discussions that recognised stakeholders' complex behaviours and the lingering influence of colonial mentalities on decision-making. By modifying the structure and design of the sessions, I aimed to create an environment conducive to meaningful participation. By cycling through discussion-proposal-reflection-discussion, incorporating expert and peer-to-peer exchanges, I sought to normalise reflexivity.

However, facilitating workshops to nurture capacities that enable reparation presented significant dilemmas, particularly in balancing epistemic justice with practical constraints. While it was crucial to include marginalised voices in the workshop, local partners resisted inviting certain individuals, fearing that such associations could jeopardise their relationships with authoritative governmental actors. Concerned about their institutional image and future collaborations, they instead pushed for the inclusion of authoritative actors who were more interested in preserving their status than genuinely engaging in transformative discussions. To navigate this, I negotiated a compromise that allowed each PhD researcher to invite stakeholders of their choice, ensuring a broader representation across domains. This approach not only preserved the inclusion of marginalised voices but also mirrored the socio-political tensions in the field, offering insights into existing governance dynamics. Furthermore, by involving authoritative figures, the workshop

had the potential to influence powerful actors who, if convinced, could become change agents themselves. Despite attempts by some stakeholders to dilute the need for reform, the diverse voices empowered through this process contributed meaningfully to the discourse.

Moreover, not all consortium members were equally committed to transformative processes, and many had divergent goals. Some prioritised institutional sustainability and remained sceptical of co-creation, often pushing for technical solutions perpetuating existing hegemonies. My role, therefore, was to navigate these competing priorities, finding ways to advance technical goals while ensuring they did not obstruct the development of non-technical solutions.

Following the workshops, I conducted follow-up interviews with three experts and four participants who attended the Repairing Pathways workshop. My questions to the experts focused on the nature of the discussions that took place and how the questions were initially framed. I also noted how the questions evolved over time and whether the informal workshop formats—such as the food fair and classroom setting—played a role in shaping these discussions.

With participants, I inquired about what they gained from the workshop, the specific questions they posed, and how the responses they received were beneficial. I explored whether the interactive exchanges helped refine their questions and if they felt they achieved their objectives. Additionally, I asked how they intended to carry forward the insights gained from the workshop.

At no point did I inquire about who spoke to whom, ensuring confidentiality was maintained. My goal was to understand if participants identified governance challenges, felt safe enough to voice these concerns, found the suggestions helpful, and whether they believed the proposed solutions were feasible and actionable thereby nurturing the capacities for reparation.

Interviewees	*Details*	*Nos.*	*Interview period*
Local City Government	Bhopal Municipal Corporation (BMC), Smart city	2	04– 06/ 2023
NGOs and CSOs	**Bhopal** - All India Institute of Local Self-Government (AIILSG) **Bhuj** - Arid Communities and Technologies (ACT) , Homes in the City (HIC)	3	
Experts	Participatory planning, partnerships and governance, modelling and technology	3	

Table 3: *Detailed list of interviewees (Workshop)*

Data Analysis

For data analysis, in addition to workshop outputs like vision statements, Mentimeter surveys, and pathways, I included follow-up interviews, conducted post-workshop. I also considered 'table chatter'—informal conversations during workshops. Using ATLAS.ti, I coded and analysed

the conditions that nurtured capacities, as detailed in the Intermezzo. Similar to the earlier research stages, I identified common themes and patterns, correlating them with the dimensions of capacities (Table 4 and 5 in Chapter 4) to assess which capacities were being nurtured and to what extent. Comparing follow-up interviews with initial fieldwork interviews helped me identify gaps and gauge the development of these capacities.

The data revealed the conditions under which reparative governance capacities could be nurtured and showcased how the presence of authoritative actors or those working on live projects could catalyse further capacity acknowledgement and strengthening. Further, I assessed how capacities were nurtured by comparing workshop outputs and observing how the results were upscaled. I examined actions that led to improvements in reparative capacities, identified hindrances, and explored potential opportunities.

The insights gained from these processes contributed to creating a 'Repair Manual' for situating transformative spaces in Indian contexts. (While the Repair Manual itself is not a part of this thesis, this research has contributed to one of the W4C products, specifically the Repair Manual). This experience also provided valuable insights into improving facilitation, understanding how internal politics within Water4Change influenced stakeholder invitations, and strengthening ties with new and existing stakeholders.

2.5.3. Limitations

In my research on reparative water governance, I engage with knowledge production through a decolonial perspective, which not only shapes the methods of inquiry but also informs the design of fieldwork and action research. This approach prompts a re-examination of whose voices are amplified, whose experiences are marginalised, and challenges hegemonic narratives by prioritising diverse, culturally grounded perspectives in water management practices across Indian cities. However, despite these strengths, the decolonial and participatory approach presents inherent limitations that require continuous reflection and adaptation.

One critical challenge is that this methodology must rigorously interrogate its assumptions, as there is a risk of inadvertently reinforcing the hegemonies it seeks to dismantle. Without such scrutiny, the framework may become powerless or produce limited knowledge under a new guise. This approach is limited by its susceptibility to co-optation, where decolonial language is superficially adopted to reinforce existing power structures rather than dismantle them, leading to tokenistic practices that fail to enact meaningful change (Rai & Campion, 2022).

Participatory methods, though valuable, also introduce complexities. Building trust, fostering inclusivity, and addressing resource constraints can shape the scope and pace of research, often introducing limitations. Despite best efforts, certain marginalised voices—particularly those affected by intersecting oppressions of caste, class, and gender—may remain underrepresented. Wittmayer et al. (2024) highlight that collaborative research often struggles with diverse power

dynamics, complicating the ability to reach consensus on notions of justice and equity. This raises difficult questions: whose vision of justice ultimately prevails?

Another challenge lies in balancing local knowledge with formal governance structures often entrenched in technocratic paradigms. Even when local voices are included, integrating them into these formal systems can be difficult, particularly when they challenge existing norms.

Also, my role within the Indo-Dutch (W4C) research consortium introduces its own set of complexities. Power dynamics within international collaborations can influence how knowledge is co-constructed and whose perspectives are prioritised. Ongoing reflexivity and adaptation are essential to prevent the decolonial framework from becoming complicit in reproducing power imbalances. This constant reassessment ensures that the research does not inadvertently perpetuate the very structures it seeks to challenge.

Navigating the power dynamics between myself as a researcher and the participants, as well as among empowered and less empowered actors, required ongoing reflexivity. Upholding integrity within an action-oriented research framework meant fostering equitable, transformative spaces while consistently reflecting on my positionality and biases. The balance between theoretical insights and participatory practices remained a persistent challenge. In the following section, I discuss my positionality and the institutional context of my Dutch organisation and the Indo-Dutch consortium that facilitated this research.

2.6. Navigating through multiple and dynamic positionalities

As a researcher studying decolonialisation, I recognise the importance of being self-aware and accountable regarding my perspective and the factors that influence my work. Acknowledging my struggles, reactions, and their influence on my research has been a vital reflective exercise, embedding them into the process of scientific inquiry. In the following sections, I aim to critically examine the methodological and positionality-related aspects of my research within the Water4Change programme and my embeddedness in DRIFT. Reflecting on the negotiation between myself and the knowledge that continues to evolve, I analyse and acknowledge the 'self' within the performative research paradigm.

2.6.1. Embeddedness in the Water4Change (W4C) programme

A. Political landscape and situatedness of the partners

The implementation of the W4C programme in Bhuj and Bhopal was facilitated through partnerships with local institutions such as the Maulana Azad National Institute of Technology (MANIT) in Bhopal and the Centre for Environmental Planning and Technology (CEPT) and the Indian Institute of Technology Gandhinagar (IITGn) in Bhuj. These well-established and historically significant institutions engage extensively with central government initiatives and other research programmes. The success of programmes like W4C hinges on these institutions'

ability to collaborate with diverse local stakeholders, including city and state governments, Non-Governmental Organisations (NGOs), private consultants, academics, and residents. Such partnerships are mutually beneficial, providing the institutions with practical project experience and opportunities to apply and test theoretical constructs while practitioners benefit from academic data sets and frameworks.

However, the assumption that these institutions can maintain a strictly non-partisan stance is idealistic. In the Indian context, the survival and continued relevance of educational institutions often depend heavily on their relational ties with authoritative bodies, such as municipal governments and funding organisations. These connections are vital for access to local data and project opportunities as well as for securing funding, extending project timelines, and maintaining institutional support. Any strain in these relationships can threaten the sustainability of both ongoing projects and future collaborations. This added layer of political entanglement necessitates a more formal ethical approach to academic practice. The challenge lies in how to critically assess and engage with feedback from local stakeholders through these institutional collaborations.

B. Navigating political sensitivities in fieldwork and workshops

Throughout my fieldwork and the facilitation of workshops, I remained acutely aware of the political situatedness of the universities involved and the influence of the Indian funders. This awareness impacted how I represented the programme. While I aimed to present authentic narratives from my research sites, I had to carefully navigate the political pressures exerted by both Dutch and Indian institutions. Often, institutions and organisations dismiss certain knowledge due to its perceived triviality within the domains of urban planning and technology and also because it touches upon politically sensitive areas that could jeopardise the institution's standing. My affiliation with a Dutch institution provided me with a level of autonomy that allowed me to navigate these barriers and strive for a more accurate representation of ground realities, relatively free from Indian institutional influence.

My embeddedness in the W4C programme required a nuanced understanding of the political landscape and the dynamics between various stakeholders. This understanding was crucial for conducting ethnographic research that remained sensitive to the intricacies of institutional and political contexts while striving to present an unvarnished depiction of the issues at hand.

2.6.2. Situatedness in a Dutch organisation

As an Indian researcher recruited by the Dutch Research Institute for Transitions (DRIFT), my academic journey has been shaped by the institution's ethos and the diverse supervision I received from a Dutch promoter and two supervisors—one Dutch and one German. DRIFT is recognised for its expertise in transition management, combining research, consultancy, and training while maintaining a strong organisational identity. At the same time, its activist stance and critical self-awareness foster a genuine openness to diverse worldviews. This transparent

articulation of its positionality allowed me to align with DRIFT's mission while also broadening Dutch discourses on transformation by introducing perspectives from the Global South.

My affiliation with DRIFT and Erasmus University Rotterdam granted me invaluable exposure to Dutch academic politics and the opportunity to apply theoretical insights in practical settings. Coming from a practitioner background, this experience was particularly enriching. In the Dutch context, I observed a marked willingness to address internal discrepancies and engage in critique—a stark contrast to the Indian context, where criticism can often threaten professional relationships or careers, thus discouraging transformative change. The Dutch's direct communication style and egalitarian culture trained me to embrace constructive criticism, an approach I had to adapt to after working within the hierarchical structures of India. This shift expanded my capacity for critique and enhanced my ability to navigate the complexities of decision-making structures in both Dutch and Indian contexts, helping me to convey difficult learnings with tact and diplomacy.

Through the cross-cultural supervision of my Dutch and German supervisors, I was encouraged to identify blind spots in my understanding of transformation while critically engaging with Indian perspectives. This reflective process led me to interrogate normative discourses surrounding transformation, especially in Western contexts, and to examine how such ideas are often misapplied or misunderstood in the Global South. For example, 'transformation' in India is frequently conflated with optimisation or mere implementation, revealing the need for a more nuanced and engaged approach to transformative concepts. This insight illuminated the broader challenges of transferring knowledge from Dutch frameworks to Indian contexts, where local conditions necessitate adaptation rather than the uncritical adoption of foreign models.

As my research progressed, I became increasingly aware of the replication of colonial practices and their manifestation in Bhuj and Bhopal. The commitment of my Dutch and German supervisors to recognise historical injustices inspired me to develop a framework centred on restorative justice. However, maintaining my focus on informality and repair required perseverance, particularly in the face of European scholars who often regarded my work as an exotic anomaly. Informality was frequently dismissed as a phenomenon confined to countries like India, with suggestions that I should simply adopt Northern frameworks. Convincing my supervisory committee and the broader academic community that informality is a global phenomenon, and that my work aimed to decolonise transformative processes rather than merely appropriate Northern models, demanded sustained effort. This journey required a critical and systematic examination of how coloniality is embedded in transformative governance frameworks, which are often rooted in climate mitigation paradigms that inadequately account for the demands of climate adaptation. Extensive literature reviews and carefully curated citations became essential in demonstrating that informality is neither a simplistic, binary construct nor a transitional governance arrangement with solely biased outcomes. Instead, I argued for recognising informality as a dynamic, adaptive mechanism with significant potential

to foster resilience and equity, necessitating a reframing within transformative governance to acknowledge its pluralistic capacities and global relevance.

2.6.3. My position in the field

Engaging in ethnography required strategies to manage power dynamics enacted by the actors. It became imperative to disclose my critical positioning within these power structures, as they influenced my positionality and situatedness (McDowell, 1992). I acknowledge the production of subjectivity in gathering knowledge. My Indian nationality contributed to my acceptance and familiarity with the Indian case study sites. My background as an urban practitioner, knowledge of Indian governance processes, and association with a partnering Indian research institute enabled me to ground the knowledge generated and establish my position (Rose, 1997). The knowledge gathered is therefore not universal, nor does it endorse generalisability. My positionality helped to situate the value-laden, embedded, historically specific knowledge demonstrated by actors in the field (Haraway, 1988). The textual and visual ethnographic notes are conceived from the perspective of the on-field researcher—me.

The decolonial lens allowed me to recognise the multiple truths and realities within different cultural contexts. It also provided a foundation for acknowledging the historical and cultural specificities that influence knowledge production. Additionally, it aided me to recognise that our understanding of these truths is mediated through social and cultural lenses. This dual approach enabled me to navigate the complexities of the field with a nuanced understanding of both the subjective experiences of the actors and the underlying structures that shape these experiences.

Although I am Indian, coming from the metropolitan city of Mumbai presented a different cosmos compared to the two secondary cities. By adopting a naïve outsider persona, speaking Hindi with a Mumbai accent peppered with English words, and occasionally mispronouncing local phrases, I was perceived as relatable enough to bridge some distance between myself and the community. Yet, I remained sufficiently 'outsider'—not entirely of the locale—which created a subtle distance that allowed people to feel comfortable sharing stories without concern for divulging guarded secrets. I documented open secrets (Wamsiedel, 2017), highlighting discrepancies between what was said and what was practised. Conversely, my Dutch privilege, reflected by staying in a hotel and carrying a water bottle with purified water, added to the power differences (Moss, 1995). These distances were negotiated through shared experiences, making it an exchange rather than simply asking questions. The interviews focused on respondents' motivations, vulnerabilities, points of view, and agency rather than technology and planning. This inquiry was rare for many respondents, as the questions prompted personal reflections. The interviews became a space for respondents to open up about personal dilemmas.

As a researcher, I did not shy away from showcasing anxieties about being in an unfamiliar place. Humble body language and respect for the subject's authority in the room played a key role in establishing power dynamics early on. Interviewing government officials involved frequent pauses and interruptions, which reflected the power hierarchies in play. These moments were

valuable opportunities to observe how the interviewee interacted with subordinates or how they themselves were treated by others. I paid close attention to what was discussed during these moments and the tasks that were undertaken. Power asymmetries were also evident when interviewing more than one respondent at a time. Furthermore, the 'waiting game' allowed me to build trust with respondents. As a lone woman waiting in an uncomfortable waiting room, I sometimes evoked pity from male respondents. Being an Indian woman in India was, for some, seen as a position of powerlessness, which encouraged people to believe that my presence would not significantly disrupt their everyday negotiations.

The nature of these conversations was not one-sided; I shared my experiences of facilitation in India and abroad. This exchange created a comfortable space for the respondents to discuss their vulnerabilities, particularly female respondents, who often found it easier to relate to me. However, I want to clarify that while this research was conducted ethically, it does not necessarily guarantee an objective truth. The work presents situated narratives from multiple vantage points. As a critical realist, I value these varied perspectives and seek to follow up on and verify different stances and pieces of information. I am fully aware of my non-objective position and its influence on the research process. My association with a live project led some subjects to view me with hope, entrusting me with personal confessions. As a field researcher, while uncovering the subjectivities of those on-site, the interaction between the researcher and the researched shaped the case study. Rather than dismissing this as a non-objective study, I consider it an opportunity to highlight the specificities and complexities of the research site.

2.6.4. My position in the workshop

Once again, my unique position as an Indian national working within a Dutch context offered a valuable perspective on the challenges inherent in implementing an ontological shift in India. My previous work experiences facilitating workshops in both India and the Netherlands gave me first-hand insight into how people engage in these platforms—how vocal they are, what encourages or discourages participation, the procedures for inviting participants, and their overall level of enthusiasm. I observed how these engagement styles were either similar or different across the two contexts.

Instead of criticising the differences in engagement styles—such as being less vocal in public spaces—I viewed the Indian ways of engagement (which were often male-dominated, hierarchical, and centred around professional seniority) as characteristics to navigate rather than hierarchies to challenge. This perspective aligns with decolonial methodologies, which recognise the value of local knowledge systems and practices without imposing external standards or judgments. This approach was essential in designing contextually appropriate workshops.

In addition to my role in workshop design, I actively worked to bridge the gap between Indian and Dutch sensibilities regarding engagement platforms, embodying the core principles of knowledge brokering within action research. My primary responsibility was to delve into the

intricate dynamics of transformative spaces, closely aligning with participatory Action Research (AR) principles.

As demonstrated in my work, a key feature of action research was a steadfast commitment to reflexivity and adaptability. Discrepancies between what participants shared in the field and what was openly discussed in the initial workshop highlighted a discomfort with addressing governance challenges in this formal setting, suggesting a misalignment with the transformative space's intended goals. This prompted a critical revaluation of the workshop's design to better suit Indian perspectives. Inspired by this reflection, I considered more informal and accessible settings, such as 'bazaar-like' (market-like) or food fair / *'chai-tapri'* (tea stall) environments, or even school classroom-like spaces where people could feel comfortable and unjudged while engaging, rather than the formal, Western-inspired, international-feeling luxurious environments that had previously been employed.

Another area requiring caution was the political situatedness of Indian institutions and its impact on whom to invite—and whom to exclude. Local institutions, aiming to maintain their standing, would often invite authoritative figures who were resistant to endorsing transformative change, frequently downplaying the urgency or scale of the challenges to protect their authority and preserve the status quo. Given that the Government of India funded our initiative, our starting point was inherently non-neutral, making the inclusion of change-resistant figures a potential obstacle to our transformative objectives. However, a decolonial sensitivity helped me empathise with local partners' need to involve these authoritative figures to strengthen their relationships within the intricate political landscape. My positionality allowed me to negotiate these ethics while respecting local politics and cultures.

Furthermore, my multifaceted role extended beyond engagements at the city level to collaboration and meaningful knowledge brokering between both technological and social science components within the consortium. My interdisciplinary background — as an architect, urban designer, photojournalist, water management expert, and transition manager — enabled me to draw on insights from a wide range of disciplines and perspectives, enriching the team's understanding. This interdisciplinary lens, however, also introduced a potential bias: my approach was not heavily engineering-focused, reflecting a degree of scepticism toward purely technical solutions. Yet, in a context where there was a consistent preference for technological solutions that frequently overlooked governance challenges, this bias served as a counterbalance, encouraging a broader dialogue on social and governance dimensions. This tendency to prioritise technology over governance considerations echoed India's post-independence phase, where technological advancement was often elevated above governance reform. Here, the design of informal engagement platforms, rooted in my experiences with workshops that had previously fallen short, enabled me to create 'bazaar'- and classroom-like spaces which were 'safe enough' (Pereira et al., 2015a) while engaging (as discussed in Chapter 6 and Intermezzo).

One of the most significant challenges was reconciling the terminology of 'repair' with Indian institutions, as opposed to the Dutch' transition management'. While the Indian side was eager to apply 'international' methodologies to their local problems, they often trivialised their local approaches. Additionally, there was concern that the term "repair" implied something was broken or malfunctioning, which some perceived as a threat to the status of their established local methods. To navigate this tension, I leveraged Dutch networks to support an 'Indian' idea, effectively transforming it into a 'buzzword' rather than advocating directly for Dutch methodologies. This situation underscored a pattern of internal colonisation within Indian methodologies, wherein external validation became essential for the acceptance of local ideas. It highlighted the value of a hybrid identity to manage complex interactions and bridge the gaps between competing perspectives.

In conclusion, navigating this role through my hybrid identity—as an Indian and Dutch researcher, water user, citizen, photographer, and urban planner—enabled me to recalibrate situated knowledge and agency across the diverse fields encountered in this research. This process was inherently performative, involving ongoing cycles of reflection, adaptation, and knowledge creation. The knowledge produced was not static; it was continuously questioned, reshaped, and enriched, blending scientific insights with experiential understanding. This dynamic synthesis of both conscious and subconscious insights, gathered during and even prior to the program, underscores the power of lived experience in complementing scholarly knowledge and adapting methodologies to complex, culturally varied contexts.

References

Bajpai, S., & Kothari, A. (2020). Towards decentralised urban governance: the case of Bhuj city, Kachchh (India). *Kalpavriksh. Pune*.

Barreiros, I. B., & Moreira, J. K. (2019). 'To decolonize is to perform': The Theory-in-Praxis of Grada Kilomba. In M. Rendeiro & F. Lupati (Eds.), *Challenging Memories and Rebuilding Identities* (pp. 56–81). Routledge.

Bettini, Y., Rijke, J., Farrelly, M., & Brown, R. (2016). Connecting levels and disciplines: Connective capacity of institutions and actors explored. In *Water Governance as Connective Capacity* (pp. 129–149). https://doi.org/10.4324/9781315547626-7

Bhan, G. (2019). Notes on a Southern urban practice. *Environment and Urbanization*, *31*(2), 639–654. https://doi.org/10.1177/0956247818815792

Biswas, A. K., & Kris, H. (2013). Why India's Secondary Cities Are the Future. *UBM‟s Future Cities, The Global Community for 21st Century City Decision Makers, Thursday*.

Boehmer, E. (1995). *Colonial and Postcolonial Literature*. Oxford UP.

Bradbury, H., Waddell, S., O'Brien, K., Apgar, M., Teehankee, B., & Fazey, I. (2019). A call to action research for transformations: The times demand it. In *Action Research* (Vol. 17, Issue 1, pp. 3–10). SAGE Publications Sage UK: London, England.

Brecht, B. (1974). Brecht on Theatre: The Development of an Aesthetic, ed., and trans. *John Willett (New York: Hill and Wang, 1964)*.

Burawoy, M. (1998). The extended case method. *Sociological Theory*, *16*(1), 4–33.

Burvey, M., Mani, N., Singh, D., Katyal, S., Singh, B. K., Pandey, K., & Singh, V. (2017). Children Focused City Resilience Strategic Directions for Bhopal. *Gorakhpur Environmental Action Group, Supported by United Nations Children's Fund, New Delhi, India*.

CAG India. (2021). *General and social sectors for the year ended 31 March 2019, Government of Madhya Pradesh. Report 3 of the year 2019*. https://saiindia.gov.in/ag2/madhya-pradesh/en/audit-report/details/115252

Chattaraj, S. (2019). Informality and state 'jugaad': How urban governance works in Mumbai. In *Working Papers*. https://www.academia.edu/36781819/Informality_and_State_Jugaad_How_Urban_Governance_Worksin_Mumbai

Cities Alliance. (2019). *Connecting systems of secondary cities.* Cities Alliance/UNOPS Brussels.

Clark, W. C., & Dickson, N. M. (2003). Sustainability science: the emerging research program. *Proceedings of the National Academy of Sciences*, *100*(14), 8059–8061.

Collier, J., & Collier, M. (1986). *Visual anthropology: Photography as a research method*. UNM Press.

Datta, R. (2018). Decolonizing both researcher and research and its effectiveness in Indigenous research. *Research Ethics*, *14*(2), 1–24.

D'Souza, R. (2002). Colonialism, Capitalism and Nature: Debating the Origins of Mahanadi Delta's Hydraulic Crisis (1803-1928). *Economic and Political Weekly*, 1261–1272.

D'Souza, R. (2006). Water in British India: the making of a 'colonial hydrology.' *History Compass*, *4*(4), 621–628.

DTCP Madhya Pradesh. (2020). *Bhopal Development Plan-2031 (Draft) Volume-I, Existing conditions, studies & analysis*.

Easton, G. (2010). Critical realism in case study research. *Industrial Marketing Management*, *39*(1), 118–128. https://doi.org/https://doi.org/10.1016/j.indmarman.2008.06.004

Escobar, A. (2015). Degrowth, postdevelopment, and transitions: a preliminary conversation. *Sustainability Science*, *10*(3), 451–462. https://doi.org/10.1007/s11625-015-0297-5

Everard, M., Ahmed, S., Gagnon, A. S., Kumar, P., Thomas, T., Sinha, S., Dixon, H., & Sarkar, S. (2020). Can nature-based solutions contribute to water security in Bhopal? *Science of The Total Environment*, *723*, 138061. https://doi.org/10.1016/J.SCITOTENV.2020.138061

Fairbanks, R. P. (2012). On Theory and Method: Critical Ethnographic Approaches to Urban Regulatory Restructuring. *Urban Geography*, *33*(4), 545–565. https://doi.org/10.2747/0272-3638.33.4.545

Frantzeskaki, N., Hölscher, K., Wittmayer, J. M., Avelino, F., & Bach, M. (2018). Transition Management in and for Cities: Introducing a New Governance Approach to Address Urban Challenges. In N. Frantzeskaki, K. Hölscher, M. Bach, & F. Avelino (Eds.), *Co-creating Sustainable Urban Futures: A Primer on Applying Transition Management in Cities, Future City* (Vol 11, pp. 1–40). Springer International Publishing. https://doi.org/10.1007/978-3-319-69273-9_1

Frick-Trzebitzky, F. (2017). Crafting adaptive capacity: Institutional bricolage in adaptation to urban flooding in greater Accra. *Water Alternatives*, *10*(2), 625–647.

Funder, M., & Marani, M. (2015). Local bureaucrats as bricoleurs. The everyday implementation practices of county environment officers in rural Kenya. *International Journal of the Commons*, *9*(1), 87–106. https://doi.org/10.18352/ijc.526

Gandy, M. (2006). The bacteriological city and its discontents. *Historical Geography*, *34*(6), 14–25.

Ghosh, B., Ramos-Mejía, M., Machado, R. C., Yuana, S. L., & Schiller, K. (2021). Decolonising transitions in the Global South: Towards more epistemic diversity in transitions research. *Environmental Innovation and Societal Transitions*, *41*, 106–109. https://doi.org/https://doi.org/10.1016/j.eist.2021.10.029

Gillard, R., Gouldson, A., Paavola, J., & Van Alstine, J. (2016). Transformational responses to climate change: beyond a systems perspective of social change in mitigation and adaptation. *Wiley Interdisciplinary Reviews: Climate Change*, *7*(2), 251–265.

Haapala, J., Rautanen, S. L., White, P., Keskinen, M., & Varis, O. (2016). Facilitating bricolage through more organic institutional designs? The case of water users' associations in rural Nepal. *International Journal of the Commons*, *10*(2), 1172–1201. https://doi.org/10.18352/ijc.688

Häberli, A., & Toogood, C. (2009). *Analysis of chemical contaminants in groundwater and assessment of the qualitative and quantitative drinking water supply situation in the communities surrounding Union Carbide India Ltd. (UCIL) plant site in Bhopal*.

Hage, G. (2005). A not so multi-sited ethnography of a not so imagined community. *Anthropological Theory*, *5*(4), 463–475. https://doi.org/10.1177/1463499605059232

Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies*, *14*(3), 575–599. https://doi.org/10.2307/3178066

Harper, D. (1987). The visual ethnographic narrative. *Visual Anthropology*, *1*(1), 1–19.

Hölscher, K., Frantzeskaki, N., McPhearson, T., & Loorbach, D. (2019). Tales of transforming cities: Transformative climate governance capacities in New York City, US and Rotterdam, Netherlands. *Journal of Environmental Management*, *231*, 843–857.

Horlings, L. G., Nieto-Romero, M., Pisters, S., & Soini, K. (2020). Operationalising transformative sustainability science through place-based research: the role of researchers. *Sustainability Science*, *15*, 467–484.

Jacob, N. (2019). Local Governance and Participative Water Management in Urban Contexts. In G. Chadha & A. B. Pandya (Eds.), *Water Governance and Management in India. Issues and Perspectives. Volume 1* (pp. 137–167). Springer.

Jha, G., & Vaidya, C. (2011). Role of urban local bodies in service provision and urban economic development: Issues in strengthening their institutional capabilities. *Nagarlok*, *43*(3), 1–38.

Johnson, S., Sahu, R., Jadon, N., & Duca, M. C. (2009). *Contamination of soil and water inside and outside the Union Carbide India Limited, Bhopal*.

Kaika, M. (2004). *City of flows: Modernity, nature, and the city*. Routledge.

Kalwar, S., Memon, I. A., & Qureshi, S. (2020). Significance of national spatial planning for economic development of secondary cities in India: Critical analysis of JNNURM programme. *Sukkur IBA Journal of Computing and Mathematical Sciences*, *4*(2), 49–60.

Kalwar, S., Sahito, N., Memon, I. A., Hwang, J., Mangi, M. Y., & Lashari, Z. A. (2019). National planning strategies for agro-based industrial development in secondary cities of Sindh province, Pakistan. *Sustainability*, *11*(24), 7066.

Kamat, R. (2019). URBAN FLOOD VULNERABILITY ASSESSMENT OF BHOPAL, MP, INDIA. *International Journal of Civil Engineers and Technology*, *10*(01), 2956–2977.

Koop, S. H. A., Koetsier, L., Doornhof, A., Reinstra, O., Van Leeuwen, C. J., Brouwer, S., Dieperink, C., & Driessen, P. P. J. (2017). Assessing the Governance Capacity of Cities to Address Challenges of Water, Waste, and Climate Change. *Water Resources Management*, *31*(11), 3427–3443. https://doi.org/10.1007/s11269-017-1677-7

Koshy, M., Aranya, R., & Refstie, H. (2022). Handling Compounded Uncertainty in Spatial Planning and Humanitarian Action in Unexpected Floods in Wayanad, Kerala: Towards a Contextualised Contingency Planning Approach. *Planning Theory & Practice*, *23*(5), 703–723. https://doi.org/10.1080/14649357.2022.2143548

Liu, J., Dietz, T., Carpenter, S. R., Alberti, M., Folke, C., Moran, E., Pell, A. N., Deadman, P., Kratz, T., & Lubchenco, J. (2007). Complexity of coupled human and natural systems. *Science*, *317*(5844), 1513–1516.

Loorbach, D. (2010). Transition management for sustainable development: A prescriptive, complexity-based governance framework. *Governance*, *23*(1), 161–183. https://doi.org/10.1111/j.1468-0491.2009.01471.x

Marais, L., & Cloete, J. (2017). The role of secondary cities in managing urbanisation in South Africa. *Development Southern Africa*, *34*(2), 182–195.

Marcus, G. E. (1995). Ethnography in/of the world system: The emergence of multi-sited ethnography. *Annual Review of Anthropology*, *24*(1), 95–117.

Marcus, G. E., & Fischer, M. M. J. (2014). *Anthropology as cultural critique: An experimental moment in the human sciences*. University of Chicago press.

Marion, J.-L. (2002). *In excess: Studies of saturated phenomena*. Fordham University Press.

Mayaux, P.-L., Dajani, M., Cleaver, F., Naouri, M., Kuper, M., & Hartani, T. (2022). Explaining societal change through bricolage: Transformations in regimes of water governance. *Environment and Planning E: Nature and Space*, *6*(4), 2654–2677. https://doi.org/10.1177/25148486221143666

McCrory, G., Schäpke, N., Holmén, J., & Holmberg, J. (2020). Sustainability-oriented labs in real-world contexts: An exploratory review. *Journal of Cleaner Production*, *277*, 123202.

McDowell, L. (1992). Doing Gender: Feminism, Feminists and Research Methods in Human Geography. *Transactions of the Institute of British Geographers*, *17*(4), 399–416. https://doi.org/10.2307/622707

Mesle, C. R. (2008). *Process-relational philosophy: an introduction to Alfred North Whitehead*. Templeton Foundation Press.

Mguni, P., Abrams, A., Herslund, L. B., Carden, K., Fell, J., Armitage, N., & Dollie, A. (2022). Towards water resilience through Nature-based Solutions in the Global South? Scoping the prevailing conditions for Water Sensitive Design in Cape Town and Johannesburg. *Environmental Science & Policy*, *136*, 147–156. https://doi.org/https://doi.org/10.1016/j.envsci.2022.05.020

Moss, P. (1995). Reflections on the 'gap' as part of the politics of research design. *Antipode*, *27*(1), 82–90. https://doi.org/https://doi.org/10.1111/j.1467-8330.1995.tb00264.x

Nastar, M., Abbas, S., Aponte Rivero, C., Jenkins, S., & Kooy, M. (2018). The emancipatory promise of participatory water governance for the urban poor: Reflections on the transition management approach in the cities of Dodowa, Ghana and Arusha, Tanzania. *African Studies*, *77*(4), 504–525. https://doi.org/10.1080/00020184.2018.1459287

Nevens, F., Frantzeskaki, N., Gorissen, L., & Loorbach, D. (2013). Urban Transition Labs: co-creating transformative action for sustainable cities. *Journal of Cleaner Production*, *50*, 111–122. https://doi.org/https://doi.org/10.1016/j.jclepro.2012.12.001

Pani, S., Dubey, A., & Khan, M. R. (2014). Decadal variation in microflora and fauna in 10 water bodies of Bhopal, Madhya Pradesh. *Current World Environment*, *9*(1), 137.

Peck, J. (2001). *Workfare states*. Guilford Press.

Pereira, L., Frantzeskaki, N., Hebinck, A., Charli-Joseph, L., Drimie, S., Dyer, M., Eakin, H., Galafassi, D., Karpouzoglou, T., Marshall, F., Moore, M.-L., Olsson, P., Siqueiros-García, J. M., van Zwanenberg, P., & Vervoort, J. M. (2020). Transformative spaces in the making: key lessons from nine cases in the Global South. *Sustainability Science*, *15*(1), 161–178. https://doi.org/10.1007/s11625-019-00749-x

Pereira, L., Karpouzoglou, T., Doshi, S., & Frantzeskaki, N. (2015). Organising a safe space for navigating social-ecological transformations to sustainability. *International Journal of Environmental Research and Public Health*, *12*(6), 6027–6044. https://doi.org/10.3390/ijerph120606027

Pierides, D. (2010). Multi-sited ethnography and the field of educational research. *Critical Studies in Education*, *51*(2), 179–195. https://doi.org/10.1080/17508481003731059

Pink, S. (2013). *Doing visual ethnography* (Third). Sage.

Ponterotto, J. G. (2006). Brief note on the origins, evolution, and meaning of the qualitative research concept thick description. *The Qualitative Report*, *11*(3), 538–549.

Prasad, D., Alizadeh, T., & Dowling, R. (2023). Smart city planning and the challenges of informality in India. *Dialogues in Human Geography*, 20438206231156656. https://doi.org/10.1177/20438206231156655

Rai, R., & Campion, K. (2022). Decoding “decoloniality” in the academy: tensions and challenges in “decolonising” as a “new” language and praxis in British history and geography. *Ethnic and Racial Studies*, *45*(16), 478–500. https://doi.org/10.1080/01419870.2022.2099750

Roncoli, C., Crane, T., & Orlove, B. (2009). Fielding climate change in cultural anthropology. In S. Crate & M. Nuttall (Eds.), *Anthropology and Climate Change: From Encounters to Actions* (pp. 87–115). Left Coast Press.

Rondinelli, D. A. (1983). Secondary cities in developing countries: Policies for diffusing urbanization. *Sage*.

Rose, G. (1997). Situating knowledges: positionality, reflexivities and other tactics. *Progress in Human Geography*, *21*(3), 305–320.

Samuel, C. A., & Ortiz, D. L. (2021). “Method and meaning”: Storytelling as decolonial praxis in the psychology of racialized peoples. *New Ideas in Psychology*, *62*, 100868. https://doi.org/https://doi.org/10.1016/j.newideapsych.2021.100868

Schmid, C., Karaman, O., Hanakata, N. C., Kallenberger, P., Kockelkorn, A., Sawyer, L., Streule, M., & Wong, K. P. (2017). Towards a new vocabulary of urbanisation processes: A comparative approach. *Urban Studies*, *55*(1), 19–52. https://doi.org/10.1177/0042098017739750

Sheth, D., & Iyer, M. (2021). Local water resource management through stakeholder participation: case study, arid region, India. *Water Practice and Technology*, *16*(2), 333–343.

Sinclair, R. (2003). *Indigenous research in social work: The challenge of operationalizing worldview.*

Smith, L. T. (2021). *Decolonizing methodologies: Research and indigenous peoples* (Third Edit). Zed Books Ltd.

Thambinathan, V., & Kinsella, E. A. (2021). Decolonizing Methodologies in Qualitative Research: Creating Spaces for Transformative Praxis. *International Journal of Qualitative Methods*, *20*, 16094069211014766. https://doi.org/10.1177/16094069211014766

Timmermans, S., & Tavory, I. (2012). Theory construction in qualitative research: From grounded theory to abductive analysis. *Sociological Theory*, *30*(3), 167–186.

Tinsley, M. (2021). Towards a Postcolonial Critical Realism. *Critical Sociology*, *48*(2), 235–250. https://doi.org/10.1177/08969205211003962

UN-Habitat. (1996). *The management of secondary cities in southeast Asia*.

van der Meulen, G. J. M., Mishra, G., van Dorst, M. J., Iyer, M., & Bacchin, T. K. (2023). Reviewing Historic Urban Water Transitions to Advance Water-Sensitive Urban Design for Bhuj, India. In *Land* (Vol. 12, Issue 10). https://doi.org/10.3390/land12101938

Wadwekar, M., & Pandey, R. (2021). Assessing Groundwater Recharge Potential Through Rainwater Harvesting in Urban Environment: A Case of Bhopal City. *Water Management and Water Governance: Hydrological Modeling*, 463–479.

Wamsiedel, M. (2017). *Approaching Informality: Rear-Mirror Methodology and Ethnographic Inquiry BT - The Informal Economy in Global Perspective: Varieties of Governance* (A. Polese, C. C. Williams, I. A. Horodnic, & P. Bejakovic, Eds.; pp. 97–115). Springer International Publishing. https://doi.org/10.1007/978-3-319-40931-3_6

West, S., Haider, L. J., Stålhammar, S., & Woroniecki, S. (2020). A relational turn for sustainability science? Relational thinking, leverage points and transformations. *Ecosystems and People*, *16*(1), 304–325. https://doi.org/10.1080/26395916.2020.1814417

Wittmayer, J. M., Huang, Y.-S. (Elaine), Bogner, K., Boyle, E., Hölscher, K., von Wirth, T., Boumans, T., Garst, J., Hendlin, Y. H., Lavanga, M., Loorbach, D., Mungekar, N., Tshangela, M., Vandekerckhove, P., & Vasques, A. (2024). Neither right nor wrong? Ethics of collaboration in transformative research for sustainable futures. *Humanities and Social Sciences Communications*, *11*(1), 677. https://doi.org/10.1057/s41599-024-03178-z

Wittmayer, J. M., & Loorbach, D. (2016). Governing transitions in cities: Fostering alternative ideas, practices, and social relations through transition management. *Governance of Urban Sustainability Transitions: European and Asian Experiences*, 13–32.

Wolfram, M. (2016). Conceptualizing urban transformative capacity: A framework for research and policy. *Cities*, *51*, 121–130. https://doi.org/10.1016/j.cities.2015.11.011

Yasmin, T., Farrelly, M., & Rogers, B. C. (2019). Adaptive governance: a catalyst for advancing sustainable urban transformation in the global South. *International Journal of Water Resources Development*, *00*(00), 1–21. https://doi.org/10.1080/07900627.2019.1611548

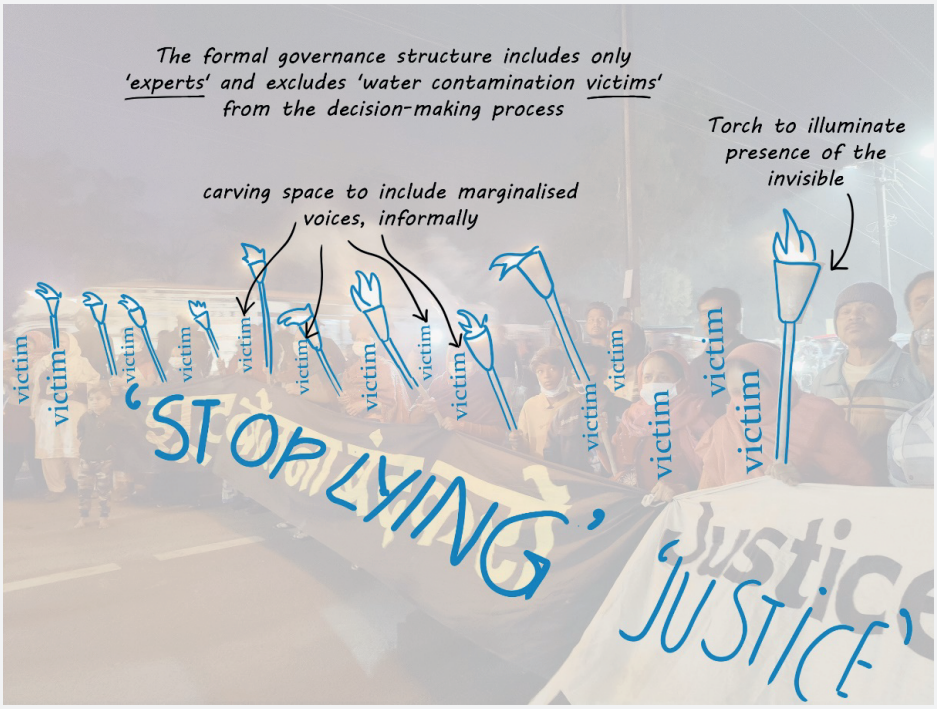
3

Visualising informal repair: Exploring photographic ‘routines’ in ethnographic methodology

Photo Narrative 5: Silent flames: A protest against the poisoning of bodies

Formal participatory platforms, though meant to be inclusive, often become performative, with water management experts dominating while sidelining the lived experiences of users. Their stories are shared not to inform decisions but to meet participation quotas, pushing people to carve out their own, informal spaces for justice.

During my stay in Bhopal, the silence surrounding water contamination became impossible to overlook. Despite the severe health impacts of contaminated water, formal discussions in the city rarely touched on the subject. Only when I stepped outside official spaces and visited an NGO working with victims of water contamination did the gravity of the situation become apparent. The aquifer was poisoned by Persistent Organic Pollutants (PoPs) leaked from the Union Carbide pesticide plant, a legacy of the Bhopal Gas Tragedy. The contamination was quietly spreading, its effects irreversible—especially on the bodies of women. Nevertheless, this catastrophic reality had been rendered invisible by those in power, who trivialised the issue, dismissing it as a problem affecting only a small area. The reluctance to address the contamination stemmed from a fear of accountability.



Investigating further would compel the state to recognise the disaster for what it truly was, bringing the weight of responsibility crashing down on those who had failed to act. As a result, the affected communities were left to bear the burden alone. Every year, leading up to December 3rd—the anniversary of the Bhopal Gas Tragedy—these women take to the streets in a solemn march, carrying torches through the cold night, a quiet demand for justice from a system that has long abandoned them.

I captured one such march in a photograph—a line of women, torches held high, their faces impassive as they move through the streets. The glow of the torches reflected off their worn expressions, as though the fire they carried was not only a symbol of their pain but also of their enduring hope. These women, many of whom had been poisoned by their water, were walking not just for themselves but for their children and the generations to come—walking with the knowledge that their bodies had become the battleground for a war waged in silence.

This moment captured in my photograph is more than a scene of protest; it reflects the hidden, unspoken ways informality operates to repair the damage left by formal governance. In this chapter, I outline five routines of conducting visual ethnography to shed light on how various actors enact informality in addressing the gaps within urban water governance. Combining ethnographic reflection with photography allowed me to document these hidden processes, offering a deeper understanding of how communities navigate the complex landscape of water governance, not just repairing systems but rebuilding lives.

Abstract

In this chapter, I illustrate the use of visual ethnography to uncover the nuanced role of informal processes and structures, henceforth referred to as informality, in navigating the complex challenges of water governance in India through enabling repair. By repair, I refer to the ability of informality to act as a transformative approach, adept at navigating and addressing the multifaceted governance challenges faced by Indian cities. The mapping of informality in repair within urban water governance uncovered three dilemmas: 1) the difficulty of documenting transient oral narratives, 2) the discrepancies between verbal accounts and observed practices and 3) ethical concerns associated with documenting illicit activities. To address these dilemmas, I coupled ethnographic approaches with photographic methods. Ethnography provided reflection, clarity and a documented record, although it introduced a delay in capturing observations. Photographic methods compensated for this by offering an immediate visual record and facilitating live analysis alongside textual notes. I outline five routines of conducting visual ethnography, applied in the cities of Bhopal and Bhuj, to shed light on how various actors enact informality in addressing the gaps within urban water governance. These routines served as a photographic praxis to critically engage with both human and non-human actors in these locales. Through these routines, I illustrate how informality results in two types of repairs: reactive and reparative. Reactive repair serves as a temporary measure to restore the status quo. In contrast, reparative repair aims at fostering long-term change, illustrating the dynamic ways in which informality contributes to repairing the intricacies of water governance in India.

Keywords
visual ethnography, methodology, informality, water governance, India, repair

Status
This chapter has been published in the book, *Threads of Informality in Policymaking*. The citation for the chapter is: Mungekar, N. (2024). Visualising informal repair: Exploring photographic 'routines' in ethnographic methodology. In L. Garner-Knapp, J. Mason, T. Mulherin, & L. Visser (Eds.), *Threads of informality in policymaking* (pp. 97–112). Emerald Group Publishing Limited. https://doi.org/10.1108/978-1-83797-280-720241007

Fit with overall thesis
In the preceding chapter, I elucidated the research methodology, providing a foundation for the investigative approach employed in this study. This chapter elaborates the specific processes involved in conducting visual ethnography. Within this framework, I have devised 5 routines aimed at uncovering implicit notions and subconscious motivations, thereby facilitating a deeper understanding of the unintentional aspects of repair. Consequently, while Chapter 2 articulated the 'why' and 'what' underpinning our methodological orientation, this chapter delves into the 'how', establishing a direct link with both Sub-Research Question 1 and Sub-Research Question 2. This progression ensures a coherent and comprehensive exploration of the thematic concerns central to this thesis.

3.1. Introduction

In the context of navigating India's complex water governance challenges (Narain, 2000), this chapter presents a methodology that aims to shed light on the underexplored role of informal processes and structures, henceforth referred to as *informality*, in *repairing* the gaps and hindrances in urban water governance in the cities of Bhopal and Bhuj. In this context, repair goes beyond mere technical fixes; it is studied as a transformative approach adept at tackling governance challenges. Despite its associated drawbacks, informality emerges as a critical element in bridging governance gaps, offering nuanced perspectives on the interconnectedness and relationships among actors within this sector (Ahlers et al., 2014; Roy, 2005). Current research methodologies often need to encapsulate these nuanced perspectives (Goodman & Marshall, 2018), indicating the need for an innovative, cross-disciplinary approach.

To fill this research gap, the heart of this chapter lies in a novel methodological proposition: the use of visual ethnography to illuminate the informal practices of water governance. This method navigates moral and methodological challenges through five photographic *routines*. The routines served as photographic praxis to critically engage with the human and non-human actors in Bhopal and Bhuj between September 2021 and January 2022.

I begin with a vignette from Bhopal, focusing on the informal practices of Overhead Water Tank (OHT) supervisor Ram Singh*. This case illustrates visual ethnography's role in uncovering obscured informal practices within complex governance structures. Subsequent sections delve into the concept of informality, exploring its potential as a means for repairing governance structures and processes. Insights gleaned through photographic routines in Bhopal and Bhuj follow this discussion. The chapter concludes with an examination of how visual methods can complement textual analysis and reflections on how my positionality influenced the research trajectory.

3.1.1. Why did Ram Singh shush Farhan?

In September 2021, during my fieldwork in Bhopal, India, I stepped into the world of Ram Singh, a Municipal field supervisor responsible for overseeing the water supply of his assigned zone. His multifaceted duties encompassed monitoring the Overhead Water Tank (OHT), maintaining the pipe network, and ensuring smooth water delivery to the local citizens.

As part of my study, I conducted interviews with local residents, gathering oral testimonials about their water supply experiences. Repeated narratives of dissatisfaction with the supply emerged due to various factors like inadequate provision, substandard water quality, and erratic pressure. Interestingly, I observed their illicit measures to these predicaments, which mostly involved tinkering with the physical water infrastructure themselves. This resourcefulness sparked my interest in Singh's critical role at the OHT, a pivotal node in the water supply network. I was intrigued: how was he dealing with these challenges? What strategies did he employ to ensure a consistent water supply amidst scarcity?

As we talked, Singh projected an image of a diligent bureaucrat, committed to the rule book, seemingly untouched by the torrent of obstacles that accompanied water shortages. His responses danced around the challenges, skirting away from acknowledging the issues that his peers openly accepted, e.g., pressure from citizens, biased prioritisation, and lack of human and financial competencies. Farhan, a member of a local political party, present during our conversation, possibly influenced Singh's responses. Yet, Singh's steadfast denial of these challenges left me baffled. Despite my persistent questioning, Singh maintained his silence, amplifying my curiosity about the untold strategies he might have in place.*

Unexpectedly, Farhan stepped in, recounting episodes of Singh's benevolence when water was dispensed free of charge to citizens. This revelation, standing in stark contradiction to Singh's narrative, took us both by surprise. Caught off guard, Singh swiftly shushed Farhan, conveying a subtle message that certain information should remain concealed from prying ears. The incident further propelled my curiosity about his underlying strategies, making me linger longer.

Post-interview, I observed Singh, who was perched under the looming water tank, engrossed in his newspaper while a few locals gradually joined him for their evening chat. It struck me how effortlessly Singh blended into the local landscape, sharing laughs and conversations with the passers-by (see Photograph 3). This realisation became apparent when observing through the camera of my smartphone, focusing on the exchange between Singh and the residents. As an observer, the smartphone's screen served as a visual frame which excluded distractions and allowed me to focus on the exchanges between Singh and the residents. I began to comprehend the significance of these personal relationships in Singh's public service.

I came to the realisation that Singh was trying to suppress any mention of these personal relationships, aiming to project an impartial image of himself. While not necessarily illegal, the subtle revelation of these relationships and Farhan's unintentional disclosure, indicated that admitting to the governance challenges would force him to reveal his informal strategies. This could jeopardise his position and potentially lead to his relocation to a different zone, uprooting the network he had painstakingly built over the years.

As I continued to observe and document, it emerged that Singh's team, primarily comprising migrant plumbers, worked in a hostile environment riddled with casteism, threats, and intimidation. Singh's personal alliances within the community acted as a protective shield, facilitating a smoother service delivery. He cleverly leveraged relationships to enable provision (albeit unequally) while ensuring a safety net for his subordinates against local prejudice. Yet, these strategies were deliberately kept under wraps, protecting the integrity of his job and his network. However, these strategies remained hidden, safeguarding Singh's position and his informal ways of water management.

Photograph 3: *Left - The physical infrastructure - overhead water tank; Right - Social infrastructure that enabled access to the resource - in-person relationships.*

Thus, the incorporation of photographic methods in studying people's cases became an integral part of my ethnographic journey, providing me with a deeper understanding of the interplay between formality, informality, and the resilience of urban life. Unearthing the intricacies of urban Indian water management necessitates understanding these clandestine practices. Traditional research methods alone, like semi-structured interviews and desk study, often miss the nuances. Consequently, I propose a combined approach, integrating traditional methods with visual ethnography to unmask the instrumental role of repair in informal water governance.

3.2. On performing different forms of repair through informal practices

Actors like Ram Singh often face the challenge of circumnavigating formal procedures to amend service shortfalls. By building networks with key citizens, Singh reduced potential hostility towards his subordinates, thus ensuring smoother maintenance operations. His manoeuvres within the formal water supply system, coupled with informal water distribution, effectively bridged the inherent gaps in these formal protocols. This was evident when residents grew frustrated with slow services or the use of non-local labour. In response, these personal networks became crucial, fostering understanding, patience and allowing for unhindered work.

Moreover, formal arrangements often involve lengthy bureaucratic processes. However, through nurturing informal networks, individuals like Singh can distribute risks and gather benefits, enhancing service provision through reparative practices. Here, the concept of repair goes beyond technical fixes: it signifies a governing approach to managing transitions. I delve into the concept of 'repair', recognised in the literature as a transformative mode adept at addressing complex governance challenges faced by Indian cities through informal mechanisms. This exploration underscores the need to view the informal as an integral component of urban governance rather than an anomaly.

The literature on repair circumscribes two perspectives. The first conceptualises repair as a reactionary process, striving to maintain the existing state and restore its original properties (Henke, 2017). Singh's use of social capital to address challenges in water supply exemplifies this. The alternate perspective positions repair as a sensibility that guides reparation as a mode of transition (Bhan, 2019). This viewpoint advocates long-term, community-focused approaches to rectify past colonial policies, ensuring equitable service provision. It emphasises collective memory, incremental change, and iterative processes (Bhan, 2019; Broto et al., 2021; Perry, 2020). These two facets of repair—reactive and reparative—are not opposed but exist on a spectrum, functioning in hybrid forms based on context.

Reactive repair and reparation require mobilising personal networks, collective memory, and local knowledge. Regional languages like Hindi proffer nuanced understandings to expand the meaning of repair with terms such as *Marammat* (returning to the original), *Rafu karna* (bolstering the old with the new), *Dosh rahit* (emphasising faultless repair), and *Sudharna* (seeking betterment for the future). These vocabularies provide a heuristic map for multi-faceted repair approaches within given constraints and opportunities through informal means.

Informality, therefore, is pivotal in steering transformative repair processes and structures, especially in managing contested resources. Drawing from the works of Roy (2005), McFarlane (2012) and Ahlers et al. (2014), I align with Roy's (2005) of urban informality as an organising logic – a system of codes governing repair processes. This logic is pertinent in a deregulated state where formal rules exist but are negotiated based on contextual conditions (Roy, 2005). Here, informal governance processes and structures do not operate in isolation or in the absence of the state but are mutually co-constitutive with formality, helping bridge gaps in service delivery (Ahlers et al., 2014; McFarlane, 2012).

The structure of informal governance resembles an ephemeral web that mobilises services as needed (Jaglin, 2014), coalescing when necessary and allocating tasks into manageable units based on availability, capacity, and resources, often circumventing formal regulations (Ahlers et al., 2014). With the formation of new coalitions, shared understanding and vocabulary materialise to enable service delivery. These relationships, characterised by their temporary and flexible nature, demonstrate resilience to shocks and adaptability to changing circumstances (Ahlers et al., 2014).

I analyse how informality's organising logic plays a role in addressing governance challenges such as mitigating departmentalisation, extending capacities in resource-deficient situations, or nudging behavioural change. Ram Singh's actions demonstrate this adaptation as he negotiates with users to ease access to infrastructure. He confronts challenges, employing emotional intelligence by empathising with his subordinate staff's needs, bridging resource provision gaps, and risking his job to meet citizen demands, thus identifying repair pathways within a deregulated context. These diverse repair pathways, laden with obscure narratives and nebulous interpretations, make their understanding a complex task, thus necessitating the development of a non-intrusive methodology to unravel how the informal processes and structures enable repair.

Hence, my research aimed to reveal the intricate ways in which actors perform informality to facilitate repair. I describe the actions as performances due to their embodied meaning and vulnerability to situational contingencies, which prompt individuals to address governance barriers hindering water service provision. This chapter emphasises the centrality of ethnographic methodology in discerning these equivocal and ambivalent practices, enabling an understanding of repair in its various forms in Bhopal and Bhuj.

3.3. On capturing and making visual narratives about the role of informality in repair

Based on ethnographic scholarship, I outline a methodological framework to capture the varied and informal manifestations of repair. An ethnographic sensibility provides an epistemological framework for *"experiencing, interpreting, and representing"* (Pink, 2013, p. 34) the multifarious performances of informal practices reflexively shaped through social norms and beliefs (Gobo, 2008). I employed textual and photographic methods to explore how repair manifests through informal means. I examine repair through personal networks, local knowledge, and grey practices—a realm between legality and illegality, where certain practices are accepted but not necessarily supported by formal codes.

In my investigation of informal water governance in Bhopal and Bhuj, I conducted 64 interviews along with 10 separate observations with users, government authorities, practitioners, NGO actors, and academics. Complementing the interviews, I made *thick* descriptions (Kharel, 2015) to cross-reference participant accounts and unravel the intricate web of informal relations. The ethnographic notes captured the practical execution of formal mandates, highlighting the actual roles of actors and identifying gaps between their actions and prescribed responsibilities. By examining the decision chain of actors at different hierarchical levels, I obtained insights regarding their vulnerabilities and intentions in adopting informal practices. This holistic approach deepened my understanding of the informal management of water resources.

However, investigating repair practices posed three dilemmas:

i. Capturing and accurately representing transient oral accounts are often abstract and challenging to document.

ii. Addressing discrepancies between respondents' oral accounts and observed actions on the ground, resulting from overlooked mundane actions or intentional concealment of facts related to illicit activities.

iii. The moral dilemma of documenting illicit activities, questioning the researcher's responsibility in reporting and the potential implications of being involved in unethical practices.

To navigate these dilemmas, I coupled ethnography with photographic methods. While the former allowed for reflection, clarity, and a record of the information, it did have limitations (Adhikari, 2018). Primarily, recording observations introduced a delay, potentially leading to missed real-time details. Photographic methods helped mitigate this issue by providing a visual record that supplemented the textual notes. The immediacy and accuracy afforded by this visual analysis helped bridge the gaps left by textual methods.

In my research, I used a Fujifilm XT3 Digital Camera and OnePlus 9 mobile phone for photography. Predominantly, I utilised my smartphone due to its less intrusive nature. The compact size and perceived casualness of the mobile phone, as opposed to the more conspicuous digital camera, made individuals more comfortable, thereby easing the consent process for photographs. The immediate on-screen viewing facilitated quick assessment and reflection, while the viewfinder or screen frame provided focused perspectives. The photography process often occurred after or alongside verbal interviews, influencing the framing of photographs. Employing an iterative approach, starting with an 'establishing shot' (Thirunarayanan, 2006), I zoomed in and out, juxtaposing fragments with the whole to decode ambiguous oral utterances and address the first dilemma of capturing oral accounts accurately.

To address the second dilemma, which involves resolving discrepancies between narratives and actions, I practised visual ethnography by actively engaging in shared activities with the respondents, such as walking, eating, and even waiting in cramped spaces outside offices. I moved with the camera, following the subjects' movements, continuously observing, analysing, and photographing while immersing myself in the experience. Using the camera or mobile phone screen, I repeated this cycle of observation and reflection. This sensory approach acknowledges that human experiences are not solely verbal or cognitive but also shaped by sensory perceptions, emotions, and bodily sensations (Pink, 2015).

Resolving the third moral dilemma of documenting illicit activities involved adopting two ethnographic approaches: immersive presence (Roncoli et al., 2009) and maintaining distance

using the *rear-mirror technique* (Wamsiedel, 2017). Immersion fostered trust and understanding of interviewees' vulnerabilities, capturing implicit cues and adding meaning to photographs. Conversely, the rear-mirror technique helped me maintain a critical distance from illicit scenes and activities. This allowed me to reflect on my biases and influence, ensuring I did not become too immersed in or influenced by the illicit activities being documented. By maintaining a critical distance, I ensured ethical integrity and respect for participants' confidentiality. Striking a balance between these approaches enabled ethical considerations to guide documentation and analysis while respecting participants' rights and confidentiality.

My background as a photojournalist and documentary photographer significantly influenced my approach. Documentary photography (Hodson, 2021; Kratochvil, 2001) allowed me to delve into the intricacies of subjects over three months. Budgetary constraints necessitated a smaller sample of interviewees focused on a well-connected group to explore repair practices across various levels, which was facilitated by snowball sampling. Conversely, photojournalism (H. S. Becker, 1995; Kratochvil, 2001) honed my ability to capture and represent stories within limited timeframes, negotiate morally ambiguous situations, and foster agility.

Drawing on these insights, I developed five routines to navigate the dilemmas encountered in my fieldwork. I term them as routines as they were informed by theoretical insights on repair and implemented during fieldwork. These routines serve as a photographic praxis that facilitates reflexive visual analysis. In the subsequent section, I will explain how these photographic routines, applied singularly or combined, helped interpret various forms of repair in Bhopal and Bhuj.

3.4. Visual tales of repair in Bhopal and Bhuj

Examining the informal water governance in Indian cities Bhopal and Bhuj reveal varied impacts on repair processes due to contrasting geographical and socio-political contexts. Bhopal, a state capital in central India, abundant with lakes, leans heavily on the distant Narmada River for water supply. Meanwhile, Bhuj, in an arid region on the north-western national border, rebuilt its water system following a 2001 earthquake, sourcing this from a canal linked to the Narmada River, located 700 km away (Sheth & Iyer, 2021).

Bhopal's water governance is fragmented and dominated by governmental bodies that often overshadow environmental NGOs and civil society's efforts, creating sporadic measures. Despite relying on an external source, the Narmada River, water security concerns appear less emphasised, reflecting a lack of urgency and unified vision for water management. This disconnect is noticeable in a report from the Comptroller and Auditor General (CAG) of India (2021) and is reinforced by my fieldwork observations.

Conversely, Bhuj, a city hardened by repeated natural disasters, exhibits community resilience and self-organisation (Sheth & Iyer, 2017). Such conditions spur the growth of civil society

groups addressing water security issues. However, my study reveals discordant approaches between these civil society organisations and local authorities, side-lining the former's efforts and downplaying the conditions which produced water issues.

Both cities showcased distinctive repair practices in response to their unique circumstances. In Bhopal, local governmental actors grappled with citizens' threatening behaviour (exemplified by Ram Singh) and departmental fragmentation (illustrated by Miheer Soni below). Water users in Bhopal also adopted informal strategies to sustain water provision by tinkering with the infrastructure. Meanwhile, Bhuj residents demonstrated remarkable resilience, blending their professional duties with personal resolve to address water security issues, embodying the city's strong inclination towards community-led repair initiatives.

3.4.1. Scale shifting photography: Unveiling interpersonal infrastructure as a means to repair

Photograph 4: *Scale shifting photography at OHT*

Intrigued by Ram Singh's informal approach to water management, revealed during his interaction with Farhan, I found it challenging to fully comprehend the influence of personal alliances on water access. With the aid of scale-shifting photography, I ventured deeper to try and make sense of the role of these alliances. Following the interview, I stepped away from the spot to capture an establishing shot and found myself instinctively drawn to photographing the larger infrastructure elements. The camera's zoom feature allowed a telescopic focus on subtler elements near and beneath the water tank, eliminating visual distractions within the frame. This oscillation between zooming in and zooming out allowed me to observe the relationship between part and whole, prompting a critical examination of what the infrastructure entailed. The collage of zoomed-in and zoomed-out photographs is seen in Photograph 4. Initially drawn by the colossal scale of the overhead tank, the scale shifting led me to realise that the real essence of infrastructure lay in the personal alliances that choreograph the flow of water to the desired recipient.

3.4.2. Walking with a Camera: Uncovering repair tactics to navigate inter-departmental relations

Photograph 5: *(Left) Soni (in blue checked shirt) waiting for the PWD officers. Meanwhile, his team exchanged greetings with PWD's team. (Right) Soni flanked by his men, displaying support and strength*

Miheer Soni*, an Assistant Engineer at Bhopal Municipal Corporation (BMC), deals daily with the intricate balance of maintaining water supply, managing public dissatisfaction, and obtaining repair permissions. To comprehend these challenges, I joined Soni on an inspection walk with the State Public Works Department (PWD).

This first-hand experience unveiled the tensions Soni faces and his innovative approaches to alleviating bureaucratic constraints. The assertive demeanour of the higher-ranking PWD officers was evident in their tone and gestures. In contrast, Soni displayed calmness as he methodically noted down the requirements, communicating them to his subordinates, illustrating his hierarchical position (see Photograph 5 right).

However, at the junior level, the hierarchy blurred. I observed camaraderie between Soni's subordinates and the PWD junior reporting team, which offset the stern exchanges among their superiors. Their informal interactions (see Photograph 5-left) bridged bureaucratic gaps and expedited operations, contributing to the mending or *marammat* (returning to the original) of siloed operations.

Using a camera to document this walk offered a deeper understanding of Soni's professional environment, revealing nuances missed in our initial interview. While the walk could have been purely observational, the camera provided a focused lens, facilitating real-time analysis without peripheral visual distractions. Through this lens, the intellectual curiosities from our previous conversation – power dynamics, loyalty, subservience, obedience, fear, pride, and respect – were visually depicted in their daily context. This inspection walk highlighted Soni's adeptness at navigating within the intricate relational dynamics to ensure operational smoothness.

3.4.3. Sensorial Knowledge Production: Decoding intention and situated expertise

Photograph 6: *(Left) Patel presenting piles of paperwork required for lake notification requirements; (Right) Jadeja engaging in soil-covered Q&A session while kneeling on the ground*

During my interactions with Ramanbhai Patel* and Jyotsnaben Jadeja* in Bhuj, I was absorbed in multi-sensory experiences. Patel, a dedicated citizen, showcased his decade-long quest to get a lake notified, which is a long formal process of declaring a body of water as a lake in an urban area. Despite his unwavering effort, evidenced by stacks of diligently arranged documents, success remained elusive. Similarly, Jadeja, who worked in an action research organisation, conducted informative Sunday walks about the city's water sources and distribution. Her patience was evident as she took time to answer tangential questions, broadening the group's understanding beyond the immediate walk.

While their methods might not yield instant results, they were instrumental in fostering awareness of these issues among citizens. Patel and Jadeja's resilient efforts, showcasing their understanding of the challenges faced, embody the essence of *sudharna* (seeking betterment for the future). Their perseverance was tangible: I felt the weight and aged scent of Patel's paperwork, symbolising the endurance required for such advocacy (see Photograph 6 left).

Likewise, while photographing Jadeja, my own dust-covered state mirrored her disregard for the soiling of her clothes as she addressed inquiries (see Photograph 6 right). Participating in shared activities with a camera made me aware of the peripheral influences on repair, such as dedication and thorough knowledge, shedding light on their ambitions and challenges.

3.4.4. Improvising photographic composition: Strengthening the representation of repair

Photograph 7: *(Left) The School principal in Bhuj explaining the importance of rainwater harvesting and conservation to his students centred in the photograph); (Right) A supervisor effortlessly showing WhatsApp-enabled phone to display water kiosk update*

Visual ethnography, an ongoing dialogue between camera and photographer, allowed my photographs to engage with the conceptual understanding of repair. These photographs embrace both content and composition.

Pareshbhai Patel*, a Bhuj school principal, initiated a systemic change by co-teaching water conservation and pollution to school children. Given the slow pace of educational curricular changes at the state or country level, without further ado, Patel collaborated with advocacy organisations and co-taught lessons as extensions of regular classes. His central position in the photograph 7 (left) captures his dynamic energy and optimism, essential for the reparative process of *sudharna* (seeking betterment).

In another instance in Bhopal, an interviewee highlighted how modern digital platforms like government websites can overwhelm citizens, leading many to use tools like WhatsApp for public participation. Citizens, municipal operators, and party workers rely on these groups to share events and complaints, often supported with photographic evidence. This free social media platform effortlessly coexists with modern digital platforms. The image of a phone showing WhatsApp platform held by a supervisor (see Photograph 7 right) illustrates the accessibility and integration of such tools alongside modern digital platforms, embodying *rafu karna* (bolstering the old with the new).

3.4.5. Long-form Documentation Approach: Discovering tools for repair

Photograph 8: *First series showcasing ordinary objects to tinker the original physical water supply infrastructure. Second series - Mobile phone becoming a norm to access easily.*

Observing patterns requires distance and demarcation. Patterns often hide in the mundane details of everyday life, subtly emerging through focused observation. My photographic journey, initially centred on the ordinary, unfolded over months and revealed a coherent pattern.

In Bhopal, citizens expressed concerns over groundwater quality, inadequate water pressure, and irregular supply. To address this, they innovatively tinkered the existing infrastructure with everyday objects. The photo series (see Photograph 8) spotlights these adaptations, e.g., in the first series: (1) specialised pipes connecting to a water pump for propelling water to upper floors, (2) an unauthorised pressure pump, and (3) a pipe for transferring groundwater from private bores into water tankers; subtly hiding their unofficial status. Local authorities were typically aware of these adaptations; some even tacitly approved them as they filled gaps in the water system. In Bhuj, despite available redressal platforms for water issues, grassroots government employees used mobile phones to improve accessibility to water services and respond to emergencies, becoming tools for socio-technical repair.

Upon revisiting the photographs, a recurring theme emerged. Over time, images initially captured for various reasons revealed a consistent theme of inventive adaptations and technology's role in social repair, embodying *dosh-rahit* (faultless repair).

3.5. Discussion & conclusion

Through my field experiences and engagement with literature, I have appreciated the importance of informal governance processes and structures facilitating repair across legal, geographical, and social contexts. Often undervalued due to their clandestine nature, I employed an

ethnographic approach, complemented by digital photography, to capture these expressions of repair. Navigating the dynamics of informal governance arrangements presented me with three dilemmas, wherein the five routines proved invaluable for their resolution.

The first dilemma, ensuring the accuracy of oral accounts, was addressed by employing visual ethnography sensorially. This approach proved a powerful tool for understanding dedication, especially in cases like Jyotsnaben Jadeja's. Oral accounts, while providing hints at her intentions, often left much to interpretation. However, visual cues enabled a comprehensive interpretation of her unspoken markers when decoded using the routines.

The second dilemma was the resolution of discrepancies between oral accounts and actions. For vulnerable individuals like Ram Singh, who was worried about his job, verbal disclosures led him to alter or conceal facts. I cross-referenced with others, such as plumbers and supervisors, to verify Singh's account. This triangulation process highlighted inconsistencies, revealing the complexities of his situation. Additionally, looking through the screen or viewfinder highlighted overlooked elements, like everyday interactions, emphasising the significance of personal relationships within these informal systems.

The third dilemma was the ethical aspect of documenting illicit activities. The notion of 'distance' (Rose, 1997) was crucial in managing ethical challenges during research. Determining the extent of immersion, mainly when covering sensitive topics like illicit water pumps and knowing when to withdraw, was essential. I opted to respect the users' oral accounts, documenting their approaches through the less conspicuous medium – the smartphone. This approach was validated when local authorities acknowledged their awareness of these illicit measures, resolving my moral dilemma.

These routines revealed two types of repair—reactive and reparative. The former is a temporary measure to restore the status quo, while the latter focuses on localised efforts to facilitate reparation. Photographic methods, when incorporated with ethnography, provided a nuanced understanding of these dynamics. Integrating photographs and interview notes enriched the textual analysis, serving as meaningful 'codes' within qualitative coding software like ATLAS.ti.

Being an Indian ethnographer in unfamiliar Indian cities, I encountered 'situated dilemmas' (Ferdinand et al., 2007), influenced by my identity. Consent posed a challenge for some, as formal documentation was required for capturing informal actions in line with my institution's best practices. Affiliation with a Dutch organisation compelled me to have written consent, which a few participants perceived as a liability. To address this, I utilised verbal consent, maintaining ethical engagement while respecting Dutch transparency norms. Balancing these contrasting ethical considerations proved challenging throughout the research process.

Recognising my inherent subjectivity as a researcher was crucial to this study. My Indian nationality offered familiarity with the study sites. This cultural proximity facilitated trust with

research subjects, allowing them to share ‘open secrets’ (Wamsiedel, 2017). Despite sharing an Indian identity, my metropolitan roots in Mumbai differed from the realities in Bhopal and Bhuj. Meanwhile, my Dutch association amplified perceived power differentials. The balance between these experiences guided my approach to power differentials and the concept of distance. The interviews became a platform for mutual exchange and personal reflection, prioritising respondents’ motivations and perspectives over purely technological and planning aspects. This approach acknowledged the value-laden, historically contingent nature of oral accounts.

3.5.1. Returning to Ram Singh

Ram Singh’s shushing gestures highlighted his balancing act between the covert aspects of interpersonal arrangements and formal mandates. Officially, he managed the OHT and water distribution, but pressure from residents led to unequal resource allocation. This deviation built essential personal networks with residents, facilitating operations. His informal management rectified governance processes which were ill-equipped for citizen-based threats.

The camera’s lens and employment of the routines served as a gateway, illuminating the latent dynamics inhabiting the space beneath the Overhead Tank (OHT). Through this visual exploration, it became evident that this seemingly mundane location bore significant weight in dictating the decisions of water distribution.

References

Adhikari, D. P. (2018). Ethnographic Fieldnote Writing: Methodological Challenges in the 21st Century. *Dhaulagiri Journal of Sociology and Anthropology*, *12*, 98–106.

Ahlers, R., Cleaver, F., Rusca, M., & Schwartz, K. (2014). Informal space in the urban waterscape: Disaggregation and co-production of water services. *Water Alternatives*, *7*(1), 1–14.

Becker, H. S. (1995). Visual sociology, documentary photography, and photojournalism: It's (almost) all a matter of context. *Visual Sociology*, *10*(1–2), 5–14. https://doi.org/10.1080/14725869508583745

Bhan, G. (2019). Notes on a Southern urban practice. *Environment and Urbanization*, *31*(2), 639–654. https://doi.org/10.1177/0956247818815792

Broto, V. C., Westman, L., & Huang, P. (2021). Reparative innovation for urban climate adaptation. *Journal of the British Academy*, *9*(s9), 205–218.

CAG India. (2021). *General and social sectors for the year ended 31 March 2019, Government of Madhya Pradesh. Report 3 of the year 2019*. https://saiindia.gov.in/ag2/madhya-pradesh/en/audit-report/details/115252

Ferdinand, J., Pearson, G., Rowe, M., & Worthington, F. (2007). A different kind of ethics. *Ethnography*, *8*(4), 519–543.

Gobo, G. (2008). What is Ethnography? In *Doing Ethnography*. SAGE Publications Ltd. https://doi.org/10.4135/9780857028976

Goodman, J., & Marshall, J. P. (2018). Problems of methodology and method in climate and energy research: Socialising climate change? *Energy Research & Social Science*, *45*, 1–11.

Henke, C. R. (2017). The sustainable University: Repair as maintenance and transformation. *Continent*, *6*(1), 40–45.

Hodson, D. (2021). The Politics of Documentary Photography: Three Theoretical Perspectives. *Government and Opposition*, *56*(1), 20–38. https://doi.org/DOI: 10.1017/gov.2019.3

Jaglin, S. (2014). Regulating service delivery in southern cities: Rethinking urban heterogeneity. In S. Parnell & S. Oldfield (Eds.), *The Routledge Handbook on Cities of the Global South* (1st Edition, pp. 434–447). Routledge. https://doi.org/10.4324/9780203387832

Kharel, D. (2015). Visual ethnography, thick description, and cultural representation. *Dhaulagiri Journal of Sociology and Anthropology*, *9*, 147–160.

Kratochvil, A. (2001). Photojournalism and documentary photography. *Nieman Reports*, *55*(3), 27.

McFarlane, C. (2012). Rethinking Informality: Politics, Crisis, and the City. *Planning Theory and Practice*, *13*(1), 89–108. https://doi.org/10.1080/14649357.2012.649951

Narain, V. (2000). India's water crisis: the challenges of governance. *Water Policy*, *2*(6), 433–444. https://doi.org/https://doi.org/10.1016/S1366-7017(00)00018-0

Perry, K. (2020). Realising climate reparations: Towards a global climate stabilization fund and resilience fund programme for loss and damage in marginalised and former colonised societies. *Available at SSRN 3561121*.

Pink, S. (2013). *Doing visual ethnography* (Third). Sage.

Pink, S. (2015). *Doing sensory ethnography*. Sage.

Roncoli, C., Crane, T., & Orlove, B. (2009). Fielding climate change in cultural anthropology. In S. Crate & M. Nuttall (Eds.), *Anthropology and Climate Change: From Encounters to Actions* (pp. 87–115). Left Coast Press.

Rose, G. (1997). Situating knowledges: positionality, reflexivities and other tactics. *Progress in Human Geography*, *21*(3), 305–320.

Roy, A. (2005). Urban informality: Toward an epistemology of planning. *Journal of the American Planning Association*, *71*(2), 147–158. https://doi.org/10.1080/01944360508976689

Sheth, D., & Iyer, M. (2017). Opportunities and Challenges in Upscaling Decentralized Wastewater Treatment Plants City Wide: Case of Bhuj. *SPANDREL-Journal of SPA: New Dimensions in Research of Environments for Living*, *13*, 57–65.

Sheth, D., & Iyer, M. (2021). Local water resource management through stakeholder participation: case study, arid region, India. *Water Practice and Technology*, *16*(2), 333–343.

Thirunarayanan, R. (2006). *Visual communication of mood through an establishing shot*. Texas A&M University.

Wamsiedel, M. (2017). *Approaching Informality: Rear-Mirror Methodology and Ethnographic Inquiry BT - The Informal Economy in Global Perspective: Varieties of Governance* (A. Polese, C. C. Williams, I. A. Horodnic, & P. Bejakovic, Eds.; pp. 97–115). Springer International Publishing. https://doi.org/10.1007/978-3-319-40931-3_6

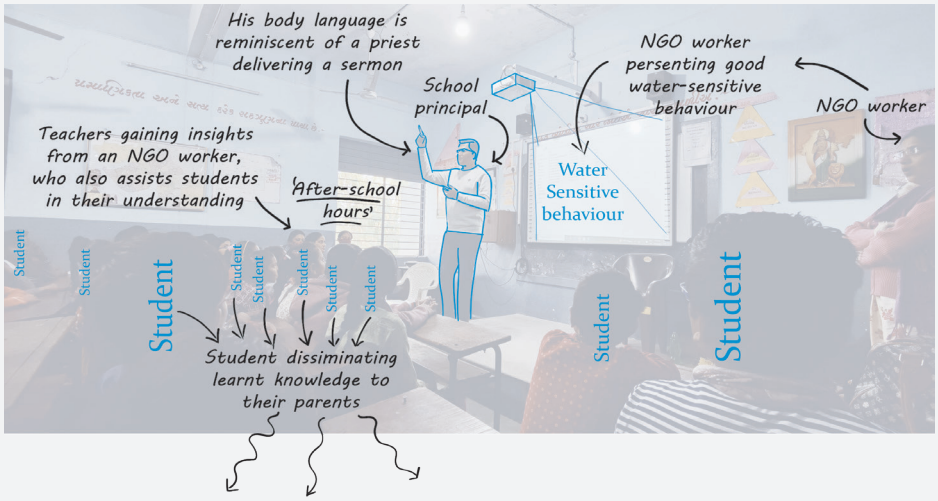
4

Framing governance capacities to mobilise reparation through informality in Indian cities

Photo Narrative 6: Teacher as water managers

As I stood to photograph this image, I was immediately drawn to the resourcefulness within the classroom—a space creatively adapted to accommodate two batches of students despite limited resources. The makeshift arrangements, from the seating to the teaching aids, reflected a community's determination to overcome constraints. The principal, leading the lesson, delivered it with the intensity of a sermon, instilling in the students a sense of responsibility toward water conservation. This moment highlighted the powerful agency at work—an agency that not only educates but also empowers, contributing to broader processes of social and environmental repair.

One of the long-term strategies for achieving water sensitivity lies in instilling water-sensitive behaviours in the younger generation. Typically, this is done by integrating topics such as rainwater harvesting, recycling wastewater, and other water-saving practices into the school curriculum. Educating children on these topics begins to dismantle the taboos associated with water recycling and creates a new generation of informed citizens. These students, in turn, become young change agents, capable of navigating social stratifications such as religion, gender, and caste to influence their families and communities.



However, in regions like Bhuj, where water-related challenges are urgent, the formal process of modifying school curricula is often slow and mired in bureaucratic delays. Recognising the pressing need for action, a group of school principals took proactive steps outside these formal structures. They formed alliances with environmental NGOs to co-create a tailored curriculum focused on water sensitivity for students in classes 5th to 7th. These lessons were delivered in extra classes after school hours, allowing them to bypass the lengthy governmental approval process and address the community's immediate needs directly.

In this chapter, I explore how this collective agency emerged to enable reparation. I trace the socio-cultural and institutional dynamics that brought these principals together with environmental NGOs, examining how they employed 'jugaad'—a frugal innovation approach deeply embedded in the local context—to creatively reimagine the school curriculum. To understand this, I develop a conceptual framework in this chapter that captures the capacities enabling these reparative efforts, particularly those leveraging informality to achieve water sensitivity. This framework serves not only as an analytical tool to assess the extent to which these efforts contribute to repair but also as a practical guide for governance actors to further nurture and enhance these capacities.

In this chapter, I present my conceptual framework of reparative governance capacities, which allows me to study how informality supports reparative governance to support water sensitivity. At its heart, this approach aims to reshape our understanding and practice of urban water governance, ensuring it is attuned not only to the complexities of urban environments but also to the enduring legacies of colonialism and the societal stratifications that continue to shape these spaces. While reparative urban water governance does entail a normative orientation—rooted in ideals of equity and justice—it is also a pragmatic necessity. This approach compels stakeholders to engage with water governance through a problem-oriented and systemic lens, addressing specific challenges tied to historical injustices and the practical need for sensitive management. This involves creating conditions that both mobilise and respond to the diverse dynamics of reparation.

To achieve this, I have identified two key functions of reparative urban water governance: consolidation and *jugaadu* (improvising within constraints). The capacities lens serves as a pivotal structuring tool, offering a way to further conceptualise and operationalise an agency-based perspective on how these functions are enacted by urban governance actors. The capacities lens is recursive: by enacting these functions, urban governance actors interact with, and change their institutional governance contexts, and thus create conditions for reparative governance.

This perspective is crucial for understanding how specific governance activities manifest in the capacities needed for reparative water governance. I conceptualise reparation as a transformative approach from a decolonial standpoint. Simply adopting transformation literature may not be sufficient for resource-constrained and culturally complex contexts like India. Reparation focuses on historical injustices while also tackling persistent water challenges in a systemic manner, particularly across intergenerational timelines.

The capacities framework presented here functions as a systemic heuristic—a tool that helps to explain and assess the development and enactment of these capacities through informality, and to identify the conditions that emerge as a result. It poses essential questions: Who is involved in developing and enacting these capacities through informal networks and practices? Which actors, including those beyond the water sector, are necessary, and what roles do they play in exercising these capacities to enable repair? How do informal mechanisms facilitate their inclusion? In what ways are shifts toward reparative urban water governance emerging, particularly through informal engagements? What capacity gaps hinder this progress, and how can these capacities be nurtured and supported informally, especially in contexts that have historically marginalised certain voices?

As discussed in Chapters 5 and 6, as well as in the current chapter, the capacities framework offers a wide range of applications. Beyond serving as a descriptive analytical tool to assess capacity gaps and evaluate the extent of reparation underway, it also holds the potential to support reparative research approaches. These approaches aim to co-create tangible and actionable

pathways, fostering transdisciplinary collaborations that cultivate capacities in contexts where the wounds of colonialism are most deeply felt—particularly in the Global South.

The capacities framework is applied in subsequent chapters to explore how informality supports reparation, offering insights into the collective capacity to organise, address challenges, and the structural conditions that arise from these efforts. This approach also contests the traditional rationalist perspective of agency by incorporating Latour's (2007b) theorisation, which acknowledges the unintentional and non-linear dimensions of human action.

4.1. Necessity for reparative governance capacities

Cities across India are currently grappling with what can only be described as 'persistent' (Loorbach, 2010) water challenges. This term, 'persistent ', underscores the urgent and complex interplay between physical issues like scarcity, pollution, flooding, and unequal access, deeply intertwined with societal and governance-related factors (Kumar, 2018; McKenzie & Ray, 2009; Pandit & Biswas, 2019a; World Bank, 1999). These persistent challenges are not just a matter of concern but a call to action, demonstrating entanglement with entrenched social hierarchies, such as caste, gender, seniority, governance issues like siloed operations, a predilection for technological fixes, and engineering-centric solutions that often exacerbate unequal access. This is especially pronounced in India's secondary cities, where rapid urbanisation, population growth, and constrained resources intensify the struggle to meet escalating demands (Cities Alliance, 2019; Pathirana et al., 2018; Sankhe et al., 2010). The inadequacy of conventional approaches is increasingly evident, underscoring the pressing need for a paradigm shift in urban water management (Mihir Shah Committee, 2016).

The WSC paradigm, or 'water sensitivity,' is a compelling response to these multifaceted challenges. The WSC paradigm proposes an integrated approach that harmonises water supply, sanitation, and stormwater management with the goals of equity, sustainability, and social cohesion (Bettini et al., 2012; Bichai & Flamini, 2017; Fletcher et al., 2015; Mguni et al., 2022; Wong & Brown, 2009). However, adopting the WSC paradigm within India's resource-constrained, culturally diverse, and post-colonial context requires governance capacities attuned to deep-rooted socio-political inequities. In the absence of such transformative governance, introducing new values risks reinforcing existing hierarchies and inequalities, ultimately exacerbating the very issues it aims to address (Giordano & Shah, 2014).

As India navigates this post-colonial landscape, it continues to grapple with legacies of internal colonialism. The uncritical adoption of Global North approaches introduces considerable risks, as bureaucratic hierarchies, entrenched caste and class structures, and a persistent reliance on colonial knowledge frameworks perpetuate the marginalisation and exclusion of indigenous and local practices (Dey, 2019; Sultana, 2023). A critical engagement with these dynamics is essential, as the wholesale application of external models risks deepening existing inequalities and obstructing the potential for genuine and equitable change.

Within this context, the concept of reparative governance emerges as a helpful approach to conceive of and embed transformative governance in the global South context. Reparative governance aims to directly address socio-political inequities and historical injustices that conventional approaches often overlook (Broto et al., 2021; Cadieux et al., 2019). Grounded in the principles of justice and equity, as articulated by Broto et al. (2021), reparative governance seeks to intertwine the process of transformation with restorative justice, ensuring that the benefits of transformation are not only equitable but also sustainable across generations (Forsyth et al., 2022). In absence of such approach, the risk looms large that efforts to implement water-sensitive management will succumb to superficial changes—often dismissed as greenwashing—wherein the underlying socio-political issues remain unaddressed or are exacerbated by the reinforcement of exclusionary value systems.

This research conceptualises the capacities for reparative governance to interrogate informality as a crucial governance modality in Indian cities. The forthcoming section provides a critical review of the literature that underpins the development of this framework.

4.2. Decolonising transformation: Pathways to reparation

4.2.1. Coloniality and the need to decolonise governance

Although India achieved formal independence from British colonial rule in 1947, the vestiges of colonialism persist in the form of internal coloniality, where power remains concentrated in the hands of a privileged elite who exert control over marginalised groups (Dey, 2019). This enduring influence, often described as a 'colonial hangover,' continues to shape socio-environmental policies favouring rapid development and extractive practices at the expense of ecological sustainability (Calvert, 2001; Chavez, 2011; D'Souza, 2002; Sultana, 2023). Far from being mere remnants of the past, these colonial structures represent a deliberate continuation of what Arora & Stirling (2023) term' colonial modernity.' This modernity perpetuates itself through mechanisms like the 'extension of controlling imaginations' and the 'expansion of toxic extraction,' which sustain the dominance of colonial logic in contemporary governance.

In the realm of urban water governance, these colonial logics are particularly glaring. As Sultana (2023) highlights, colonial modernity within water governance entrenches power structures within organisations, institutions, and political frameworks, echoing the hierarchies established during British rule. This is evident in prioritising large-scale, technocratic projects—such as dams and centralised water systems—often heralded as symbols of modernity. However, these projects are, in reality, a continuation of colonial ambitions to control and exploit natural resources for economic gain (Kaika, 2004). While ostensibly modern, such initiatives frequently disregard local knowledge systems and the needs of marginalised communities, leading to the displacement of populations and disruption of natural water cycles (Kaika, 2004).

Moreover, D'Souza (2006) provides a historical perspective on how British colonial administrators reconfigured local flood management systems, shifting from practices that harmonised with

natural flood cycles to a more controlling, domestication-oriented approach. This colonial rationality has left India grappling with significant water-related crises, which can be directly traced to these entrenched logics. Arora & Stirling (2023) describe this as the 'expansion of toxic extraction,' a practice that persists in contemporary policies favouring resource-intensive approaches, such as deep groundwater extraction and extensive river diversions. While framed as essential for development, these policies systematically undermine environmental sustainability and social justice. The continued exploitation of natural resources under the guise of modernisation underscores the urgent need to dismantle these entrenched colonial logics that persistently exploit and marginalise vulnerable communities.

The influence of coloniality extends beyond physical infrastructure and practices, as it deeply permeates the very frameworks of knowledge and the construction of meaning within water governance. At the core of this ongoing influence is what Arora & Stirling (2023) term the 'extension of controlling imaginations.' This aspect encapsulates a colonial mindset that persistently views local ecosystems and communities as assets to be controlled and exploited for economic gain. This mindset, rooted in colonial legacies, continues to shape contemporary governance, where top-down, technocratic approaches are often imposed, side-lining the wisdom embedded in local knowledge systems and disregarding the lived experiences of marginalised communities. These modern practices, cloaked in the rhetoric of progress, are, in actuality, a continuation of the same exploitative logic that has long marginalised these communities and degraded their environments.

To genuinely decolonise water governance, there is an urgent need to undergo a process of unlearning, undoing, and relearning (Asadullah, 2021). This involves not only dismantling existing frameworks of control and extraction but also actively rejecting the ongoing influence of colonial modernity in environmental management. Recognising this necessity compelled me to explore alternative, localised approaches to transformative governance.

As I will elaborate in the following sections, this study situates and advances transformative governance in India through the approach of *reparation*, a process aimed at addressing and rectifying the enduring impacts of coloniality on water management practices.

4.2.2. Decolonialising transformation through reparation

In rethinking urban water governance in India, it becomes increasingly apparent that the conventional models of transformative governance—predominantly shaped by perspectives from the Global North—are not fully equipped to address the intricate socio-historical and ecological contexts of this region. These models often presuppose a pathway to transformation that can be resource-intensive and, if not carefully managed, risks eroding accountability and deepening existing social divides (Giordano & Shah, 2014).

In the literature on sustainability and resilience, there is a growing recognition that pursuing transformative goals, while necessary, is not sufficient in itself. It is urgent that these goals

intersect with justice-oriented objectives to ensure that transformative actions remain transparent and accountable (Lele et al., 2018b). In this light, the management of water must be envisioned in ways that are both ecologically sustainable and socially just (Bichai & Flamini, 2017). Examples of this can be seen in initiatives such as the restoration of urban lakes, which, while seemingly positive, can inadvertently lead to processes like gentrification, disproportionately affecting indigenous populations and marginalised communities (H. Kim & Jung, 2019). This underscores the critical need to intertwine sustainability efforts with justice goals, ensuring that our actions do not result in exclusionary or inequitable outcomes (Lele et al., 2018).

To navigate these complexities, I find it useful to engage with the concept of 'reparation' or 'repair' as a mode of transformation. In reviewing the literature, two distinct understandings of repair emerge. The first, often viewed through the lens of maintenance, is concerned with restoring systems to their original state or capacity (Henke, 2017; Houston, 2017). This approach is typically reactive, addressing breakdowns or failures within existing systems. While it may be necessary in certain circumstances, this form of repair can inadvertently reinforce the status quo. However, repair has the potential to be a deliberate and strategic mode of transformation, offering hope for a more equitable future.

The second understanding of repair, which resonates more deeply with me, frames it as a transformative action. In this context, repair is not merely a technical intervention but a deeply political and social process to address the colonial extractive practices embedded within our urban water systems. It seeks to foster long-term, intergenerational healing (Bhan, 2019; Broto et al., 2021; Cadieux et al., 2019; Durbach, 2016; Webber et al., 2022). Responding to Lele et al.'s (2018) call for the integration with justice goals, this notion of reparative governance is grounded in the principles of restorative justice, emphasising healing, reconciliation, and the mending of relationships as central to the pursuit of sustainability (M. Forsyth et al., 2022; Gibbs, 2009; M. Kim, 2021; Vasilescu, 2022). Scholars such as Frick-Trzebitzky (2017) and Ureta (2014) also argue that repair can be reimagined as a proactive, iterative process that integrates new practices with existing traditions to mend towards contextually appropriate solutions.

Therefore, I conceptualise repair as an incremental, iterative process that actively seeks to heal the divisions wrought by historical injustices. It is a process that draws on cultural knowledge and local practices, ensuring relevance and avoiding the perpetuation of harm. Crucially, this form of repair cannot be imposed from above; it must emerge organically, in alignment with the emancipatory processes described by Ghosh et al. (2021). Through this reparative lens, we can reimagine water governance in India—not as a series of superficial fixes but as a deeper transformation that genuinely serves the diverse needs of all communities. In particular, for the secondary cities in India, where financial limitations, social stratification, and colonial legacies intersect in complex ways, the idea of reparation becomes crucial. It is through this lens that we might begin to address the social inequities that undermine our water sensitivity goals.

To mobilise this transformative approach, the role of informality is crucial. Informality provides the flexibility needed to effectively implement reparative practices, particularly in India's secondary cities' dynamic and often urgent conditions. By leveraging the capacities of informal networks, repair can transcend its traditional boundaries and become a powerful tool for systemic transformation. This approach not only addresses immediate crises but also lays the groundwork for long-term, sustainable change in urban water governance.

4.3. Understanding how informality contributes to capacities towards reparation

While the study could have moved directly to framing capacities from this point, doing so would have inadvertently assumed a formal governance context— one typically characterised by structured, procedure-driven decision-making processes, where actors come together within an established governance hierarchy, government-centred, with relevant regulatory tools and mechanisms to enable coordinated implementation of solutions (Innes et al., 2007; Meijer & Ernste, 2019; Weber et al., 2009). However, this assumption does not hold true, in most countries, but especially in a post-colonial context like India. Here, governance arrangements are complex, characterised by a rich social and cultural fabric intertwined with a constant state of crisis. Such a setting often renders formal governance structures inadequate for providing the necessary adaptability and responsiveness.

Informal governance prevails in India but is often overlooked or dismissed as unsuitable (Anand, 2017; Burt & Ray, 2014; Ranganathan, 2014; Roy, 2009). While informality is often utilised to categorise housing, locality, and labour in most literature, contemporary scholars review it as a mode of operation (Ahlers et al., 2014; Cleaver, 2002; Kooy, 2014; McFarlane, 2019; Roy, 2005; Wahby, 2021). However, while informal governance offers adaptability, it also carries risks, such as the potential to perpetuate inequalities or be co-opted by powerful actors if not carefully managed (Funder & Marani, 2015). Furthermore, recognising that informal governance can occasionally yield outcomes lacking in accountability and transparency, I nevertheless seek to explore how this form of governance might be leveraged to enable reparative practices. I aim to build upon the potential of informality while devising approaches that address its pitfalls.

In this study, I explore the potential role of informality in facilitating reparative governance. While scholars have extensively described, illustrated, and analysed informal governance, they have not yet demonstrated how its attributes can be mobilised to proactively achieve reparative urban water governance. With its inherent plurality and obscurity, the interpretation of informality presents a challenge in developing a structured framework that effectively captures its agency and potential (Ahlers et al., 2014) Below, I delve into the literature on informal governance to elucidate its reparative acumen, which could be harnessed to develop a capacity framework.

Informality governance represents a complex and dynamic 'organising logic' (Roy, 2009) that emerges within deregulated environments. This organising logic is crucial in contexts where

formal governance structures are insufficient or disconnected from local realities. Informality mobilises authority, personnel, and knowledge within existing constraints, facilitating the co-production of services and blending formal and informal practices to create hybrid governance systems (Ahlers et al., 2014; McFarlane, 2019; K. Schwartz et al., 2015; Wahby, 2021). These blending challenges the formal-informal divide and allows for greater flexibility and innovation, particularly in contexts where rigid formal mechanisms fall short (Cawood et al., 2022; McFarlane, 2019; Misra, 2014; K. Schwartz et al., 2015; Wahby, 2021).

Moreover, informality plays a critical role in reconfiguring power dynamics by breaking down the centralised control typical of formal institutions. This enables more inclusive and adaptive governance arrangements necessary for reparation. Southern cities often operate through a complex, ephemeral web where entities coordinate differentially, showcasing their ability to adapt to various situations and contexts (Jaglin, 2014). This adaptability highlights the mutually constitutive relationship between formal and informal practices, fostering new collective meanings and goals through negotiation and collaboration (McFarlane, 2012, 2019).

By challenging entrenched power hierarchies, informality empowers marginalised groups to participate in governance processes, fostering a more equitable distribution of resources and opportunities. As both state and non-state actors adapt and innovate within deregulated environments, they create governance models that are more responsive to local needs and realities (Funder & Marani, 2015). Informality is not merely a reaction to the absence of formal regulation but a strategic mode of governance that reconfigures power dynamics and offers innovative solutions to complex socio-political challenges (Ahlers et al., 2014; K. Schwartz et al., 2015).

Also, the multi-scalar nature of informal governance operates simultaneously at various levels—from local communities to regional and national scales (Cleaver, 2002; Funder & Marani, 2015; Mayaux et al., 2022). As informal practices gain traction and are widely adopted, they can influence broader governance frameworks, leading to systemic change. This potential for upscaling is critical where formal governance structures are either too rigid or too disconnected from on-the-ground realities. By enabling the diffusion of innovative practices across different scales, informality can contribute to transforming entire governance regimes, making them more adaptable to changing social and environmental conditions.

Informality in governance, particularly in water management, possesses significant reparative potential. Its process of creatively adapting and blending different elements to address complex challenges fosters socio-ecological sustainability. Informal practices, rooted in local knowledge and values, often arise out of necessity in resource-constrained environments. While they can lead to sustainable, context-specific solutions, the extent to which informality drives sustainable transformations depends on its capacity to challenge and reshape dominant paradigms of resource use (Mayaux et al., 2022).

At its core, informality in governance is characterised by its humane aspect, relying on intrinsic motivations and emotional intelligence. This supports the agency in collectively building and sustaining a speculative vision (Badami, 2018; Córdoba et al., 2021; Funder & Marani, 2015). This capacity encourages the design and implementation of frugal innovation driven by individual interest, though it also acknowledges that intrinsic drives can be self-serving or altruistic.

Thus far, the interpretation of informality, with its attributes of plurality and obscurity, has posed significant challenges in creating a structured framework that effectively captures and mobilises its agency (Ahlers et al., 2014; K. Schwartz et al., 2015). The lens of governance capacities offers a valuable means to bridge this gap by harnessing the action-oriented potential of informality to facilitate reparative governance.

To operationalise informality within this context, I focus on two key capacities: *consolidative* and *jugaadu.* These capacities offer a way to engage with the nuances of informal practices in a manner that honours their potential for reparation. *Consolidative* capacity refers to the ability to bring together diverse groups, fostering the conditions necessary for self-organisation and sustained, inclusive collaboration. This capacity is crucial in contexts where formal structures may fail to accommodate the complexities of local governance. *Jugaadu* capacity, meanwhile, embodies the resourcefulness and adaptability that are often necessary in post-colonial settings, allowing actors to navigate and challenge the lingering effects of colonial legacies. Through frugal innovation and contextually appropriate strategies, *jugaadu* capacity helps address water challenges in ways that are both feasible and locally resonant.

These capacities provide a lens through which to understand how informality can be more than a stopgap measure or a response to the absence of formal regulation. Instead, when viewed through the governance capacity framework, informality emerges as a strategic mode of governance that reconfigures relationships between state and non-state actors blurs the boundaries between legality and illegality and offers innovative solutions to complex socio-political challenges. By focusing on these capacities, I aim to explore how informal practices, despite their inherent complexities, can be harnessed as a catalyst for social justice and environmental sustainability.

The governance capacity framework also enables us to delve deeper into the agency of actors within informal governance. It reveals both conscious and subconscious motivations behind their actions, as Cleaver (2002) highlighted. Drawing on Latour's (2007) theorisation of agency, I acknowledge that actions within these capacities are often non-linear and unintentional, challenging the reduction of informality's complexities into overly simplistic models. Recognising the varied worldviews, motivations, and intentions that actors bring to the table allows us to appreciate the diversity of practices that informality fosters. This understanding is critical in decolonising traditional governance approaches, which often impose rigid frameworks that do not align with local realities.

Furthermore, it is essential to recognise that both agency and institutions, as products of colonialism, can perpetuate colonial structures. The socio-political power arrangements embedded in everyday practices frequently reinforce these entrenched structures, often maintained by elite groups with authoritative power. The conditions that support the capacities of informality are thus crucial in determining whether informality is truly reparative and, if so, to what extent.

Drawing inspiration from the transformative urban climate governance model developed by Hölscher, Frantzeskaki, et al. (2019), this framework offers a pathway to address the specific challenges of reparative informal water governance. By focusing on consolidative and *jugaadu* capacities, this approach connects the activities of informal actors with emerging governance arrangements, providing insights into how informality can be mobilised to achieve reparative outcomes and enhance water sensitivity in resource-constrained contexts.

4.4. Iterative methodology for developing the capacities framework

The framework I present here identifies two interdependent capacities of informality—**consolidative** and ***jugaadu***—that are crucial in driving reparation by highlighting the conditions supporting its underlying organising logic. While this dissertation focuses on the final framework, it is also imperative to discuss the iterative process through which this framework evolved, particularly as a decolonial researcher committed to ensuring that it reflects the complexities and realities on the ground.

In previous sections, I underscored the complexities of informality, shaped by subconscious motivations, and influenced by intricate cultural and resource constraints. It became evident that the framework could not be constructed from existing literature, especially given that much of this literature is rooted in the Global North, with only a few contributions from the Global South. At the outset, the scarce availability of transformative research on informality—particularly in the context of reparation—posed a significant challenge. The available literature included works by Indian and Southern scholars supported by Southern institutions (Bhan, 2019) and Southern scholars affiliated with Northern universities (Anand, 2017; Badami, 2018; Chattaraj, 2019; Ghosh et al., 2021). Additionally, there were contributions from Northern scholars funded by Northern organisations but working in Southern contexts (Ahlers et al., 2014; Cleaver, 2002; McFarlane, 2012). This body of work provided the initial foundation for the framework, offering insights into how informality could manifest as a mode of operation and a potential mode of transformation.

These writings furnished me with the vocabulary and initial conceptual tools, introducing nuances such as the term *'jugaad'*—a concept far more contextually appropriate than 'frugal innovation'. However, a notable realisation emerged during fieldwork: the normative foundation of repair became apparent only after observing the varied manifestations of transformative informality. This realisation underscored the necessity of integrating a justice-oriented perspective into the

framework; without this intersection, a framework solely focused on transformative informality would remain incomplete.

To illustrate the iterative process that led to the final framework, I outline three key iterations:

Framework 1: Pre-fieldwork, literature-informed conceptualisation
The initial framework emerged from a comprehensive review of existing literature. I consulted works on governance capacities akin to, or supportive of, consolidation, such as integration (Freeman et al., 2013), cooperation (Dang et al., 2016), flexibility (Termeer et al., 2015), collaboration (Ansell & Gash, 2008), integration and orchestration (Hölscher, Frantzeskaki, et al., 2019). Although I drew upon Bhan's (2019), conceptualisation of consolidation, the broader literature—primarily from Global North perspectives on governance, transition, and transformation studies—guided me in delineating consolidative capacity as fostering directionality and alignment through self-organisation. This resulted in a somewhat regimented framework, reflecting a 'saviour complex' embedded in much of the literature. Three key dimensions were identified: 1) establishing directionality by fostering diverse ownership over strategic goals (Benford & Snow, 2000; Hölscher, Frantzeskaki, et al., 2019; Wolfram, 2016) in addition to empowering actors to shape their environment in a targeted direction(Avelino et al., 2020); 2) mediating cross-boundary collaboration through roles like knowledge brokers (Pahl-Wostl, 2009), bureaucratic and policy entrepreneurs (Teske & Schneider, 2016), and 3) trust-building (Leahy & Anderson, 2008; Ubels et al., 2010). These dimensions emphasised the need for alignment towards larger goals, mediation to resolve discrepancies, and trust-building within actor coalitions.

In examining *jugaadu* capacity, I analysed governance capacities, including transformative (González & Healey, 2005; Hölscher, Frantzeskaki, et al., 2019), unlocking (Hölscher, Frantzeskaki, et al., 2019), connective (Bettini et al., 2016) and innovative (Furman et al., 2002) capacities. I specifically built on the transformative and unlocking capacities outlined by Hölscher, Frantzeskaki, et al. (2019), with a focus on embedding novelty creation and exposing unsustainable path dependencies, which were particularly pertinent to my research. These studies, however, often overlook Southern attributes such as frugality, constraint, improvisation, and resilience. Therefore, I further nuanced *jugaadu* capacity by integrating principles of frugality and local logic, encapsulated in the Indian notion of *jugaad*—an 'innovative fix' in Hindi (Badami, 2018).

Jugaad captures a range of practices, including makeshift solutions, frugal innovation, and temporary measures, which reflect resilience amidst material, monetary, political, and legal constraints (Badami, 2018). Due to the specificity of *jugaad*, I drew on literature from India and similar post-colonial contexts. For *jugaadu capacity*, I identified three dimensions: 1) collective ways of knowing (Wolfram, 2016b) to foster awareness of system dynamics, path dependencies, and obduracies (Burch & Robinson, 2007); 2) discrete crafting and improvisation (Chattaraj, 2019; Elmqvist et al., 2018; Kemerink-Seyoum et al., 2019), and 3) establishing credibility and

anchoring (Chattaraj, 2019; Ubels et al., 2010). This iteration of the framework emphasised innovation and action yet required more sensitivity to the existing cultures of repair and the subtleties of informal governance.

Framework 2: Fieldwork-informed revisions and on-site analysis

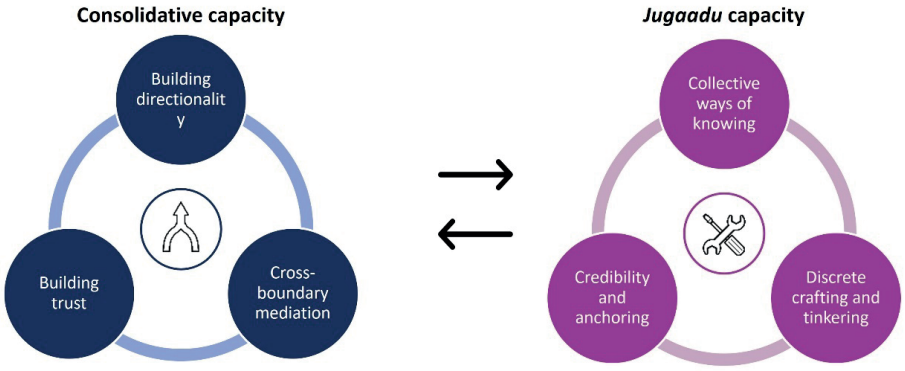


Figure 2: *Capacities framework: Version derived only from desk research*

My understanding of the framework evolved through field visits and visual ethnography. For example, the initial term 'building' within consolidative capacity implied a prescriptive, top-down approach. However, insights from the field prompted a re-evaluation of this terminology. Taking a decolonial perspective that values diversity and resists hegemonic structures, I replaced 'building' with 'veering' to reflect a more nuanced, inclusive approach to directionality. Literature on *veering* (Royle, 2011) supported this re-framing. Similarly, the dimension of mediation was refined to 'pragmatic mediation' to emphasise adaptation within existing constraints rather than imposing unrealistic ideals (Giordano & Shah, 2014). Field observations further highlighted that trust deficits differ significantly from distrust, shifting the focus towards 'rebuilding' trust rather than establishing it from scratch (Cheung, 2013; P. H. Kim et al., 2009; M. Williams, 2012). Consequently, the framework evolved to feature 1) veering directionality, 2) pragmatic mediation, and 3) rebuilding trust.

In my initial characterisation of *jugaadu capacity*, I focused solely on 'doing.' However, insights gained from workshops underscored the need to expand this to include 'unlearning' and 'learning' as essential components, a theme further explored by K. Becker (2008), Porter (2010), van Oers et al. (2023), and Visser (2017). This shift acknowledged that decolonising governance demands challenging entrenched wisdom and embracing alternative approaches. Fieldwork insights highlighted that it was not a lack of effort but rather a deficit in the recognition, routinisation, and validation of these efforts, as discussed by Dewulf et al. (2020). Thus, *jugaadu* capacity was revised to encompass 1) collective ways of knowing, 2) learning and unlearning, challenging conventional practices, and 3) establishing credibility and anchoring.

Framework 3: Post-analysis refinement and literature re-engagement

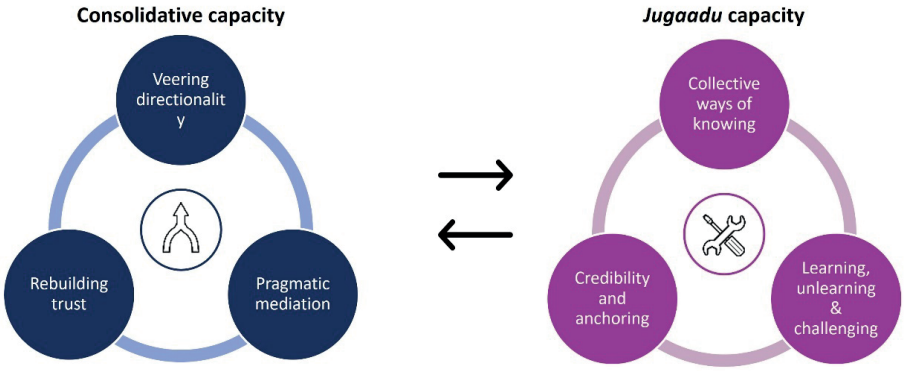


Figure 3: *Capacities framework revised after incorporating reflections from the field and the workshops*

The final iteration of the framework emerged during the analysis and writing phases, as I reconnected fieldwork findings with the literature, further refining the framework through abductive reasoning (Timmermans & Tavory, 2012). This phase involved recognising gaps where certain results did not align with existing dimensions, necessitating a rethinking and reconfiguration of the framework. This final version of the framework reflects a more comprehensive and nuanced understanding of the capacities required to effectively operationalise informality, integrating insights from field observations and scholarly literature.

The iterative process, informed by the literature review and fieldwork, enabled the development of a capacity framework that is theoretically rigorous and grounded in the practical realities of informality and its nuanced comprehension of reparation. By concentrating on consolidative and *jugaadu* capacities, the framework bridges the activities of actors with emerging governance structures, providing a critical perspective to understand how informality can be leveraged to achieve reparative outcomes and enhance water sensitivity in resource-constrained settings.

The latest version of the framework is described further.

4.5. The capacities framework: An overview

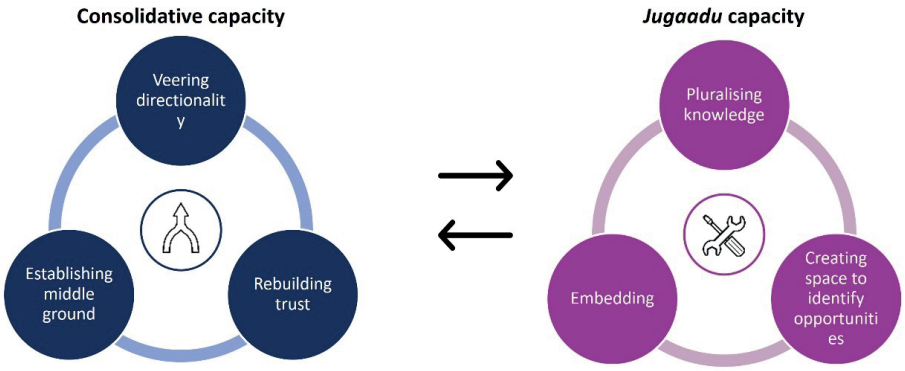


Figure 4: *Capacities framework enabling reparation*

4.5.1. Consolidative capacity

Consolidative capacity reflects the ability of actors to strengthen or develop conditions that facilitate the self-organisation of diverse groups. Bhan (2019) introduces the concept of 'consolidative' in the context of the Global South to describe the nuanced self-organisation and directional efforts evident in these settings. The term 'consolidate' is deliberately chosen for its connotation of uniting distinct entities into a cohesive whole while preserving their individual identities. It embodies a pluralistic approach that balances individual and collective roles, where actors with varied backgrounds and skills collaborate, challenging and reshaping traditional theories and methods to pursue a shared, forward-looking vision.

This dynamic is particularly pronounced when those who have experienced past injustices join forces with decision-makers working towards long-term goals within complex cultural and social frameworks. In such scenarios, informal governance structures become sites of healing, enabling actors to engage in processes that aim to mend through collaboration. Bhan (2019) further refines this concept by building on Hölscher et al.'s (2019) idea of orchestrating capacity, emphasising that consolidation transcends mere coordination in Southern contexts. It focuses on networks of healing rather than just task completion, adhering to mandates where associations are often voluntary, temporary, and discreet, facilitating better risk anticipation and a deeper understanding of diverse perspectives (Anand, 2017; Mayaux et al., 2022).

Incorporating the element of healing into reparation enriches consolidative capacity, encouraging sustained engagement, holistic thinking, and the inclusion of marginalised voices. It fosters the ability to appreciate viewpoints that have previously been dismissed. This capacity is driven by intrinsic motivation and perseverance, enabling actors to combine their varied agencies,

mandates, and interests to pursue restorative justice through informal means (Funder & Marani, 2015).

Enhancing consolidative capacity requires *veering directionality*—a process of aligning individual actions with broader, collective goals within institutional constraints (Dahlmann & Stubbs, 2023). This alignment is achieved by synthesising actions, sharing information, and fostering a collective sense of responsibility (Kudtarkar, 2021). Veering directionality nurtures a shared sense of duty and empathy, enhancing motivation and fostering emotional and intellectual collaboration that transcends mere incentivisation (Córdoba et al., 2021).

However, in contexts where distrust towards authorities, specific communities, actors, organisations, and particular disciplinary and knowledge systems, efforts might be perceived as isolated tasks rather than as part of a unified mission unless trust is actively rebuilt *(trust rebuilding).* Addressing distrust—a deeper and more complex issue than merely rectifying a trust deficit—requires acknowledging the vulnerabilities and concerns of marginalised groups wary of further mistreatment (P. H. Kim et al., 2009). To mend relationships and bolster consolidative capacity, clarifying the roles of actors, visibly demonstrating the efforts made by authorities, and effectively communicating these efforts are essential for rebuilding trust (Leahy & Anderson, 2008).

Establishing a middle ground through pragmatic mediation is critical. This approach creates essential frameworks, elucidates trade-offs, reinterprets local norms, and addresses translation challenges among diverse actors. Strategic brokers with systemic awareness and inter-scalar connectivity play a vital role in facilitating agreements in contexts where policies are disconnected or socially contentious (Funder & Marani, 2015; Mayaux et al., 2022). The middle ground encourages intellectual and emotional collaboration, creating spaces for understanding and aligning with collective goals, generating commitment to goals.

In the following section, a table will outline the specific activities that support or enable the conditions for consolidative capacity.

Dimensions	*Contribution of informality*
Veering directionality	Translating and aligning the goals of various delivery configurations with the larger mission (Huitema & Meijerink, 2013) Sparking intrinsic motivation to self-organise, align individual actions, and foster a sense of ownership towards the collective goal (Dahlmann & Stubbs, 2023; Huitema & Meijerink, 2010) Creating situated awareness that encourages forming alliances to collectively mitigate crises within institutional constraints (Córdoba et al., 2021; Kudtarkar, 2021; Zhao & Wu, 2020)
Rebuilding trust	Increasing familiarity with local staff and processes to build trust with the government or former transgressors (Leahy & Anderson, 2008) Assisting in organising events to rebuild a sense of community, which is essential for generating social trust and sustaining reciprocal interactions in heterogeneous neighbourhoods (Koshy & Smith, 2023; Leahy & Anderson, 2008) From the user's perspective, understanding the learning processes of the transgressor (authoritative party) helps mitigate distrust by acknowledging bureaucratic pressures, powerlessness, top-down management, legal discrepancies, and resource constraints (M. Williams, 2012) Publicising efforts and celebrating the success of technical skills and socio-ecological initiatives can help regenerate confidence in technical competency (Leahy & Anderson, 2008) Focusing on outreach and exploring avenues to address unchecked distrust (Cheung, 2013) aids in developing shared interests and values (Leahy & Anderson, 2008)
Establishing middle ground	Devising methods to provide usable legal tools, access to understandable data, and safe spaces to discuss failures(Huitema & Meijerink, 2010; M. Williams, 2012). Extending current mandates to support various forms of mediation, including boundary spanners, knowledge brokers, cultural mediators (Anand, 2011; Cleaver & Whaley, 2018; Jaglin, 2014b) and bureaucratic and policy entrepreneurs, in addition to the usual roles of leaders (Funder & Marani, 2015; Hughes & McKay, 2009; Mayaux et al., 2022) Highlighting the need for neutral, community-friendly organisations like schools, NGOs, and sports centres to serve as mediation spaces (Kudtarkar, 2021)

Table 4: *Dimensions and activities supporting consolidative capacity*

4.5.2. *Jugaadu* capacity

This capacity is characterised by the ability to improvise through contextually viable methodologies, ideologies, and organisational structures, aiming at dismantling colonial legacies and fostering inclusivity in addressing challenges within resource-constrained environments (Elmqvist et al., 2018; Funder & Marani, 2015). While some may question the novelty of such innovations due to their cost-effectiveness, their true value lies in the timely adaptation and repurposing of existing knowledge as conduits for reparation. *Jugaadu* capacity encourages a flexible and adaptive approach to governance, integrating local knowledge and practices

to address historical injustices and fostering long-term healing and sustainability in water management (Cawood et al., 2022; Wahby, 2021).

Furthermore, *jugaadu* capacity is evident in efforts to *pluralise knowledge* by challenging entrenched disciplinary, geographic, institutional, and epistemological hegemonies. It promotes engagement with diverse forms of knowledge, including those that have been marginalised, to establish channels for transdisciplinary exchanges (Yates et al., 2017). This capacity thrives not only on scientific data but also on acknowledging collective memory—current and past experiences that aid in anticipating risks, identifying opportunities, and informing the efficiency of policies and mandates (Funder & Marani, 2015; Sultana, 2023). Given the persistence of coloniality, which often subordinates Indigenous, feminist, and socio-ecological practices, making space for this 'othered' knowledge becomes an integral dimension of *jugaadu* capacity (Sultana, 2023). This process also entails unlearning entrenched beliefs and relearning or re-establishing Indigenous practices that have been dismissed, which is central to the functioning of this capacity.

Frugality characterises this capacity as it is manifested through efforts to *create safe spaces for* deliberation, prioritisation, and the *identification of opportunities.* This fosters persistent optimism and courage in the face of uncertainty and fear of failure, reducing reliance on external justification and using constraints as resources for reparation (Funder & Marani, 2015). The decolonial perspective further underscores that opportunities do not necessarily involve action but also the critical process of undoing. The embeddedness of unsustainable practices can be painful to undo, as it impacts associated dependent practices. Therefore, creating informal processes that support methods such as storytelling to share failures is crucial, revealing new possibilities and fostering a more contextual approach (van Borek & Abrams, 2023; Ziervogel et al., 2016).

Moreover, *jugaadu* capacity is manifested in efforts to *embed improvisations* within the socio-political fabric. By relying on organic, informal arrangements and a flexible, trial-and-error methodology, communities can continuously adapt and refine processes, fostering a deep sense of ownership over the work rather than simply aiming for specific outcomes (Haapala et al., 2016). Informal collaborative decision-making is key to overcoming the rigidity of unsustainable practices, allowing for critical assessment and resistance to top-down approaches. This approach creates room for more contextually relevant solutions better suited to local conditions (Cleaver, 2002; Funder & Marani, 2015). At the heart of this capacity is the ability of actors to use their courage and emotional intelligence to discern when and how to implement these improvisations effectively within their specific contexts (Chandran et al., 2014; Kudtarkar, 2021; Zhao & Wu, 2020). However, improvisations could also risk perpetuating colonial structures and inequalities without careful consideration. Therefore, experiential, and systemic knowledge is crucial for assessing the broader socio-political context and ensuring that these improvisations challenge and transform existing power dynamics rather than reinforce them (Mayaux et al., 2022).

Below, I outline the specific activities and conditions that support and enable *jugaadu* capacity.

Dimensions	***Contribution of informality***
Pluralising knowledge	Acknowledging past events (significant or insignificant) to anticipate risks, identify opportunities, and enhance the effectiveness of policies and mandates (Funder & Marani, 2015; Haapala et al., 2016) Drawing on diverse forms of knowledge to build resilience in the face of uncertainty, integrating various perspectives and experiences (Koshy et al., 2022) Supporting the inclusion of Indigenous knowledge to challenge colonial systems and ensure that Indigenous perspectives are respected and valued in decision-making processes (Sultana, 2023)
Creating space to identify opportunities	Promoting alternative methods of narrative and experience-sharing to share successes and learn from community experiences, revealing new possibilities and fostering innovation (van Borek & Abrams, 2023; Ziervogel et al., 2016) Creating safe platforms for deliberation and dissent, where even failures can be openly discussed, assessed, and learned from, encouraging continuous improvement (Chattaraj, 2019; Cornwall, 2004; Healey, 1997)
Embedding	Facilitating continuous adaptation through trial-and-error methodologies fostering a sense of ownership over processes rather than just focusing on outputs (Haapala et al., 2016) Utilising bricolage to integrate local knowledge and practices ensuring that innovations are embedded within the cultural and social fabric of the community, thereby enhancing their relevance and sustainability (Funder & Marani, 2015; Haapala et al., 2016; Mayaux et al., 2022) Enabling flexible and organic institutional designs that allow communities to modify and adapt innovations over time, fostering long-term resilience and reducing dependence on rigid, top-down structures (Haapala et al., 2016)

Table 5: *Dimensions and activities supporting jugaadu capacity*

4.6. Further applications

The capacities framework serves as a crucial tool for analytically assessing and proactively nurturing city governance capacities, aiming towards reparative water governance in cities of the Global South. In Chapter 5, the framework's utility is demonstrated in assessing the extent of the development of these capacities and supporting governance actors to enable reparation. Further, Chapters 6 and the Intermezzo outline the potential of this framework to facilitate transformative research approaches aimed at co-creating actionable strategies within a transdisciplinary research setting.

Additionally, the framework has provided five guiding considerations for structuring my research on reparative water governance. These considerations build on insights from Hölscher et al.'s (2019) capacities framework for transformative climate governance. Firstly, it facilitates an intergenerational perspective by integrating Indigenous practices and addressing historical

injustices. This approach aspires to extend beyond traditional sectoral boundaries, grounding governance in restorative justice principles and illuminating the synergies and trade-offs among competing objectives, enriching urban water governance with a comprehensive and inclusive viewpoint.

Secondly, the framework offers an agency-based understanding of governance by emphasising the role of intrinsic motivations and subconscious aspects of repair. It humanises governance capacities, acknowledging the complexity of these processes and affirming Indigenous practices that have been marginalised by conventional, often colonial, resource management strategies. This focus on agency highlights the deeper, often overlooked, drivers behind effective governance.

Thirdly, the framework challenges the often-negative perceptions of informality, rooted in colonial legacies, by advocating for decolonisation through culturally relevant concepts such as 'pragmatic' mediation and *'jugaad.'* These concepts are more attuned to the local cultural logic, thereby enhancing the operationalisation of capacities and offering a more contextually appropriate approach to reparative governance.

Fourthly, the framework elucidates the interconnectedness of consolidative and *jugaadu* capacities, demonstrating their cumulative potential for reparation. It guides the reassessment and realignment of coalitions, ensuring they are better equipped to pursue long-term goals of restorative justice. This interplay between capacities enables a more dynamic and responsive approach to governance.

Finally, by identifying capacity gaps, the framework critically assesses whether efforts are genuinely reparative or merely reactive. It sheds light on the cultural relevance and feasibility of reparative initiatives, helping to nurture these capacities strategically within urban governance structures. This capacity to identify and address gaps ensures that governance efforts align with social justice and sustainability goals.

References

Ahlers, R., Cleaver, F., Rusca, M., & Schwartz, K. (2014). Informal space in the urban waterscape: Disaggregation and co-production of water services. *Water Alternatives*, *7*(1), 1–14.

Anand, N. (2011). Pressure: The politechnics of water supply in Mumbai. *Cultural Anthropology*, *26*(4), 542–564.

Anand, N. (2017). *Hydraulic City: Water and the Infrastructures of Citizenship in Mumbai* (2017th ed.). Oxford University Press. https://doi.org/10.1215/9780822373599

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory*, *18*(4), 543–571.

Arora, S., & Stirling, A. (2023). Colonial modernity and sustainability transitions: A conceptualisation in six dimensions. *Environmental Innovation and Societal Transitions*, *48*, 100733.

Asadullah, M. (2021). Decolonization and Restorative Justice: A Proposed Theoretical Framework. *Decolonization of Criminology and Justice*, *3*(1), 27–62.

Avelino, F., Dumitru, A., Cipolla, C., Kunze, I., & Wittmayer, J. (2020). Translocal empowerment in transformative social innovation networks. *European Planning Studies*, *28*(5), 955–977. https://doi.org/10.1080/09654313.2019.1578339

Badami, N. (2018). Informality as Fix. *Third Text*, *32*(1), 46–54. https://doi.org/10.1080/09528822.2018.1442190

Becker, K. (2008). Unlearning as a driver of sustainable change and innovation: three Australian case studies. *International Journal of Technology Management*, *42*(1–2), 89–106. https://doi.org/10.1504/IJTM.2008.018062

Benford, R. D., & Snow, D. A. (2000). Framing processes and social movements: An overview and assessment. *Annual Review of Sociology*, *26*(Volume 26, 2000), 611–639. https://doi.org/10.1146/ANNUREV.SOC.26.1.611/CITE/REFWORKS

Bettini, Y., Farrelly, M., De Haan, F. J., & Brown, R. (2012). Achieving water sensitive cities: Institutions as building blocks of collective action. *WSUD 2012 - 7th International Conference on Water Sensitive Urban Design: Building the Water Sensitive Community, Final Program and Abstract Book*, *February*.

Bettini, Y., Rijke, J., Farrelly, M., & Brown, R. (2016). Connecting levels and disciplines: Connective capacity of institutions and actors explored. In *Water Governance as Connective Capacity* (pp. 129–149). https://doi.org/10.4324/9781315547626-7

Bhan, G. (2019). Notes on a Southern urban practice. *Environment and Urbanization*, *31*(2), 639–654. https://doi.org/10.1177/0956247818815792

Bichai, F., & Flamini, A. C. (2017). The Water-Sensitive City: Implications of an urban water management paradigm and its globalization. *Wiley Interdisciplinary Reviews: Water*, *5(3)* (December 2017), 1–9. https://doi.org/10.1002/wat2.1276

Broto, V. C., Westman, L., & Huang, P. (2021). Reparative innovation for urban climate adaptation. *Journal of the British Academy*, *9*(s9), 205–218.

Burch, S., & Robinson, J. (2007). A framework for explaining the links between capacity and action in response to global climate change. *Climate Policy*, *7*(4), 304–316. https://doi.org/10.1080/14693062.2007.9685658

Burt, Z., & Ray, I. (2014). Storage and non-payment: Persistent informalities within the formal water supply of Hubli-Dharwad, India. *Water Alternatives*, *7*(1), 106–120.

Cadieux, K. V., Carpenter, S., Liebman, A., Blumberg, R., & Upadhyay, B. (2019). Reparation ecologies: Regimes of repair in populist agroecology. *Annals of the American Association of Geographers*, *109*(2), 644–660.

Calvert, P. (2001). Internal colonisation, development, and environment. *Third World Quarterly*, *22*(1), 51–63.

Cawood, S., Wahby, N., & Ferrara, L. N. (2022). Hybridity in Practice: Responding to Water Insecurity in São Paulo, Dhaka, and Cairo. *Water Alternatives*, *15*(3), 688–708.

Chandran, P., Shekar, N., Abubaker, M., & Yadav, A. (2014). Waste management & resource utilisation. *Waste Management & Resource Utilisation*.

Chattaraj, S. (2019). Informality and state 'jugaad': how urban governance works in Mumbai. In *Working Papers*. https://www.academia.edu/36781819/Informality_and_State_Jugaad_How_Urban_Governance_Worksin_Mumbai

Chavez, J. R. (2011). Aliens in Their Native Lands: The Persistence of Internal Colonial Theory. *Journal of World History*, *22*(4), 785–809. http://www.jstor.org.eur.idm.oclc.org/stable/41508018

Cheung, A. B. L. (2013). Public governance reform in Hong Kong: rebuilding trust and governability. *International Journal of Public Sector Management*, *26*(5), 421–436. https://doi.org/10.1108/IJPSM-05-2013-0070

Cities Alliance. (2019). *Connecting systems of secondary cities*. Cities Alliance/UNOPS Brussels.

Cleaver, F. (2002). Reinventing institutions: Bricolage and the social embeddedness of natural resource management. *The European Journal of Development Research*, *14*(2), 11–30. https://doi.org/10.4324/9780203045886

Cleaver, F., & Whaley, L. (2018). Understanding process, power, and meaning in adaptive governance. *Ecology and Society*, *23*(2). https://doi.org/10.5751/ES-10212-230249

Córdoba, D., Peredo, A. M., & Chaves, P. (2021). Shaping alternatives to development: Solidarity and reciprocity in the Andes during COVID-19. *World Development*, *139*, 105323. https://doi.org/https://doi.org/10.1016/j.worlddev.2020.105323

Cornwall, A. (2004). Spaces for transformation? Reflections on issues of power and difference in participation in development. In S. Hickey & G. Mohan (Eds.), *Participation: From tyranny to transformation? Exploring new approaches to participation in development* (pp. 75–91). Zed Books.

Dahlmann, F., & Stubbs, W. (2023). Purpose framing as an informal governance approach to sustainability transformations in the private sector. *Earth System Governance*, *15*, 100165. https://doi.org/https://doi.org/10.1016/j.esg.2023.100165

Dang, T. K. P., Visseren-Hamakers, I. J., & Arts, B. (2016). A framework for assessing governance capacity: An illustration from Vietnam's forestry reforms. *Environment and Planning C: Government and Policy*, *34*(6), 1154–1174.

Dewulf, A., Klenk, N., Wyborn, C., & Lemos, M. C. (2020). Usable environmental knowledge from the perspective of decision-making: the logics of consequentiality, appropriateness, and meaningfulness. *Current Opinion in Environmental Sustainability*, *42*, 1–6. https://doi.org/https://doi.org/10.1016/j.cosust.2019.10.003

Dey, D. (2019). India: The context of its current internal colonialism. *Shifting Forms of Continental Colonialism: Unfinished Struggles and Tensions*, 249–272.

D'Souza, R. (2002). Colonialism, Capitalism and Nature: Debating the Origins of Mahanadi Delta's Hydraulic Crisis (1803-1928). *Economic and Political Weekly*, 1261–1272.

D'Souza, R. (2006). Water in British India: the making of a 'colonial hydrology.' *History Compass*, *4*(4), 621–628.

Durbach, A. (2016). Towards reparative transformation: Revisiting the impact of violence against women in a post-TRC South Africa. *International Journal of Transitional Justice*, *10*(3), 366–387.

Elmqvist, T., Siri, J., Andersson, E., Anderson, P., Bai, X., Das, P. K., Gatere, T., Gonzalez, A., Goodness, J., Handel, S. N., Hermansson Török, E., Kavonic, J., Kronenberg, J., Lindgren, E., Maddox, D., Maher, R., Mbow, C., McPhearson, T., Mulligan, J., … Vogel, C. (2018). Urban tinkering. *Sustainability Science*, *13*(6), 1549–1564. https://doi.org/10.1007/s11625-018-0611-0

Fletcher, T. D., Shuster, W., Hunt, W. F., Ashley, R., Butler, D., Arthur, S., Trowsdale, S., Barraud, S., Semadeni-Davies, A., Bertrand-Krajewski, J. L., Mikkelsen, P. S., Rivard, G., Uhl, M., Dagenais, D., & Viklander, M. (2015). SUDS, LID, BMPs, WSUD and more – The evolution and application of terminology surrounding urban drainage. *Urban Water Journal*, *12*(7), 525–542. https://doi.org/10.1080/1573062X.2014.916314

Forsyth, M., Pali, B., & Tepper, F. (2022). Environmental restorative justice: An introduction and an invitation. In B. Pali, M. Forsyth, & F. Tepper (Eds.), *The Palgrave Handbook of Environmental Restorative Justice* (pp. 1–23). Springer. https://doi.org/10.1007/978-3-031-04223-2

Freeman, M. C., Ogden, S., Jacobson, J., Abbott, D., Addiss, D. G., Amnie, A. G., Beckwith, C., Cairncross, S., Callejas, R., Colford Jr, J. M., Emerson, P. M., Fenwick, A., Fishman, R., Gallo, K., Grimes, J., Karapetyan, G., Keene, B., Lammie, P. J., MacArthur, C., … Utzinger, J. (2013). Integration of Water, Sanitation, and Hygiene for the Prevention and Control of Neglected Tropical Diseases: A Rationale for Inter-Sectoral Collaboration. *PLOS Neglected Tropical Diseases*, *7*(9), e2439. https://doi.org/10.1371/journal.pntd.0002439

Frick-Trzebitzky, F. (2017). Crafting adaptive capacity: Institutional bricolage in adaptation to urban flooding in Greater Accra. *Water Alternatives*, *10*(2), 625–647.

Funder, M., & Marani, M. (2015). Local bureaucrats as bricoleurs. The everyday implementation practices of county environment officers in rural Kenya. *International Journal of the Commons*, *9*(1), 87–106. https://doi.org/10.18352/ijc.526

Furman, J. L., Porter, M. E., & Stern, S. (2002). The determinants of national innovative capacity. *Research Policy*, *31*(6), 899–933. https://doi.org/10.1016/S0048-7333(01)00152-4

Ghosh, B., Ramos-Mejía, M., Machado, R. C., Yuana, S. L., & Schiller, K. (2021). Decolonising transitions in the Global South: Towards more epistemic diversity in transitions research. *Environmental Innovation and Societal Transitions*, *41*, 106–109. https://doi.org/https://doi.org/10.1016/j.eist.2021.10.029

Gibbs, M. (2009). Using restorative justice to resolve historical injustices of Indigenous peoples. *Contemporary Justice Review*, *12*(1), 45–57.

Giordano, M., & Shah, T. (2014). From IWRM back to integrated water resources management. *International Journal of Water Resources Development*, *30*(3), 364–376. https://doi.org/10.1080/07900627.2013.851521

González, S., & Healey, P. (2005). A sociological institutionalist approach to the study of innovation in governance capacity. *Urban Studies*, *42*(11), 2055–2069. https://doi.org/10.1080/00420980500279778

Haapala, J., Rautanen, S. L., White, P., Keskinen, M., & Varis, O. (2016). Facilitating bricolage through more organic institutional designs? The case of water users' associations in rural Nepal. *International Journal of the Commons*, *10*(2), 1172–1201. https://doi.org/10.18352/ijc.688

Healey, P. (1997). *Collaborative planning: Shaping places in fragmented societies* (1st ed.). Macmillan Press Ltd. https://doi.org/10.1007/978-1-349-25538-2

Henke, C. R. (2017). The sustainable University: Repair as maintenance and transformation. *Continent*, *6*(1), 40–45.

Hölscher, K., Frantzeskaki, N., McPhearson, T., & Loorbach, D. (2019). Tales of transforming cities: Transformative climate governance capacities in New York City, US and Rotterdam, Netherlands. *Journal of Environmental Management*, *231*, 843–857.

Houston, L. (2017). The timeliness of repair. *Continent*, *6*(1), 51–55.

Hughes, S., & McKay, J. (2009). The contribution of actors to achieving sustainability in Australia through water policy transitions. *Water Policy Entrepreneurs: A Research Companion to Water Transitions around the Globe. Edward Elgar Publishing, Cheltenham, UK*, 175–192.

Huitema, D., & Meijerink, S. (2010). Realizing water transitions: the role of policy entrepreneurs in water policy change. *Ecology and Society*, *15*(2).

Huitema, D., & Meijerink, S. (2013). Water Policy Entrepreneurs. In *Water Policy Entrepreneurs*. https://doi.org/10.4337/9781849803366

Innes, J. E., Connick, S., & Booher, D. (2007). Informality as a Planning Strategy. *Journal of the American Planning Association*, *73*(2), 195–210. https://doi.org/10.1080/01944360708976153

Jaglin, S. (2014). Regulating service delivery in southern cities: Rethinking urban heterogeneity. In S. Parnell & S. Oldfield (Eds.), *The Routledge Handbook on Cities of the Global South* (1st Editio, pp. 434–447). Routledge. https://doi.org/10.4324/9780203387832

Kaika, M. (2004). *City of flows: Modernity, nature, and the city*. Routledge.

Kemerink-Seyoum, J. S., Chitata, T., Domínguez Guzmán, C., Silva-Novoa Sanchez, L. M., & Zwarteveen, M. Z. (2019). Attention to sociotechnical tinkering with irrigation infrastructure as a way to rethink water governance. *Water*, *11*(8), 1670.

Kim, H., & Jung, Y. (2019). Is Cheonggyecheon sustainable? A systematic literature review of a stream restoration in Seoul, South Korea. *Sustainable Cities and Society*, *45*, 59–69. https://doi.org/https://doi.org/10.1016/j.scs.2018.11.018

Kim, M. (2021). Transformative justice and restorative justice: Gender-based violence and alternative visions of justice in the United States. *International Review of Victimology*, *27*(2), 162–172.

Kim, P. H., Dirks, K. T., & Cooper, C. D. (2009). The Repair of Trust: A Dynamic Bilateral Perspective and Multilevel Conceptualization. *The Academy of Management Review*, *34*(3), 401–422. http://www.jstor.org.eur.idm.oclc.org/stable/27760011

Kooy, M. (2014). Developing Informality: The Production of Jakarta ' s Urban Waterscape. *Water Alternatives*, *7*(1), 35–53.

Koshy, M., Aranya, R., & Refstie, H. (2022). Handling Compounded Uncertainty in Spatial Planning and Humanitarian Action in Unexpected Floods in Wayanad, Kerala: Towards a Contextualised Contingency Planning Approach. *Planning Theory & Practice*, *23*(5), 703–723. https://doi.org/10.1080/14649357.2022.2143548

Koshy, M., & Smith, D. (2023). Community resilience implications for institutional response under uncertainty: Cases of the floods in Wayanad, India and the earthquake in Port-au-Prince, Haiti. *Sustainable Development*, *n/a*(n/a). https://doi.org/https://doi.org/10.1002/sd.2678

Kudtarkar, S. G. (2021). *Dharavi Model: A Framework for Containing Covid-19 Pandemic in Resource-Limited Democratic Settings*.

Kumar, M. D. (2018). Water management in India: The multiplicity of views and solutions. *International Journal of Water Resources Development*, *34*(1), 1–15. https://doi.org/10.1080/07900627.2017.1351333

Latour, B. (2007). *Reassembling the social: An introduction to actor-network-theory*. Oup Oxford.

Leahy, J. E., & Anderson, D. H. (2008). Trust factors in community–water resource management agency relationships. *Landscape and Urban Planning*, *87*(2), 100–107.

Lele, S., Srinivasan, V., Thomas, B. K., & Jamwal, P. (2018). Adapting to climate change in rapidly urbanizing river basins: insights from a multiple-concerns, multiple-stressors, and multi-level approach. *Water International*, *43*(2), 281–304. https://doi.org/10.1080/02508060.2017.1416442

Loorbach, D. (2010). Transition management for sustainable development: A prescriptive, complexity-based governance framework. *Governance*, *23*(1), 161–183. https://doi.org/10.1111/j.1468-0491.2009.01471.x

Mayaux, P.-L., Dajani, M., Cleaver, F., Naouri, M., Kuper, M., & Hartani, T. (2022). Explaining societal change through bricolage: Transformations in regimes of water governance. *Environment and Planning E: Nature and Space*, *6*(4), 2654–2677. https://doi.org/10.1177/25148486221143666

McFarlane, C. (2012). Rethinking Informality: Politics, Crisis, and the City. *Planning Theory and Practice*, *13*(1), 89–108. https://doi.org/10.1080/14649357.2012.649951

McFarlane, C. (2019). Thinking with and beyond the informal–formal relation in urban thought. *Urban Studies*, *56*(3), 620–623. https://doi.org/10.1177/0042098018810603

McKenzie, D., & Ray, I. (2009). Urban water supply in India: status, reform options and possible lessons. *Water Policy*, *11*(4), 442–460. https://doi.org/10.2166/wp.2009.056

Meijer, M., & Ernste, H. (2019). Broadening the Scope of Spatial Planning: Making a Case for Informality in the Netherlands. *Journal of Planning Education and Research*, 0739456X19826211. https://doi.org/10.1177/0739456X19826211

Mguni, P., Abrams, A., Herslund, L. B., Carden, K., Fell, J., Armitage, N., & Dollie, A. (2022). Towards water resilience through Nature-based Solutions in the Global South? Scoping the prevailing conditions for Water Sensitive Design in Cape Town and Johannesburg. *Environmental Science & Policy*, *136*, 147–156. https://doi.org/https://doi.org/10.1016/j.envsci.2022.05.020

Mihir Shah Committee. (2016). *A 21st Century Institutional Architecture for India's Water Reforms. Report submitted by the Committee on Restructuring the CWC and CGWB*. *July*, 146. http://wrmin.nic.in/writereaddata/Report_on_Restructuring_CWC_CGWB.pdf

Misra, K. (2014). From formal-informal to emergent formalisation: Fluidities in the production of urban waterscapes. *Water Alternatives*, *7*(1), 15–34. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896861480&partnerID=40&md5=6486d2b5315d3670b6b8c6e02c41b463

Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, *19*(3), 354–365. https://doi.org/10.1016/j.gloenvcha.2009.06.001

Pandit, C., & Biswas, A. K. (2019). India's National Water Policy: 'feel good' document, nothing more. *International Journal of Water Resources Development*, *35*(6), 1015–1028. https://doi.org/10.1080/07900627.2019.1576509

Pathirana, A., Radhakrishnan, M., Quan, N. H., & Zevenbergen, C. (2018). Managing urban water systems with significant adaptation deficits—unified framework for secondary cities: part I—conceptual framework. *Climatic Change*, *149*(1), 43–56. https://doi.org/10.1007/s10584-017-1953-9

Porter, L. (2010). *Unlearning the colonial cultures of planning*. Ashgate Publishing, Ltd.

Ranganathan, M. (2014). "Mafias" in the waterscape: Urban informality and everyday public authority in Bangalore. *Water Alternatives*, *7*(1), 89–105.

Roy, A. (2005). Urban informality: Toward an epistemology of planning. *Journal of the American Planning Association*, *71*(2), 147–158. https://doi.org/10.1080/01944360508976689

Roy, A. (2009). Why India cannot plan its cities: Informality, insurgence, and the idiom of urbanization. *Planning Theory*, *8*(1), 76–87. https://doi.org/10.1177/1473095208099299

Royle, N. (2011). *Veering: A Theory of literature*. Edinburgh University Press.

Sankhe, S., Vittal, I., Dobbs, R., Mohan, A., Gulati, A., Ablett, J., Gupta, S., Kim, A., Paul, S., & Sanghvi, A. (2010). *India's urban awakening: Building inclusive cities, sustaining economic growth*. McKinsey Global Institute Mumbai.

Schwartz, K., Tutusaus Luque, M., Rusca, M., & Ahlers, R. (2015). (In)formality: the meshwork of water service provisioning. *WIREs Water*, *2*(1), 31–36. https://doi.org/https://doi.org/10.1002/wat2.1056

Sultana, F. (2023). Decolonizing Climate Coloniality. In R. Solnit & T. Y. Lutunatabua (Eds.), *Not Too Late: Changing the Climate Story from Despair to Possibility* (pp. 58–65). Haymarket Books.

Termeer, C. J. A. M., Dewulf, A., Breeman, G., & Stiller, S. J. (2015). Governance Capabilities for Dealing Wisely with Wicked Problems. In *Administration and Society* (Vol. 47, Issue 6). https://doi.org/10.1177/0095399712469195

Teske, P., & Schneider, M. (2016). The bureaucratic entrepreneur: The case of city managers. *Local Government Management: Current Issues and Best Practices*, 372–388. https://doi.org/10.4324/9781315539386-37/BUREAUCRATIC-ENTREPRENEUR-CASE-CITY-MANAGERS-PAUL-TESKE-MARK-SCHNEIDER

Timmermans, S., & Tavory, I. (2012). Theory construction in qualitative research: From grounded theory to abductive analysis. *Sociological Theory*, *30*(3), 167–186.

Ubels, J., Acquaye-Baddoo, N.-A., & Fowler, A. (2010). *Capacity development in practice*. Earthscan.

Ureta, S. (2014). Normalizing Transantiago: On the challenges (and limits) of repairing infrastructures. *Social Studies of Science*, *44*(3), 368–392.

van Borek, S., & Abrams, A. L. (2023). Respecting local knowledge keepers through cellphilms featuring local water bodies: towards decolonizing water management. *AQUA - Water Infrastructure, Ecosystems and Society*, jws2023169. https://doi.org/10.2166/aqua.2023.169

van Oers, L., Feola, G., Runhaar, H., & Moors, E. (2023). Unlearning in sustainability transitions: Insight from two Dutch community-supported agriculture farms. *Environmental Innovation and Societal Transitions*, *46*, 100693. https://doi.org/https://doi.org/10.1016/j.eist.2023.100693

Vasilescu, C. M. (2022). Participatory Governance and Restorative Justice: What Potential Blending in Environmental Policymaking? In B. Pali, M. Forsyth, & F. Tepper (Eds.), *The Palgrave Handbook of Environmental Restorative Justice* (pp. 171–200). Springer. https://doi.org/10.1007/978-3-031-04223-2

Visser, M. (2017). Learning and unlearning: a conceptual note. *The Learning Organization*, *24*(1), 49–57. https://doi.org/10.1108/TLO-10-2016-0070

Wahby, N. M. (2021). Urban informality and the state: Repairing Cairo's waters through Gehood Zateya. *Environment and Planning E: Nature and Space*, *4*(3), 696–717. https://doi.org/10.1177/25148486211025262

Webber, S., Nelson, S., Millington, N., Bryant, G., & Bigger, P. (2022). Financing Reparative Climate Infrastructures: Capital Switching, Repair, and Decommodification. *Antipode*, *54*(3), 934–958.

Weber, M., Gerth, H., & Mills, C. W. (Charles W. (2009). From Max Weber: essays in sociology. In *Routledge classics in sociology TA - TT* -. Routledge. http://catdir.loc.gov/catdir/toc/ecip0824/2008034087.html

Williams, M. (2012). *Building and rebuilding trust: Why perspective taking matters*.

Wolfram, M. (2016). Conceptualizing urban transformative capacity: A framework for research and policy. *Cities*, *51*, 121–130. https://doi.org/10.1016/j.cities.2015.11.011

Wong, T. H. F., & Brown, R. (2009). The water sensitive city: Principles for practice. *Water Science and Technology*, *60*(3), 673–682. https://doi.org/10.2166/wst.2009.436

World Bank. (1999). *Inter-Sectoral Water Allocation Planning and Management*.

Yates, J. S., Harris, L. M., & Wilson, N. J. (2017). Multiple ontologies of water: Politics, conflict, and implications for governance. *Environment and Planning D: Society and Space*, *35*(5), 797–815. https://doi.org/10.1177/0263775817700395

Zhao, T., & Wu, Z. (2020). Citizen–state collaboration in combating COVID-19 in China: Experiences and lessons from the perspective of co-production. *The American Review of Public Administration*, *50*(6–7), 777–783.

Ziervogel, G., Cowen, A., & Ziniades, J. (2016). Moving from Adaptive to Transformative Capacity: Building Foundations for Inclusive, Thriving, and Regenerative Urban Settlements. In *Sustainability* (Vol. 8, Issue 9). https://doi.org/10.3390/su8090955