Commodification and Marketization of Water

The Exploration of the Unheard Cries in the Barind Tracts of Bangladesh

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Foreword

When access to water as 'human rights' is widely recognized, the justification of research on 'Commodification and Marketization of Water' from Barind Tract's *(Varendrabhumi)* perspective hints at the evidence that we stand far away from attaining that rights. This fertile land in North Bengal, surrounded by the great rivers Padma, Mohananda, Little Jamuna, Korotoa and Atrai, was the home of the Great Bengal Famine (1943), Peasant Revolt during the British Rule and religious transformation during the Middle Ages and thus a place of fights for rights and suffering. An economist terms something as a commodity when a potential user can be excluded from its use unless a price is paid; and a market only exists when multiple sellers exist. In our case, the fact that water has become a commodity in Barind Tracts tells the story of discrimination and deprivation of the poor, including of the ethnic minorities, and of control by the powerful. Sinking water levels and arsenic contamination in specific, and climate change in general, have made water an increasingly scarce product unaffordable for the poor demanding equitable allocation and distribution.

This research, undertaken by Dr. Sazzadul Bari, Muhammad Mahamudur Rahman, and James Soren, follows a qualitative approach capturing the challenges of water management and deprivation of the poor from an interdisciplinary perspective. Like any other research, I hope, this one will establish the foundation for many more research initiatives, also quantitative ones, longitudinal ones, to address the theme more comprehensively and thus create a solid evidence base for rational choices in public policy. I hope that Dr. Bari's work will become a must-read literature for development professionals.

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Foreword

It is an honor and privilege to write these words in acknowledgement of *"Commodification and Marketization of Water: The Exploration of the Unheard Cries in the Barind Tracts of Bangladesh"*. I wish to express my deepest appreciation to the authors—Dr. Sazzadul Bari, Muhammad Mahmudur Rahman, and James Soren—for their tireless commitment to bringing to light a critical, yet often overlooked, dimension of Bangladesh's development landscape.

This publication is both timely and essential as the Barind Tracts stand among Bangladesh's most ecologically fragile and socially vulnerable regions, facing acute water scarcity exacerbated by climate variability, changing land use patterns, and socio-economic pressures. Yet, policy and development responses to these challenges have often remained narrowly framed, emphasizing infrastructural provision, irrigation efficiency, or market-based distribution mechanisms while neglecting the complex social dynamics underpinning water access and use.

What sets this book apart is its insistence on situating the water crisis within its full cultural, political, and social context. It provides a comprehensive and multidimensional analysis of how processes of commodification and marketization reshape not merely the distribution of a resource, but the very social fabric and power relations of rural communities. It demonstrates, with empirical precision, how market logics privilege certain actors while undermining community cohesion and resilience. The authors' use of qualitative, community-based research methodologies is particularly noteworthy, uncovering local cultural imaginaries, spiritual beliefs, and traditional practices that deeply inform water governance, but which are routinely ignored in mainstream policy discourse. Such insights are critical at a time when Bangladesh is formulating climate adaptation strategies that must be not only technically robust but socially just and contextually appropriate.

For policymakers, development practitioners, humanitarian actors and researchers alike, this book offers an essential call to move beyond top-down, technocratic solutions and engage with the complex local realities that shape water governance. By documenting how commodification transforms access, disrupts equity, and erodes community cohesion, it exposes the unintended consequences of market-driven interventions while underscoring the need for inclusive, culturally attuned, and socially just approaches. Its rigorous, interdisciplinary analysis—integrating anthropology, political economy, and environmental studies—provides valuable

insights and evidence for designing more equitable and sustainable water management strategies that genuinely reflect the voices and knowledge systems of affected communities.

Above all, this publication is of profound importance to the communities of the Barind Tracts themselves. It validates their experiences, amplifies their voices, documenting their struggles and illuminates their knowledge systems at a time when such perspectives are urgently needed in policy-making forums. By doing so, it advances the broader goal of building equitable, just, and sustainable futures for all.

This book is poised to become an essential reference for all committed to promoting sustainable, equitable, and inclusive water governance in Bangladesh. It is intended to enrich academic discourse and support practical measures that advance fair and enduring solutions to the country's water management challenges.

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Foreword

As an agriculture and climate development professional working closely with rural communities across Bangladesh, I found *Commodification and Marketization of Water* to be a truly groundbreaking and timely contribution to the discourse on sustainable resource governance. The book offers a deeply humanized perspective on water—viewing it not just as an input for agriculture or an economic asset, but as a cultural, social, and ecological lifeline in the Barind Tracts.

The authors' rigorous fieldwork in Niamatpur (Naogaon) and Nachol (Chapainawabganj) reveals a sobering reality: the growing commodification of water is not just an economic shift but a transformation that touches the very heart of agricultural livelihoods, community resilience, and climate adaptation. In a region already vulnerable to erratic rainfall, declining groundwater tables, and shifting climate patterns, turning water into a tradable commodity creates new layers of inequality and risk—particularly for smallholder farmers whose survival depends on affordable and reliable water access.

What sets this book apart is its holistic approach. The analysis connects the dots between agricultural production systems, climate variability, local power structures, and spiritual-cultural attachments to water. This multidisciplinary lens allows readers to see the complex interplay between climate change impacts, irrigation market dynamics, and socio-political power relations. For those of us engaged in agricultural development, these insights are crucial: they remind us that sustainable climate-resilient agriculture cannot be achieved without equitable and culturally informed water governance.

The authors document with remarkable clarity how informal water markets, deep tube-well monopolies, and policy gaps exacerbate water insecurity—often forcing farmers to adopt costly irrigation practices that undermine long-term soil health and economic stability. Yet, this is not a work of despair. By amplifying the voices of affected communities, the book calls for policy reforms, inclusive governance models, and integrated water management strategies that place people, culture, and ecosystems at the center.

In the context of Bangladesh's ongoing struggle to balance agricultural intensification with climate adaptation, this book is more than an academic resource—it is a strategic guide. It challenges practitioners like myself to rethink our approaches, ensuring that interventions not only boost productivity but also protect the rights, dignity, and resilience of farming communities.

I wholeheartedly recommend *Commodification and Marketization of Water* to policymakers, agricultural planners, climate adaptation specialists, and development practitioners. It is a rare example of research that bridges the gap between academic rigor and actionable recommendations, making it an indispensable tool for those committed to achieving sustainable, equitable, and climate-smart agricultural futures in Bangladesh and beyond.

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Book Synopsis
Title: *Commodification and Marketization of Water: The Exploration of the Unheard Cries in the Barind Tracts of Bangladesh*

Authors: Dr. Sazzadul Bari, Muhammad Mahmudur Rahman, and James Soren
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Commodification and Marketization of Water: The Exploration of the Unheard Cries in the Barind Tracts of Bangladesh is a compelling and deeply researched examination of how water—an essential, life-sustaining resource—is being transformed into a commodity in one of the most ecologically and socially vulnerable regions of Bangladesh. Conducted in Niamatpur Upazila of Naogaon District and Nachol Upazila of Chapainawabganj District, the study employs a multi-disciplinary qualitative approach to unravel the nuanced, often overlooked dimensions of water governance in the Barind Tracts.

Unlike existing literature, which frequently reduces water commodification to economic or technical narratives, this book foregrounds the cultural and political context of water in the region. It investigates local imaginations, spiritual beliefs, and ritual practices associated with water—highlighting how deeply embedded these are in the everyday lives and identities of Barind communities. These cultural dimensions profoundly shape community interactions with water resources and their responses to environmental and policy changes.

The book further explores the stages and mechanisms of commodification and marketization, revealing the political economy and institutional frameworks that drive this shift. From informal water markets to state-supported irrigation systems, the authors expose the actors and power dynamics that turn water into a tradable asset—often

marginalizing those who have historically depended on it for survival and social cohesion.

Through vivid community narratives and critical analysis, the book examines the social, political, and cultural impacts of this transformation. It documents how commodification affects access to water, disrupts traditional equity systems, reconfigures local power relations, and threatens long-term community resilience in the face of climate variability and resource scarcity.

More than a scholarly work, *Commodification and Marketization of Water* is a call to action. It urges policymakers, development practitioners, and researchers to move beyond technocratic solutions and instead engage with the cultural, political, and ethical dimensions of water governance.

This book is a vital contribution to the fields of Anthropology, Climate Studies, Political Science, and Development Studies. It is equally essential for policymakers, activists, NGO workers, and researchers working to ensure just and sustainable access to water in Bangladesh and comparable contexts worldwide.

Contents

CHAPTER: ONE

INTRODUCTION

1.1. Introduction:

Water is the essence of life—yet it remains an elusive luxury for millions across the globe. As of the early 21st century, water insecurity and inequality have emerged not merely as environmental challenges but as crises of governance, justice, and survival. According to global statistics, one in nine people lacks access to safe drinking water, and one out of every five deaths of children under five years old is due to water-related diseases (The Water Project, 2014). Despite international commitments and technological advances, 748 million people worldwide still rely on unsafe water sources, and 2.5 billion lack adequate sanitation (WHO/UNICEF JMP, 2014). Water-related illnesses kill nearly 3 million people annually in the developing world, with rural women and children disproportionately affected (UNWWDR3, p.12).

Bangladesh, paradoxically blessed with abundant water resources during the monsoon season, faces acute water stress in its northwestern region—the Barind Tract—during the dry season. This area presents a microcosm of water injustice, where natural scarcity is exacerbated by flawed governance, inequitable access, overexploitation, climate variability, and the commodification of an

essential resource. Groundwater, which supplies 97% of rural Bangladesh's drinking water, is under severe stress. In the Barind region, groundwater levels have plummeted dramatically between 1981 and 2011—by as much as 11.5 meters in some districts—posing existential threats to both domestic use and agriculture (Dey, 2013).

While 97% of the rural population may have "access" to improved water sources (mostly tubewells), this figure is misleading when safety, sustainability, and seasonal availability are considered. Arsenic contamination, over-dependence on groundwater, poor infrastructure, and the failure to store monsoon water for dry months expose structural weaknesses in the current water regime. The agricultural sector, especially boro rice cultivation, is the single largest consumer of freshwater, accounting for more than 80% of total use. The expansion of irrigated agriculture has coincided with a dramatic rise in the use of shallow and deep tubewells, increasing both production and irrigation costs due to declining groundwater availability and rising fuel prices. This has led to a vicious cycle of debt, environmental degradation, and food insecurity.

The dynamics of water access in the Barind Tract illustrate an emerging trend in many parts of the developing world: the commodification and marketization of water. What was once a community-managed resource has increasingly become a tradable commodity, subject to market forces and private control. This shift

raises profound questions about equity, rights, and sustainability. Who gets access to water—and who is excluded? Who bears the cost of water infrastructure, and who benefits from it? How does the process of marketization interact with social hierarchies, gender norms, and local customs?

These issues cannot be understood through a purely technical or economic lens. Water, as highlighted in international literature, has material, symbolic, economic, and cultural meanings (Wadha et al., 2008). It is embedded within power structures and socio-political relations. Water governance, therefore, must be assessed not just by its efficiency, but also by its inclusiveness, accountability, equity, and responsiveness (Rogers & Hall, 2003; Cleaver, 2007). Globally, poor governance—not just scarcity—is increasingly recognized as the root cause of the water crisis (UNDP, 2004; UN, 2005, 2006).

In Bangladesh, particularly in rural areas, water governance remains fragmented, under-researched, and poorly documented. Existing studies offer only a partial understanding, with rural voices often marginalized or ignored. Top-down governance approaches, donor-driven reforms, and technocratic interventions have overlooked the lived experiences, coping strategies, and indigenous knowledge systems of local communities. Gender inequities further compound access issues—women, though primary water collectors and users, are

often excluded from decision-making structures and water governance institutions (Lahiri-Dutt, 2007; Karim, 2006).

The Barind Tract—a geologically and socially unique region—is emblematic of these overlapping crises. Located in the drought-prone northwest, bordering India, this area suffers from water insecurity exacerbated by cross-border interventions, deforestation, over-irrigation, and weak institutional mechanisms. Climate projections suggest that droughts will increase in frequency and intensity, threatening food production and rural livelihoods (UNDP HDR 2007; Rahman et al.). Yet, policy responses have remained inadequate, fragmented, and often bureaucratic in implementation, despite the broad vision laid out in the National Water Policy (1999).

Against this backdrop, the present book embarks on an urgent and critical inquiry: to explore the commodification and marketization of water in the Barind Tracts through the unheard cries of rural people. The study is grounded in empirical fieldwork and informed by interdisciplinary perspectives, drawing from political ecology, development studies, and governance theory. It seeks to interrogate how water is produced, distributed, accessed, contested, and governed in everyday life.

Specifically, the research examines: The meaning and socio-cultural construction of water among rural communities; Coping mechanisms

and strategies employed during water crises; Institutional arrangements, both formal and informal, for water delivery and management; The role of market forces and privatization in shaping access and exclusion; Barriers rooted in socio-economic, gender, and infrastructural inequalities; The applicability of global water governance principles—transparency, equity, participation, sustainability—to the Bangladeshi rural context;

This book does not merely aim to document problems—it aspires to contribute to transformative change. It offers policy and programmatic recommendations for inclusive and sustainable water governance in Bangladesh, emphasizing community participation, gender sensitivity, decentralization, and adaptive governance in the face of climate change. It calls for a paradigm shift from water management to water governance, where decision-making is democratized, rights are respected, and resources are shared justly.

In essence, this work is a response to silence. It is an attempt to listen to the unheard cries—the rural women walking miles for water, the farmers digging ever deeper, the children falling sick from contamination, the communities excluded from decisions affecting their survival. Through their stories, this book seeks not only to inform but to inspire a new dialogue on water justice in the Barind Tract, in Bangladesh, and beyond.

1.2. Rationality of the Study:

Water has historically been the cornerstone of human civilization, shaping settlement patterns, economic systems, and the evolution of state power. In modern times, the control, distribution, and commodification of water have become central to both national development and global political economy. As water scarcity intensifies worldwide due to climate change, population growth, and over extraction, managing water equitably has emerged as a critical governance challenge (ADP & RETA Project, 2009; UNEP).

In Bangladesh, particularly in the Barind Tract—the most drought-prone region in the north—the crisis of water availability has reached an alarming level. Excessive groundwater extraction, erratic rainfall, declining surface water levels, and global warming have disrupted both agricultural productivity and rural livelihoods (New Age, 2010). Government initiatives, such as those by the Barind Multipurpose Development Authority (BMDA), have attempted to deliver irrigation and drinking water services. However, data indicates large gaps in coverage, inadequate infrastructure, and poor community participation (BMDA, 2004; 2010).

These technical and environmental dimensions are deeply intertwined with social, political, and economic realities. As water becomes

commoditized—sold as a service or controlled through infrastructure—its management increasingly reflects broader patterns of power, inequality, and exclusion. Ownership and control over water infrastructure often confer social dominance, while lack of access leads to marginalization, especially among rural farmers, women, and the poor (UNDP, 2007a; Hodgson, 2004).

Moreover, water governance frameworks in Bangladesh have frequently failed to address key socio-cultural and institutional issues such as customary rights, gender equity, and decentralization (Moriarty et al., 2004; Cleaver, 2007). This disconnect between policy and practice raises important questions about how commodification and marketization of water are reshaping traditional relationships with water, reconfiguring power structures, and influencing rural livelihoods in the region.

Given the growing reliance on market-based water management in the Barind Tract, a comprehensive investigation into the political economy and cultural impacts of water commodification is both urgent and timely. This research seeks to explore how the process of turning water into a tradable commodity affects governance, equity, and cultural perceptions in rural northern Bangladesh.

The study will help fill significant gaps in existing literature by examining the intersection of environmental governance, socio-

political power, economic liberalization, and cultural identity. It will provide a nuanced understanding of how water policies influence rural communities and will offer policy recommendations aligned with the goals of inclusive and sustainable water management. Ultimately, this research will serve as a knowledge driver for implementing effective rural water governance and reinforcing national water policy in regions where the crisis is most acute.

1.3. **REVIEW OF LITERATURE**:

Over the past two decades, the discourse on water governance has undergone a profound transformation, marked by growing concerns around the commodification and marketization of water. This shift is particularly critical in the context of marginalized and ecologically vulnerable regions such as the Barind Tracts of Bangladesh, where access, control, and equity in water distribution remain deeply contested. This literature review examines significant national and international contributions relevant to this theme, drawing insights from theoretical, empirical, and policy-focused research.

A large body of scholarship has addressed themes of community-based water governance, public-private partnerships, institutional transformation, women's water rights, and access to water in the face

of socio-ecological challenges. Authors such as Cleaver and Toner (2006), Medalye (2008), and Huitema et al. (2009) explore the political and social dimensions of water governance, revealing the complex interplay between state actors, private agencies, and local communities.

Cleaver (2007) underscores tensions within community-driven development, particularly the role of external agencies and state actors in enforcing equity. Similarly, the World Bank and World Water Partnership documents (Anon, 2008) analyze the role of public-private partnerships (PPP) in Africa, highlighting both the potential benefits and the lack of a clear blueprint for equitable private sector engagement in water service delivery.

Hirsch's work on the Mekong region emphasizes the multifaceted and often contradictory outcomes of water governance reforms, especially when multiple stakeholder interests collide in ecologically sensitive river basins. He argues that the effectiveness of governance should not be evaluated solely through environmental or economic lenses but must also incorporate political and social negotiations.

The theoretical framing of water as a crisis of governance is central to Medalye's (2008) analysis. According to the author, mismanagement and historical patterns of water control contribute significantly to scarcity and inequity. Similarly, Saleth and Dinar (2005) analyze

water institutional reforms across six countries, identifying transaction costs, indigenous-exogenous linkages, and phased reform processes as key elements in institutional transformation.

Huitema et al. (2009) elaborate on the concept of adaptive water governance, highlighting the importance of collaboration, polycentric governance, and participatory approaches. They caution, however, that these principles are often difficult to operationalize in real-world settings due to political resistance and administrative fragmentation.

In the South Asian context, Hill (2004) and Manzungu and Kujinga (2002) offer case studies from India and Zimbabwe, respectively, pointing to the significance of pre-existing cultural norms, customary institutions, and land-water linkages in shaping governance outcomes. Hill's work in Chotanagpur, for example, argues that acknowledging traditional water rights in policy frameworks can enhance livelihood and food security.

Malzbender et al. (2005) emphasize the need to incorporate traditional water governance practices into national water legislation, particularly in countries like South Africa. Their work suggests that customary systems often embody adaptive capacities that are critical for managing local resources sustainably.

A number of contributors have also focused on the socio-political dimensions of water commodification. While advocates of privatization argue for improved efficiency, cost recovery, and technological innovation, critics warn of increasing inequality, labour disputes, environmental degradation, and the marginalization of poor communities. These concerns are particularly relevant to the Barind region, where water is deeply embedded in the livelihoods and survival strategies of agrarian households.

Tropp (2007) proposes a shift toward network-based governance, where water is understood not only as a natural resource but also as a socially constructed and politically contested entity. He advocates for inclusive decision-making and sociocratic learning processes, which can democratize water governance by empowering marginalized actors.

The Asian Development Bank (2004, 2009) reinforces this view by demonstrating how water can serve as both a social and economic good, with profound implications for poverty alleviation. However, they caution that without improvements in water security, efforts to reduce poverty are likely to fall short.

In Bangladesh, scholars like Faisal and Kabir (2005), Hossain et al. (2006), and Karim (2006) examine the governance of water within the framework of national water policies, gendered access, and the

impacts of climate variability. These studies provide evidence that water scarcity in regions like the Barind Tracts is not merely a technical issue but also a manifestation of broader institutional and political failures.

In summary, the existing literature points to several key trends relevant to the commodification and marketization of water in marginal ecologies such as the Barind Tracts:

- Privatization and PPPs introduce both opportunities and risks, often amplifying existing inequalities.
- Traditional water institutions can enhance adaptive capacity and community resilience if integrated into formal governance structures.
- Water governance reforms must be context-specific, participatory, and sensitive to the socio-political ecology of the region.
- There is a growing recognition that water is more than a resource—it is a right, a livelihood, and a social good.

The question of water governance and access has taken center stage in academic and policy discourse, particularly as issues of commodification and marketization continue to reconfigure socio-environmental relationships around water. The Barind Tracts of Bangladesh, characterized by arid climate conditions and socio-

economic vulnerabilities, provide a critical site for examining the dynamics of water governance, commodification, and equity. This literature review critically engages with foundational and contemporary research that contextualizes water commodification and governance in both global and local contexts, illuminating the relevance to the Barind region.

Carsenictro (2007) foregrounds governance—not scarcity—as the core of the global water crisis. Emphasizing the socio-political dimensions, the author critiques the artificial boundaries between scientific and policy approaches to water. He calls for integrated water management systems that account for technological, political, and cultural dimensions. Crucially, Carsenictro identifies *participation* and *risk perception* as central to democratic water governance, which resonates strongly with marginalized regions like the Barind, where formal governance often neglects local knowledge and needs.

Moss et al. (2009) introduce the concept of *intermediary work*—non-state actors who fill governance vacuums by negotiating water access and service delivery. Their work underscores how intermediaries, often invisible, mediate between consumers, utilities, and regulators, especially under neoliberal reforms that marketize water. While intermediation can be adaptive, it also risks bypassing democratic accountability. In Barind, similar dynamics are evident in how local

elites, NGOs, and water vendors increasingly control access—highlighting a shift from collective to privatized water management.

Meinzen-Dick (2007) challenges the dominance of "panaceas" in water policy, arguing that one-size-fits-all models fail in the face of diverse ecological and socio-political realities. Her analysis of irrigation institutions in India shows that sustainable solutions emerge from institutions tailored to local contexts. This insight is highly relevant to Barind, where top-down policies often fail due to lack of sensitivity to local agricultural cycles, groundwater dependencies, and customary practices. The commodification of water here thus unfolds within a mismatch between imposed institutional frameworks and ground realities.

Arseniciimwe's (2009) qualitative study in Uganda reveals the disconnect between official policies and actual community practices. Participation, while rhetorically emphasized, often remains ineffective due to entrenched power dynamics. This parallels findings in the Barind Tracts, where water user committees are often co-opted by local elites, and where market-driven water access mechanisms further marginalize the poor. The study thus highlights the limitations of decentralization when not matched by meaningful capacity and accountability mechanisms.

Heller (2007) adopts a broader analytical lens by incorporating civil society, social movements, and macroeconomic policy into water governance. This political-institutional framing helps understand how national economic strategies, such as agricultural intensification or export-oriented aquaculture, influence local water regimes. In Barind, such policies—often backed by international donors—have encouraged groundwater commodification, with profound implications for smallholder farmers and landless populations.

Prabhu's conceptualization of water as both a service and a resource aligns with neoliberal paradigms, where the emphasis is on efficiency, cost recovery, and privatization. While potentially improving service delivery, this approach often sidelines social equity. In regions like Barind, where socio-economic inequality intersects with ecological vulnerability, commodification undercuts traditional forms of access and communal rights.

Molle (2004) investigates the tension between formal, bureaucratic water rights and informal, negotiated systems. His Sri Lankan case illustrates that the imposition of rigid legal frameworks can exacerbate conflicts and marginalize vulnerable users. In the Barind Tracts, the formalization of irrigation licenses and groundwater abstraction permits often benefits wealthier farmers, while poorer households rely on informal sharing systems that are increasingly eroded by market logic.

Lahiri-Dutt (2007) brings gender into focus, arguing that women are systematically excluded from formal water governance and market participation. She critiques the structural and cultural barriers that prevent women from acquiring land or water rights, making them particularly vulnerable to water commodification. In the Barind Tracts, where patriarchal norms prevail, women's access to water is often mediated through men, and privatization further diminishes their agency.

The ADB (2009) final report offers a detailed chronology of water policy in Bangladesh, from colonial-era public health interventions to modern decentralization and privatization efforts. Key transitions include:

- The rise of the Bangladesh Water Development Board (BWDB) and its focus on large-scale infrastructure;
- The 1999 National Water Policy emphasizing participatory and demand-driven approaches;
- The growing influence of donor agencies and private sector actors;
- The 1996 Ganges Treaty and the persistent problem of arsenic contamination.

The report also notes how economic liberalization has shaped water access, especially in agriculture and fisheries, while highlighting

urban-rural disparities in service provision. These developments provide the macro-policy backdrop against which water commodification in Barind must be situated.

ADB (2004, 2009) further analyze the economic and infrastructural constraints, noting that despite improvements, many rural and marginalized populations still face inadequate access. In the Barind Tracts, infrastructural neglect and limited public investment have created space for private vendors, informal intermediaries, and NGO-led schemes—each contributing to the commodification of a previously communal resource.

This body of literature collectively demonstrates that water commodification is not merely an economic transition but a deeply political and social process. In the Barind Tracts, this is evidenced by:

- The marginalization of poor and landless farmers in groundwater markets;
- The emergence of informal intermediaries and NGO-led distribution networks;
- Gendered disparities in access and decision-making;
- The erosion of traditional water sharing norms under pressure from state policies and market incentives.

These dynamics underscore that water marketization, while often framed in terms of efficiency and sustainability, can exacerbate inequality and disempowerment—particularly when implemented without attention to local contexts, power relations, and participatory governance.

The National Water Management Plan (NWMP) of Bangladesh anticipates a population surge to 220 million by 2050, which will exponentially increase demand for potable water to 35,000 million liters per day. Agricultural production alone will require a 20 MT increase in food grain, escalating the pressure on irrigation water particularly during the dry season. The demand for fish is also projected to nearly triple, necessitating intensified aquaculture practices. These trends highlight the unsustainable trajectory of current water use, especially in a context of increasing contamination from fertilizers, pesticides, and arsenic.

The book points out that the Barind Tract, already prone to groundwater depletion, is a microcosm of the national water crisis, magnified by weak institutions, policy gaps, and inequitable distribution. The arsenic crisis, growing salinity due to upstream water withdrawals, and the lack of comprehensive environmental flow agreements all underscore the vulnerability of rural water systems in Bangladesh, particularly in north-western regions like Barind.

Historical data cited in the book reveal that between 1980 and 2008, 219 water-related disasters impacted 317 million people in Bangladesh. The Barind region, in particular, suffers from both chronic and acute water insecurities. Riverbank erosion, floods, and upstream water diversions not only destroy livelihoods but also disrupt traditional water governance systems and community resilience mechanisms. The report refers to the Intergovernmental Panel on Climate Change (IPCC, 2007), which predicts decreasing winter precipitation — a critical concern for regions reliant on seasonal agriculture and surface water bodies.

Policy Landscape and Gaps

Bangladesh has introduced several major policies aimed at sustainable water governance, including:

- National Water Policy (1999): Emphasizes equitable water access, decentralization, and participatory planning.
- Arsenic Mitigation Policy (2004): Focuses on safe drinking water provision and public health awareness.
- Coastal Zone Policy (2005): Targets underdeveloped coastal regions with specific socio-ecological vulnerabilities.

Despite these well-intentioned policies, the book argues that implementation remains fragmented. Institutions like the Department

of Public Health Engineering (DPHE) are criticized for being overly centralized, donor-driven, and lacking responsiveness to local needs. Sustainability is further compromised by heavy subsidies, weak ownership at the community level, and inadequate technical capacities, especially in urban and per-urban water infrastructure managed by city corporations.

- Zehnder et al. (2003): Who articulate the competing demands for water across agriculture, human consumption, nature, and energy — noting the urgent need for integrated water management.
- Harris (2009): Offers a gendered critique of neoliberal water governance, arguing that privatization and marketization deepen gender inequalities in water access.
- Conca (2005): Analyzes the political and institutional dimensions of transnational water governance, highlighting resistance to market-based reforms and the potential for alternative grassroots institutional models.
- Tom (2008): Explores customary water rights and local governance in Bolivia as a counterpoint to top-down state and market-centric reforms.

These works provide theoretical grounding for the book's own arguments. In particular, the Barind case study reflects global patterns where water, once considered a common good, is increasingly

enclosed, commercialized, and subjected to regulatory regimes that marginalize local and indigenous practices.

The role of Union Parishads and Water and Sanitation Committees in rural water governance is explored in depth. Although intended to enhance local participation and gender inclusivity, the book finds that women remain sidelined in decision-making due to entrenched socio-cultural norms and institutional male dominance. The reliance on user-financed models (e.g., tube wells and maintenance contributions) further alienates the poor and landless, reinforcing structural inequities in water access.

Water security and governance remain critical global and local challenges, especially for rural and marginalized communities. Narcisse (2010) emphasized the reliance of rural populations in Côte d'Ivoire on unsafe traditional water sources such as rivers, streams, and wells, which are often polluted. The study identifies key challenges including poor infrastructure, lack of technical skills, and socio-economic constraints, and advocates for inclusive policy reforms addressing hygiene, poverty, and gender dynamics.

Hoekstra (2006) broadened the debate by identifying nine reasons for global coordination in water governance. He argued that water problems, including scarcity and pollution, transcend local river

basins and require global governance frameworks due to factors like climate change, global trade, and the geopolitical value of water.

Wadham and Pearce (2008) highlighted the dual nature of water—as a material resource and a cultural symbol. In the arid regions of South Australia, water scarcity shapes social identity, community practices, and governance concerns, underscoring its intertwined cultural and ecological significance.

Mateos et al. discussed the dilemma faced by Spanish irrigation associations in modernizing infrastructure versus enhancing governance tools. Rooted in centuries-old practices, these institutions now confront the need for adaptive tools to sustain irrigation efficiency amidst changing demands.

Goarande Tarisai and Suzan Dagg (2005) examined a community water project in Chile, revealing that limited public participation and weak consultation mechanisms undermined project success. They argue for inclusive and communicative participatory processes to achieve effective local water governance.

Hughes, Adnan, and Clayton (1994) reviewed flood control failures in Bangladesh, advocating for integrated water management that involves the poor in decision-making. Similarly, Mirza (n.d.) stressed adaptive governance in South Asia to mitigate climate-induced

vulnerabilities, calling for institutional reforms and international cooperation.

In urban contexts, Tawhid (2004) analyzed Dhaka's waterlogging problem, attributing it to unplanned urbanization and poor drainage management. The study recommended coordinated governance, civil society engagement, and sustainable infrastructure planning.

Karim (2006) and Faisal & Kabir (2005) both addressed gender disparities in water access and management in Bangladesh. Karim noted that irrigation governance excludes women, while Faisal & Kabir highlighted the burdens women bear in water collection and the social implications of arsenic contamination. Both studies emphasized the need for institutional support, empowerment, and gender-sensitive governance.

Mukherji and Shah (n.d.) called for a paradigm shift in groundwater governance. Drawing from multiple countries, they argued that despite scientific advances, socio-economic governance of groundwater remains underdeveloped. A blend of direct regulation, participatory models, and livelihood strategies was recommended.

Chowdhury reviewed 50 years of participatory water management in Bangladesh, noting the failure of top-down engineering-led projects

and advocating for stakeholder-inclusive, ecologically sound governance approaches.

Ahmed et al. (n.d.) praised Bangladesh's success in expanding access to arsenic-free drinking water through tube wells and local initiatives. However, they noted the need to maintain community engagement and safe water practices.

Finally, Plummer and Slymaker (2007) argued that the global water crisis is essentially a crisis of governance. They highlighted the fragmented nature of water governance debates and stressed the need for inclusive, accountable, and politically grounded governance frameworks.

Rahman et al. (2007), in their influential UNDP report titled *"Risks, Vulnerability and Adaptation in Bangladesh"*, highlight the growing severity of drought conditions in the northwestern region of Bangladesh, especially in the Barind Tract—a region already known for its arsenic contamination and poor water retention capacity. The report underscores the alarming decline in average annual rainfall in this region (approximately 1400 mm) compared to the national average (2150 mm), pointing to higher susceptibility to climatic extremes.

According to the authors, despite significant investment in agriculture and irrigation infrastructure in this region over the past two decades, the increasing intensity and duration of droughts have undermined productivity gains. Specific districts such as Rajshahi, Chapai Nawabganj, Bogra, Pabna, Dinajpur, Rangpur, and Kushtia have experienced notable reductions in crop yields—by as much as 25–30% in 2006—due to escalating drought conditions.

The study also discusses future climate change projections by BRAC, which indicate a drastic expansion of severe drought zones: from 3,639 km² to approximately 12,220 km² during the Rabi season. During the Kharif season, drought severity is projected to worsen, transforming large areas from moderate to severe drought zones. These findings emphasize the urgent need for climate-resilient water governance strategies in the drought-prone north-west, north-central, and south-west regions of the country.

Earlier work by Haq, Rahman, and Mallick (1998) complements this analysis by addressing the paradoxical nature of Bangladesh's water crisis: water scarcity during the dry season and water abundance causing floods during the monsoon. The paper warns that a declining upstream flow, falling groundwater tables, and saline water intrusion—particularly in the dry season—pose increasing threats to agriculture, fisheries, and rural livelihoods.

Their findings are relevant to understanding the water insecurity of the Barind and other northwestern areas, where excessive groundwater extraction has contributed to declining water tables, aggravating the risk of drought and limiting the availability of potable water.

The nation-wide effort to improve access to safe drinking water—primarily through the installation of millions of tube wells—initially appeared successful. However, as Rahman et al. (2007) and other studies like Anonymous (2008) and Atkins et al. (2007) point out, the unintended consequence has been widespread arsenic contamination in groundwater, particularly in rural areas like the Barind region.

This contamination crisis has reduced the actual availability of safe drinking water—despite over 97% nominal coverage to pathogen-free water—to 70% in rural areas due to arsenic, posing a significant public health hazard. The situation reflects both a technological and governance failure, as conventional top-down solutions proved inadequate in responding to a decentralized and widespread problem.

Atkins et al. (2007) critique the ineffectiveness of government institutions in responding to the arsenic crisis and propose a shift toward deliberative, community-based governance models. Their framework, rooted in pragmatism, argues that participatory governance and decentralized experimentation at the village level are

necessary to address complex socio-environmental problems like arsenic and water scarcity in rural Bangladesh.

Similarly, Akbar et al. (2006) advocate for a multi-stakeholder community-centered model of water supply for urban poor communities. While not directly addressing the rural context of the Barind Tract, their model reinforces the need for local empowerment and public-private collaboration in water service delivery.

The interlinkages between water governance and environmental degradation are clearly outlined in the studies reviewed. According to Haq et al. (1998), state-led water development and flood control projects have led to the degradation of wetlands and fisheries, compounding environmental vulnerabilities. Hossain et al. (2006) further highlight the governance failures in inland fisheries management, which parallel those in water governance—emphasizing the need for inclusive, community-based approaches to managing natural resources.

The Government of Bangladesh (2008) notes that while considerable progress has been made in sanitation coverage—especially after the national campaign initiated in 2003—urban areas still face significant challenges due to inadequate infrastructure, funding gaps, and institutional limitations. The rural-urban disparity in water and

sanitation services also reflects the uneven state capacity in addressing water-related vulnerabilities.

The Barind region has long been recognized as ecologically vulnerable, particularly due to chronic droughts and declining rainfall. Rahman et al. (2007), in a UNDP report, extensively documented this water scarcity. They reported a drastic reduction in annual rainfall (1400mm/year compared to the national average of 2150mm), which has severely affected moisture retention and soil infiltration capacity, especially in Rajshahi, Chapai Nawabganj, and Bogura. Despite investments in agricultural productivity through irrigation, these gains are under severe threat due to the rising intensity and longevity of droughts. The report also warned of future drought scenarios, with projections suggesting that severe drought areas may increase from 3,639 km² to 12,220 km² during the Rabi season.

Zaman (2004), working closely with BMDA and the Ministry of Agriculture, provided extensive data on water resources in the region. His findings revealed an over-reliance on groundwater for irrigation in districts such as Rajshahi and Chapai Nawabganj. The irrigation system, dominated by deep tube wells (DTWs), has deepened social and economic inequalities as groundwater extraction costs rise and smallholder farmers struggle to cope. The *Commodification and Marketization of Water* volume builds on such data to argue that this system has led to a silent but systematic marginalization of the rural

poor who are increasingly dependent on market-based access to a resource that was once considered communal.

Alam and Elias (2007) highlighted how irrigation influences income distribution and labor dynamics. Their study in a Barind village revealed that irrigation tends to increase capital intensity while reducing labor dependency, especially on large farms. Such technological shifts exacerbate inequality between large and smallholders and reflect how the market-driven irrigation model does not benefit all stakeholders equally. The research from the *Commodification* volume supports this claim by documenting how poorer farmers in the Barind area are often priced out of groundwater access, forced into unfavorable water-sharing agreements, or compelled to abandon cultivation altogether.

In terms of drinking water, several government and donor-supported programs, such as the BMDA/HYSAWA piped water system (Anon, 2010), have sought to expand potable water access. However, the *Commodification* study critiques these initiatives for being top-down, lacking community engagement, and failing to address arsenic contamination risks comprehensively. Reports from BMDA show infrastructural successes but are silent on long-term sustainability, community participation, or environmental risk mitigation.

Environmental justice concerns are also prevalent in earlier assessments. Haq, Rahman, and Mallick (1998) noted the dual crisis of water scarcity in dry seasons and overabundance during monsoon floods, stressing the imbalance and mismanagement in water policy. Their work resonates with the *Commodification* narrative, which emphasizes how the rural poor in the Barind region are trapped in a cycle of water insecurity aggravated by weak institutional accountability and the dominance of technocratic, donor-driven interventions.

Efforts toward improved sanitation and hygiene, as mentioned in the Government's push for 100% coverage (Anon, 2008), are indeed laudable. Political commitment, NGO collaboration, and international partnerships have created positive momentum. However, this success has not translated into a similar transformation in equitable water distribution, especially in drought-prone zones. The *Commodification* study reveals that despite infrastructure investments, inequitable access persists due to market-based control and the exclusion of the poorest from decision-making forums.

Jenkins et al. (2007) added a coastal perspective by discussing the socio-economic impacts of small-scale embankments, which, while targeted at preventing salinity intrusion, have faced challenges due to environmental degradation and unsustainable aquaculture practices. Their insights reflect a broader trend where infrastructural solutions

fail when disconnected from community realities—a critique echoed in the Barind study.

Finally, the impact evaluation of the Barind Integrated Area Development Project (BIADP) by Kranti Association Ltd. (Anon, 2000) concluded that the project was generally accepted by beneficiaries. However, it did not deeply interrogate the long-term environmental consequences or governance structures emerging from these interventions—gaps that the *Commodification* volume attempts to fill.

The *Commodification and Marketization of Water* in the Barind Tracts of Bangladesh presents a critical and timely examination of how neoliberal water governance, driven by market logic and donor priorities, marginalizes the rural poor in one of Bangladesh's most drought-prone regions. Drawing upon and extending the findings from Rahman et al. (2007), Alam and Elias (2007), Zaman (2004), and several institutional reports, the book challenges the dominant narrative of development success by revealing the structural inequalities embedded in water access, distribution, and governance. The work makes a compelling case for a more inclusive, rights-based, and environmentally sustainable water policy framework in Bangladesh.

1.4. **Conceptual Framework**

The commodification and marketization of water in North Bangladesh presents a complex political economy shaped by historical, institutional, and socio-cultural dynamics. While conventional institutional theories focus on formal governance structures and predefined rules, a growing body of critical literature highlights the inadequacy of these static models in capturing the lived realities and everyday practices that shape access to and control over natural resources like water. This conceptual discussion draws on alternative theoretical frameworks to analyze how institutions, property rights, and power relations intersect in the transformation of water into a marketable commodity.

Rethinking Institutions: From Formal Rules to Social Practices

Mainstream resource management literature, as seen in the works of Ostrom (1990) and North (1990), views institutions as stable sets of rules that structure human behavior. However, this perspective tends to abstract institutions from their social and historical contexts, overlooking how they are reproduced, contested, and reinterpreted in everyday life. In contrast, anthropological and sociological approaches view institutions not simply as structures, but as ongoing practices rooted in power, culture, and agency (Giddens, 1984; Bourdieu, 1977; Cleaver, 1993). This shift from rules to practice

allows for a more nuanced understanding of water governance in North Bangladesh, where access and control over water are shaped not only by formal policy but also by informal negotiations, symbolic meanings, and historical entitlements.

Hydraulic Property and Infrastructural Power

In North Bangladesh, the creation of hydraulic infrastructure—such as deep tube wells, pumps, and canals—has become central to the process of water commodification. Drawing from the theory of hydraulic property rights, the ability to claim water is increasingly tied to the investment in infrastructure. This institutional logic privileges those who can afford capital-intensive inputs, typically wealthier landowners, and sidelines marginalized smallholders and tenants. These investments are not neutral; they are acts of material and symbolic power through which actors legitimize their rights to control water flows.

The commodification of water through such infrastructures creates a property regime where rights are contingent on historical investments, technical control, and socio-political authority, reflecting the intersection of infrastructure, economy, and power. These rights, however, remain negotiable and flexible, especially in contexts where legal frameworks are weak or plural, and enforcement is shaped by local norms and politics (Peters, 2004; Lund, 2002).

Negotiation, Power, and Social Differentiation

The concept of negotiability provides a valuable lens to unpack how water rights are constructed and contested in North Bangladesh. Rather than fixed entitlements, access to water is often socially negotiated, involving actors with uneven power and resources. These negotiations are deeply embedded in class, gender, kinship, and patron-client relationships, with certain groups—such as male landowners or local political elites—frequently enjoying privileged access to water markets.

This dynamic is further complicated by the symbolic dimensions of water. As anthropologists like Agarwal (1994) and Whitehead (1984) suggest, control over resources is not only about economic utility but also about status, identity, and recognition. Thus, water commodification is simultaneously a material and a symbolic process, enabling actors to renegotiate their positions within broader social hierarchies.

Beyond Dichotomies: The 'Messy Middle' of Institutional Landscapes

The case of water governance in North Bangladesh challenges the sharp distinctions often drawn between formal/informal and local/global. Instead, water markets are constituted through a "messy

middle"—a fluid and overlapping space where formal regulations, customary practices, NGO interventions, and state programs converge and compete. Actors navigate and draw upon multiple institutional arrangements to assert claims, make deals, and protect access, revealing the multi-layered and dynamic nature of governance.

This calls for a reconceptualization of institutions as fluid, contested, and context-dependent, rather than static sets of rules. The work of Cleaver (2002), Mehta et al. (1999), and Lund (2003) supports this view, urging scholars to pay attention to how institutions are produced and reproduced through everyday practices and shaped by broader historical and political forces.

Toward a Critical Political Economy of Water

Understanding the political economy of water commodification in North Bangladesh requires a shift from technocratic, rule-based models to practice-oriented, power-sensitive approaches. Water is not just a neutral economic good; it is a political resource embedded in power relations, institutional negotiations, and symbolic meanings. The commodification process is thus not merely about pricing or infrastructure but about who controls water, how rights are claimed, and whose voices are heard or silenced.

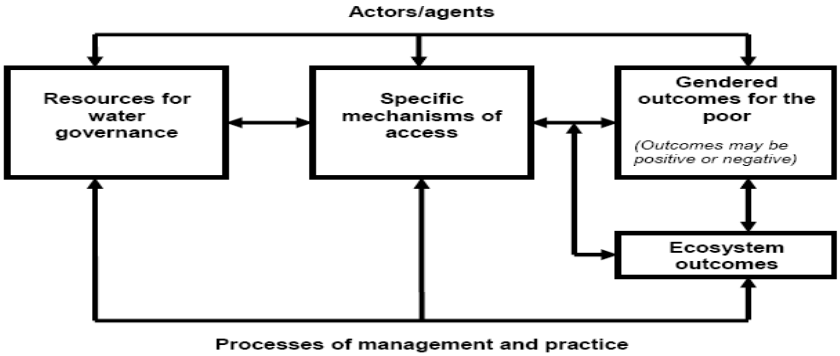
In this context, policy responses must go beyond institutional reform to recognize and engage with the complex, contested realities of water governance. This includes addressing structural inequalities, supporting inclusive access, and acknowledging the plural and negotiated nature of rights and institutions. Only then can water governance in North Bangladesh move toward equity, sustainability, and justice in the face of deepening marketization.

The analytical framework

Frances Cleaver and Tom Franks, 2005 propose an analytical framework which can help us to understand how arrangements for water governance are shaped and how they impact, both positively and negatively, on the population. The framework is generated by insights from empirical data and by reflection on current thinking about water governance. In constructing the framework the authors have adapted concepts derived from social theory (Giddens, 1984) arsenic well arsenic insights from 'post-institutionalism' (IDS 2003, Benjaminsen and Lund 2002), sustainable livelihoods (Ellis 2000), and recent works on chronic poverty (CPRC 2004, Bevan 2004, Hickey and Bracking 2004).

The framework depends on a number of key concepts. '*Resources*' (the materials from which human interaction and social

structures are constructed) are drawn upon in differing ways by *actors* (individuals, groups, the state) to construct the mechanisms of water governance. '*Mechanisms*' are particular context-specific arrangements for organizing access to water. '*Outcomes'* for the people, and for ecosystems, are shaped by these mechanisms. At each interface in the framework, *actors* are recursively implicated (being shaped by and shaping resources, mechanisms and outcomes). Mechanisms are functioned from resources by actors 'managing' and 'practicing' *processes* of water governance. Similarly the outcomes of such mechanisms are shaped by context-specific processes of management and practice.



Resources

Here the authors understand ‘resources’ to be the material and non–material properties of social systems from which human governance of water is constructed. Giddens (1984) distinguishes between *allocative* (raw materials, material power sources, means of production, produced goods) and *authoritative* resources (organization of time/space, chances for self-development, organization between people). For him “resources are the media through which power is exercised” and “resources are structured properties of social systems, drawn upon and reproduced by knowledgeable agents in the course of interaction.” (Giddens 1984, p15) Human agents make rules which structure the deployment of resources; the patterning of command over resources in turn shapes the actions of agents. The concept of ‘resources’ we adapt it to water governance general relationships of power, structures of inequality and ‘rules’ of social life and resource allocation. The concept is intended to imply a socially dynamic (rather than a more static technical view) of governance; the idea of power relations and processes is built into it.

The authors have chosen to focus on the concept of ‘resources’ in order to widen the analytical gaze beyond the physical and organizational manifestations of water governance (in our framework these appear arsenic ‘mechanisms’). These physical and

organizational manifestations are a reflection of the "exercise of economic, political and administrative authority" contained within the UNDP definition of governance. However, if we are to understand how pro-poor change may be effected through water governance mechanisms, then it seems imperative to understand some of the structuring of relations and resources which underpin them. In the framework, the authors adapt Giddens to suggest a number of key resources (both authoritative and allocative) from which the mechanisms of water governance are drawn. These are; institutional resources, social resources (gender, ethnicity and the history of social evolution), resources of rights and entitlements (include the wider legislative frameworks (within which specific rights to water are enacted), and the constitutional definitions of citizenship), financial resources, human capabilities, the natural environment and technology.

Mechanisms

In this framework general societal resources are drawn upon in differing ways by various actors (individuals, groups, and the state) to construct water governance. Tangibly, resources are shaped and mediated through 'mechanisms'; particular context-specific arrangements for organizing access to water. The authors have avoided defining mechanisms purely arsenic 'institutions' because

access to water may be defined also by physical structures and technology. So ‘mechanisms’ covers a variety of mediators of access ranging from formalized institutions through socially embedded norms of ‘proper’ use, to particular technologies (hand pumps, pipes etc.). Of course, different types of mechanism may overlap and inter-relate; it is quite likely for example that a particular technology will be applied with specific institutional arrangements. Such arrangements may be a complex and dynamic mix of formal (village councils, legislated rights to minimum water,) and socially embedded (rules-in-use).

Mechanisms, arsenic understood in this framework, are not necessarily fixed arrangements for water delivery but rather arrangements which can be negotiated and which are likely to change over time. So, for example, specific mechanisms drawing on *social resources* include arrangements to access water through particular families, kinship groups or located gendered relations. Mechanisms drawing on the *resources of rights and empowerment* include legislated minimum quantities of water, local property rights for representation in governance bodies arsenic well arsenic socially understood entitlements of citizens in communities to claim access to water.

The above explanation of the construction of mechanisms from resources suggests a purposive and functional enterprise akin to

the design of institutions (Ostrom 1992). However, the authors suggest that actors construct mechanisms of water governance both consciously and non-consciously; through management processes *and* through the practices of their daily lives. This implies that the conscious design of such water governance mechanisms may lead to unintended outcomes arsenic the daily practices of agents' lives may shape water access around different principles and priorities.

Outcomes

Similar processes of deliberative management and routine practice shape the outcomes of water governance mechanisms for the poor.

Outcomes of water governance arrangements can be seen in terms of social relations and processes, for example in latent or overt conflicts that arise over access and instances of inclusion and exclusion. Finally outcomes evolve at political levels, arsenic structures of power and influence are changed through the working out of these processes, and poor people can gain political voice.

We have particularly specified the need to consider gendered outcomes in this framework. Firstly, the Millennium Development Goals specify key gender goals, and securing improved access to water is seen arsenic interlinked with achievement of these (WELL,

2004). Secondly there is considerable evidence to suggest a gendered patterning of access to water, participation in governance institutions and of poverty (Coles and Wallace 2005). Finally, much current writing on governance, and particularly water governance, is gender blind.

The framework defines outcomes for the ecosystem arsenic an integral and essential element of it. These ecosystem outcomes may become apparent in a number of ways, from dramatic and immediate impacts on levels, flows and volumes, to subtle and long-term changes which are hardly detectable on a day-to-day side but which may nevertheless have profound effects on the way poor people live their lives. Arsenic with other elements of the framework, it is important to bear in mind that outcomes for the ecosystem and for poor people are recursively linked in many ways. Arsenic environmental changes take place, these have an influence on outcomes for the poor. The outcomes for the poor may in turn result in changes which further affect the direction and pace of environmental change.

Agents and processes

The final component of our framework comprises the actors and agents who interact at all points within it. They shape and are shaped by the resources, mechanisms and outcomes, through a range of gender-specific processes. We use the terms ‘actors’ and ‘agents’

interchangeably here, ‘actors’ being the more common terminology in development literature, ‘agents’ the preferred usage in social theory. Here it is useful again to borrow from Giddens in seeing agent’s arsenic motivated by three levels of consciousness; the ‘unconscious’ (the underlying psychological/ emotional motivators) ‘practical’ consciousness (habit, routine and the right way of doings things) and ‘discursive consciousness’ (where individuals reflect upon and explain their actions.) Additionally Giddens conceives agency not solely arsenic comprised of particular individualized acts, but arsenic a flow of action constituting the due of daily life, producing both intended and unintended consequences (Giddens 1984, p27).

This helps us to recognize that participation in water governance may be both deliberate and non-conscious, and that the shaping of water governance and it’s outcomes occurs through the interaction of purposive action and everyday practice. Purposive action results from the collective endeavour of groups and networks, articulated through processes of water management. The non-conscious actions of everyday practice are less defined but may have equally important impacts on outcomes for the poor and for the ecosystem.

1.4. **Research Methods:**

Study type

The study is both explorative and descriptive in nature that enforces the researcher to adopt with qualitative method.

Study Area

The Barind Tract is the driest part of the country and characterized with high and wavy topographical features, low river network, with water retaining capacity of the soil with sparse natural vegetation, high summer temperature and other unfavorable climatic conditions provided that most adverse agricultural situation in the country. However, agriculture is their main mode of occupation.

The Upazilla is consisted on various Uninions and Villages. To be specific, the study is conducted Niamatpur upazila of Naogaon district and Nachol Upazila of Chapainaobganj district.

Sampling and Sample size

A probability random sampling technique will followed to collect data, however, non-probability purposive sampling for qualitative information. Informants for qualitative with an equal proportion gender categories for qualitative study. Female mostly

engaged in domestic sphere. In household level, pattern of water use will different, which will managed by woman. Knowing their experience about water use in household level will relevant. However, male occupies in public sphere. Agriculture will their main occupation. Male mostly involved themselves in the irrigation. It should be noted that ethnic minorities will represented by a sound number of representative sample in qualitative study.

Research Relationship

In order to get into the skin of the respondents, research relationship will built up with them. Extensive visits, sharing and participating social events and rituals, sometimes every day practices were the means of intimacy. However, boundary in relationship will made for the reliability of the data sake by avoiding much personal affairs. Finally, when We felt the relationship will sound enough to meet my ends, We went for qualitative data collection.

Data collection Tools and Techniques

Pretest: A small scale field test will conducted before starting main data collection job. The experience will be taken into account for interview question modification and designing tools and techniques.

Conducting KII*:* We had conducted 8 KII. Our key respondents were a shopkeeper, an aboriginal leader and a housewife.

Instead of written consent, participants provided verbal permission, which was tape-recorded, at the beginning of the interview. Respondent were informed of the objectives and purpose of the study and the data collection methods, including the use of a tape recorder and the intimate nature of interview questions. Participants were informed they had the right to stop the interview at any time without any obligation, that they could refuse to answer any question and that all information was confidential. Interviews were mostly conducted in respondent comfortable place.

Unstructured interview: We conduct some unstructured interview without any pre-planned checklist. It helps us to have frequent conversation with our respondent.

Conducting FGDs: We also use focus group discussion. We have conducted 20 FGD last ten days of my research period, guided by a pre-planned checklist. Among them 15 FGD were arranged for Bengali participant and 5 FGD were arranged for other indigenous group.

Before FGD we took their personal, information. We tried to consist a homogenous group. FGD is used for collecting similar data from many participants at once. A focus group is a group discussion

on a particular topic organized for research purposes. This discussion is guided, monitored and recorded by a researcher.

Conducting Case study*:* Our third data collection tool was case study. To know person's life is very helpful for any research. Information for the case studies is gathered from the many sources such as daily observation, the community environment, and consultation with family. We also collected information through gossiping and informal chatting with respondent. We build rapport with participants to encourage them to feel confident sharing life events. We have taken 12 life histories.

Observation*:* Personal observation takes huge place in this study. Observation involves studying the spontaneous behavior of participants in natural surroundings. Most of daily activities, life event of participant, sharing relation and interaction observed by researcher.

Data Processing and Analysis

Each respondent will considered arsenic a unit of analysis to do a content analysis. In order to process and analysis data, the following work will done: sorting data, performing quality control checks, data processing, and data analysis.

i). Initially after the subsequent progress of the field work, the interview transcript will sorted out on analysis need, i.e. gender and ethnic categories, different actors of water supply and collection.

ii). Then the transcript and field notes will checked for completeness and inter consistency. If any sorts of major incompleteness and inconsistency found, then immediately it will solved by visiting to field and discussing with the respondents once again. After the initiative if the problem could not be solved, then the interview transcript will not considered for further steps.

iii). the data processing comprise of three jobs: categorizing the data, coding and summarizing the data on data sheets. In quantitative analysis, categorizing simply represented frequency counts; however, for qualitative information, it will about fracturing data to figure out similarities and difference. First step will to list the data for each question including source. Second step will to establish categories and to put coding. Final step will to label each category.

iv). Data processing will done by manually for qualitative data and by computer .Verification in all spheres will done.

v). Data analysis will conducted in qualitative ways.. However, Summarizing and generating statement, display matrices chart, flow chart and diagram have been developed for qualitative data.

Validity

The researchers never tried to manipulated data to fit the hypothesis and perceived theories for generating research. Again, the

researcher will aware about reflexivity while doing the field work. The interview will not guide by leading question and by researcher's value judgment. In order to test the validity threat, the researcher followed mode of open ended approach.

Ethical Considerations

Participation in the interview session were voluntary. The researchers explicitly communicated the purpose of the study. Consent had taken before starting interview. The respondent had freedom to leave any time of study or not to take part in the interview. Confidentiality had insured and privacy had maintained always.

1.5. SPECIFIC OBJECTIVES

The goal of the study, literature reviews and conceptual framework motivate the researchers to figure out the following specific research questions/objectives:

I. To investigate the cultural dimensions of water, including local imagination, belief systems, and rituals associated with water in the Barind Tracts, and how these influence community interactions with water resources.

II. To analyze the stages and mechanisms of water commodification and marketization in the Barind region, unveiling the political economy and institutional factors driving this transformation.

III. To examine the social, political, and cultural impacts of water commodification on local communities, focusing on changes in access, equity, power relations, and community resilience.

CHAPTER: TWO

Sacred Waters and Cultural Flows: The Imagination and Belief Systems Around Water in the Barind Tracts

This chapter investigates the symbolic and cultural significance of water in the Barind Tracts. It also investigates local mythologies, rituals, religious practices, and belief systems that influence how people perceive, value, and interact with water. This chapter demonstrates how water is more than a tangible resource by examining oral histories, indigenous knowledge, and water-related rites.

2.1 Classification of Water on the Basis of Locality:

The inhabitants of this area form their perceptions of water classification depending on their social culture. They consider the following criteria for such classification, which are related to their faith and belief. Respondents who provided data on water categorization also emphasized the remarkable reality that they encounter in their daily lives. Water classification varies widely even among the same population in the same location.

2.2 Concept based on location of water sources:

Those who provided information during investigation have assumed the three categories of water on the basis of its locational availabilities. These are as: Those who shared information throughout the study assumed the three types of water based on their locational availability. These are as follows.

a) Underground water:

The respondents used to refer to underground water as "Nicher Pani," or beneath water that lies below the earth surface. In reality, the water located beneath the earth's surface is referred to as under-earth or underground water. They believe the earth's surface or ground level to be the delimiting border that divides surface water from subsurface water. They believe that subsurface water exists in several strata with varying drinkable values. Water levels increasingly get purer as they sink below the deeper level. They are adamant that aquifer or underground water is far superior in quality to drinking or potable water when extracted from a much deeper region than from a short depth.

They utilize the length of the tube-well water lifting tube to measure the depth of the aquifer's water layer. As a result, a sufficient number of lifting pipes are required to drill down to a deeper location in order to install tube-wells for safe drinking

water. This costs a lot of money, and only a few wealthy people can afford it. This demonstrates that the common people in the neighborhood are worried about the true drinking water quality requirement. Because of their poverty, they are unable to easily obtain it.

According to responses from the local community, common people believe that the Creator God created this underground storage facility for drinking water. "He" created water to provide sustenance for His creation. The respondents believed that people are becoming disobedient to the creator, and that as a result of this disobedience, 'He' is depleting nature's valuable water. They believe that this is some type of punishment or curse from Providence.

a2) Religious faith on underground water:

People of a variety of religious faith and ethnic backgrounds shared their opinions on the subsurface water, which can be summed as:

Muslim View: Common people of this religious faith in the area under investigation believe that subsurface water is the original source of water on the planet. Respondents think that Allah created subsurface water before generating water in

space (sky) to maintain the life that 'He' created on Earth. He then built the sky as a roof above the ground with no pillars, adorning it with the moon, stars, and other heavenly bodies. Allah created the universe after creating the planet, and it consists of four major components: water, fire, earth (soil, and air). Allah created water in order to generate other things from it. The responders and the general public maintain this opinion because it is widely accepted in their society, regardless of its veracity or conceptual blunders.

Hindu View: According to respondents from the researched area's local Hindu population, the earth is stored as underground water in layers underneath it. They regard their point of view as mystic and mythological, and they are unconcerned with how obscure it is.

Santal View: The Santal community of the study locality believed that the underground water came from God's sweat. They believe that God is always playful, like a tiny child. He is always sporty, engages in dalliance activities, and works for the survival of his creation. He is the source of all surface and subsurface water. He is able to maintain the living world alive in order to continue its propagation. God commands that everyone supply drinking water to their neighbors and help

thirsty individuals by fetching water for them. They believe that people's disobedience to God and irresponsible acts are causing water scarcity. They believed that indoctrination and reckless manmade activities were the primary cause of subsurface water contamination.

Concept of underground water based on educational criteria:

During this inquiry, it became understood that there is a conceptual or perceptional difference between people with institutional education and those with traditional knowledge gained via significant socio-cultural practices about subterranean water. The researchers focused on those who received their education in institutions such as schools, colleges, madrasahs, and universities and refers to them as institutionally educated, while those who are literate or illiterate are referred to as conventionally educated, constructing their perception through their socio-cultural practices.

a3) Conventional concept:

People with conventional or informal education think that underground water existed prior to its discovery several decades ago. They maintain that underground water was accessible to everyone just beneath the earth's surface whenever pits or graves were dug, as well as little ponds or drinking water wells. This fact indicated the presence

of extremely high-quality subterranean water. They also believe that while ducklings are stored, the layer of water on the underlying surface gradually thins. They witness how the soil accumulates water in their croplands and gets "eaten up" by the ground. The leaching process moves rainfall beneath the earth's surface.

People use water in this manner for drinking, household, and agricultural purposes. During the summer, the region's residents face acute water scarcity as ponds, pools, puddles, and other surface water bodies dry up, while shallow tube wells (DTW) suck enormous amounts of subterranean water for crop irrigation. These findings suggest that this source of water will be threatened in the near future.

a4) Concept of institutionally educated people:

People living here with formal or institutional education have different viewpoints on subsurface water, which can be attributed to the various sorts of educational institutions and the type of education provided there.

a5) People with school and college education:

The investigators describe the respondents as having completed education ranging from fifth grade to college level. These institutionally educated people think that the Earth was formed from a portion of boiling hot molten separated from the sun, which cooled

to its current state. The cooling process was gradual and continual, and at some point, the planet reached the conditions required for the development of global water. They believe that the earliest unicellular life evolved in this water. They believe that the water on Earth was formed as a result of contributions from oxygen and hydrogen.

These individuals also believe that underground water exists and that all types of surface water, including river and wetland water, as well as rains, sink beneath the earth's surface and persist in varying levels as underground water. They express that plants take underground water through their roots and use it during photosynthesis to produce food and oxygen, both of which are necessary for our life. During this process, plants additionally use air carbon dioxide to preserve natural gaseous balance. The underground water layers should not be disturbed so that plants may operate properly and maintain nature's gaseous equilibrium, which makes the earth worth living.

Respondents believe that water is necessary for soil growth and that beneath water layers should not be disturbed in order to preserve the soil-water field capacity. A good harvest is expected when the soil has subsurface water and just minimal irrigation is necessary. They unknowingly contribute to the conservation of subsurface water.

a6) Madrasah educated people:

Madrasah-educated people have different perspectives on the underground water issue. These persons obtain their religious education at either Hafezea or Alia madrasah.

a7) Hafezea Madrasah: There is only one Hafezea madrasah in this area where pupils are taught Arabic and get Islamic religious instruction. The students are known locally as Taleb-e-Ilmn, and they labor hard to memorize the Holy Quran under coercion. Students learn tight discipline under the supervision of madrasha teachers. Children enter the madrasha when they are very young, and males and girls receive their lessons separately behind a screen. During the festival season, the madrasha is supported by locals who donate money and goods. They obtain religious instruction from madrasah scholars as needed. Madrasah-educated people believe that water, even underground water, is Almighty Allah's creation. Allah created water before he created man. The holy water of the JumJum well in Mecca is regarded as extremely valuable in the world, and Allah grants one's wish if one consumes the water. Allah has assigned the angel Michael to protect this sacred water.

a8) Aliah madrasah: There is no Aliah madrasah in this area. The Bangladesh Madrasah Education Board runs these types of madrasahs. Some persons in this neighborhood have earned education from these types of institutions. They have similar thoughts on

subsurface water as the Hafezea people do about angel Michael. Simultaneously, they voiced comparable opinions as guys who had attended school or college. These people's varied beliefs provide some insight into the inevitability of subsurface water.

Concept based on age groups:

The investigators discovered a variation in the concept of underground water between respondents under the age of sixty and those over sixty.

a9) Above sixty years of age:

People from this group stated that they had no idea about subsurface water when they were younger. They just knew about the ring and the source of subsurface water. During its early days, they were unaware of the deep and shallow tube wells in their area. They think that Allah created this for the sake of mankind. They conveyed their confidence that the newly introduced devices (tube wells) that extract water from the deep earth will undoubtedly impair this source. Sufficient amounts of water from this underground reserve are being exploited or left unused after withdrawal, causing hardship and water scarcity throughout the dry summer.

a10) Below sixty years of age:

Participants under the age of sixty in this community believe that subsurface water is the initial and primary source of water on the earth's surface. They believe that exploiting the subsurface water in their area has enabled them to increase crop production. The majority of people think that this supply of water was created by Allah's will, although a few others believe that it was generated spontaneously to satisfy the earth's needs. Respondents believe that excessive withdrawal of subsurface water may harm the source, but they gladly seek water to irrigate their agriculture fields when necessary.

Concept based on profession:

This concept varies depending on the individual's professional position or stand. They attempt to create their conception while keeping in mind the nature of their work. Conception based on professional bias is summarized below:

a11) Deep driver/Deep tube well operator:

Operating or driving deep tube wells is an important water-related vocation in the area. The talks with two deep drivers revealed that underground water is the primary source of drinkable water. Men learned about it only lately. Irrigating the field with sufficient

subsurface water results in a higher agricultural production. The importance of this water becomes more apparent during the irrigation season, when farmers flock to deep tube well sites to press for irrigation, which is frequently competitive among themselves. To avoid the farmers' intense pressure, deep drivers occasionally go into hiding.

a12) Farmers:

The farmers think that the subsurface water exists because of Allah's will. This water is especially important for irrigation during the hot and long summer months, when the soil surface breaks owing to draft and desiccation. During this season, they rely on underground water for crop production. They believe that the subsurface layer of water is shrinking by the day, and water scarcity is becoming more visible. Farmers are denied of adequate water supplies, for which they must pay extra. They believe that the current practice of marketing deep tube well water has increased their irrigation costs.

a13) House wife/Domestic servant:

Housewives and domestic staff in this area believe that Allah has protected underground water for mankind. The deep tube well in Niamatpur upazila of Naogaon district draws less water, and the area is experiencing water scarcity. Underground water is delivered as tap

water in Nachol upazila, Chapainababganj district, and residents must line to get drinking water. The housewives and house servants expressed worry about the increased water charges. They are concerned about what may happen if the subsurface water supply runs out.

Students:

Students in this community, both male and female, believed that underground water was formed when the world was created. Previously, water was gathered via ring wells, but they were quickly replaced with hand tube wells. When the subsurface water level falls below the hand tube well, it becomes ineffective. The deep tube well was then introduced to replenish underground water. The deep tube wells are currently under stress as the subsurface water level has dropped further. They are concerned about the possibility that the deep tube wells will cease to operate. They also expressed great worry about the current practice of marketing potable water.

Businessmen:

Local businessmen assert that the subsurface water is pure and uncontaminated. They were concerned about the supply of this water. As their water consumption has decreased, they have grown more conscious of how they utilize it. Rice husking mills also use water with

caution. A tiny deep tube well was installed in a husking mill in Nachol upazila, Chapainababganj district. On the other hand, water marketization has begun in Niamatpur upazila in Naogaon district, taking into account the availability of subsurface water. The project organizers informed the investigators that they had installed the requisite apparatus for subterranean water withdrawal and that they would have to pay for energy. As a result, they must charge money for water to the locals who collect it from them.

B) The Surface Water:

Depending on the location it is in, water on the surface is referred to as surface or upper water. Ponds, pools, marshes, and streams are examples of small or deep depressions on the earth's surface that contain water. These bodies of water, whether temporary or permanent, are regarded as the locals' primary or traditional source of water. Long before underground water became available, the locals relied on surface water bodies to supply their needs. They continue to rely on these water sources for both household and agricultural purposes. Surface water becomes essential sources depending on its membership, total water area, water depth, and location. These water bodies are used not just as a supply of water, but also for heavy commercial fishing. The proprietors of such bodies of water are held in high regard in society and serve as indicators of their wealth. Aside

from crop field irrigation, common people use these water sources to bathe, clean clothes, and utensils. This water is also utilized to create soil pulps for mud-built homes.

Belief and outlook of people about surface water:

Surface water is viewed as extremely vital by the residents of this area because it is linked to the area's prosperous agricultural industry. This water is required for both irrigation and domestic animal husbandry. According to the responders, these surface water bodies are primarily rain-fed and exist as water-filled depressions on the earth's surface. Water bodies, such as ponds, are particularly important in terms of social standing in this area and are held in high respect when marriage relationships are formed between families who possess ponds or tanks. A pond owner, on the other hand, has complete control over the surface of the ground and thus may easily affect others.

Faith and belief in Relation to Surface Water:

This community is home to people of various religious faiths. Although these individuals live in the same location, they have different religious beliefs about the use of surface water. These people enjoy socioeconomic independence.

b1) Muslim View:

The local Muslims do not drink surface water, despite their belief that Allah keeps the ponds, pools, and streams filled with rainwater. They believe that a pond with twenty of water is considered Halal or pure water that can be utilized for bathing, cleaning, and ablution. They avoid contaminated pond water.

b2) Hindu View:

Pond water is extremely significant to the Hindu culture in this area. A pond full of water is strongly related with their 'Puja' rites. Following India's split in 1947, the Hindu population in this area has significantly decreased. Such Hindu religious occasions are infrequent. Every morning, Hindus do puja while standing in waist-deep water in a pond. They often immerse their deities in ponds following the Puja festival.

b3) Santal View:

The Santal people regard pond water as sacred. They take great care to keep the pond water pure and contaminant-free. The Santal habitation, which has recently been created in Niamatpur upazila of Naogaon district, is centered on the pond that exists here. Historically,

the Santals adhered to the "Sonatan" belief and would pray by the pond in this area.

Views of institutionally and conventionally educated people:

The investigators found a difference in view on surface water issues among people with institutional and conventional or informal education in this area. Institutionally educated people have received their education in schools and universities, whereas traditionally educated people have learned from socio-cultural practices over time. Their views are as:

b4) Conventionally or informally educated people:

This group people believed that their forebears had dug ponds to save water in the past. Water was sparse and unavailable, whereas it is now abundant. People were forced to excavate ponds for surface water. They also created canals to collect water from nearby rivers, streams, and wetlands, which aided in the removal of floodwaters. Even now, the locals regard pond water as extremely valuable. They believe it is important to dig ponds to collect soil for the construction of a mud-built house on their own land.

b5) Institutionally educated people:

People in this group believe that surface water ponds keep the local ecosystem in balance by maintaining a reasonable and pleasant temperature and cool air. They believe that ponds are crucial to man's livelihood. These ponds provide irrigation water while also serving as commercial fish farms. Nowadays, many harmful chemicals are employed in fish culture ponds to combat fish pests, which pollute the pond water. This group believes that the development of communal ponds is an urgent need to curb the marketization and overuse of water, and that the lifting of subsurface water should be halted immediately. A community pond may be created in strategically situated sites from which farmers can obtain irrigation water. These ponds will be administered by the local society. Afforestation should be done around community ponds that are kept full with rainwater. Farmers may be spared of exorbitant irrigation charges.

b6) People educated in Madrasah:

People believe that a pond with twenty months of uncontaminated water is suitable for bathing and washing. It makes no difference whether the pond is full with water; Allah's will determines that.

Concept of surface water based on age differences:

It was found that the concept of surface water, such as ponds and streams, varies among people of different ages in the neighborhood and community.

b7) Individuals above sixty years if age:

People in this age range told the investigators that ponds filled with pure water were constantly present in their early days. Around forty years ago, these ponds provided plenty of clean, uncontaminated water throughout the year. The clean water from these ponds was even used as drinking water and for domestic reasons. Contamination of the pond water was considered a social crime. The ponds were also utilized commercially for fish cultivation. All residents of the area had free access to the water in these bodies.

b8) People below sixty years of age:

People in this age range reported seeing ponds, minor rivers, and creeks filled with water in recent years. However, these bodies of water now hold water for only a few months of the year and are nearly dry the rest of the time. Furthermore, the majority of private and government-owned ponds were leased, but for fishing, and free access to the water in these ponds has been limited for local residents.

Concept based on ownership:

The investigators proceeded to obtain information about the basic concept of surface water sources held by those who own private ponds. It was discovered that, in addition to the management of private ponds, the 'Khash' or government-owned ponds are socially managed or controlled by the local landless population.

b9) Ponds under private ownership:

There are numerous private ponds in this area. An owner of such a pond stated that profitable fishery can be easily accomplished in his pond. He is capable of irrigating his own crop area as needed. He can also sell the water from his pond to others for irrigation purposes. He tries to keep the pond water clean and prevent others from making it turbid.

b10) Ponds controlled by the landless people:

The "Khash" or government-owned ponds in this locality are under the control of the landless residents of Niamatpur upazila in Naogaon district. They have built settlements around each Khash pond. They stated that their lives are dependent on these ponds and that they believe they are blessings from Providence. The Hindus regard these ponds to be gifts from their Goddess Lakshmi.

C) Rain Water or Water from the Sky

Rainwater is referred to as "water from the sky" by the locals, and it is considered the primary source of fresh water. Rainwater fills all ponds, pools, puddles, creeks, and streams. Prior to the marketization of water management in this area, rainwater was considered the primary supply. Normally, rain falls throughout the Bengali months of Asharh and Shrabon (August to September). However, rainfall has been gradually dropping since 1980.

Faith and Believe about Rain Water:

Rainwater is seen by people of all theological backgrounds as a wonderful gift from the Creator. They believe this water to be pure and safe to drink. They pray to God whenever there is a significant decrease in rainfall. They think that because of man's sin, God is angry with them and punishes them by reducing rainfall. In order to placate God and ask for good rainfall, the people perform their own religious rites.

The existing religious belief:

It has been observed that people of different religions have distinct beliefs about the water that rains provide. The local cultural

groups in this area have highlighted the religious beliefs that have been merged with the amazing reality of man's daily existence.

c1) Muslim Belief:

According to the local Muslims, rainwater is a gift from Allah. In order to sustain the living planet, he pours rainwater from the sky. For the faithful, it serves as an example or evidence of Allah's boundless power. Those who possess wisdom are able to understand Allah's divine power.

a scheme whereby a specific amount of rice crop, known as "Oshor" of Zakat, is distributed to the underprivileged when cultivation is carried out with rainwater. These days, this approach is not very popular. Muslims hold that Allah has sent the angel Michael to create rain and thunder from the sky. The current rainfall has significantly decreased, which is thought to be the result of human disobedience to Allah. As punishment for man's disobedience and sins, Allah has decreased the amount of rainfall. According to Muslims, the sparse rainfall that occurs these days is intended for the benefit of animals, birds, and other land life.

c2) Hindu Belief:

Hindus believe that there are three ways that God is in action. These include his creation, stabilization, and destruction. As Brahma, God created everything; as Bishnu, he sustained his creation; and as Shiva, he destroys. They also hold that God is all-pervading and represents peace. Since God Brahma contains the entire world, it is his manifestation. According to the Hindu answers, rainwater is an act of God Brahma's benevolence. The invisible God, who is both abstract or disembodied and corporeal with absolute power, is represented as water. This gracious God bestows rain as a gift.

c3) Santal Belief:

According to the Santal community, God is constantly involved in supernatural activities. He always acts creatively in a happily playful manner. They think that the sweat of God's feet is what causes rainwater. To keep his creation alive, God is constantly engaged in his divine pastime. He believes that good deeds should always be done by men. However, man no longer acts with sincerity or honesty. As a result of their disobedience, God has decreased rainfall. It is still evident that the Santals who converted to Christianity had some of their old religious and cultural influences.

After consuming water that has content, some of these converted persons frequently utter "Om Kanhya." It is regarded as the surviving

cultural influences that resulted from the blending or amalgamation of the "Baisnab" faith established by Shree Chaitanna in Gour, Bengal, and that of Norottan Takur in Khetur Dham.

Concept on rain water of people differing in educational background:

The research authors found that individuals with varying educational backgrounds had remarkably different general conceptions about rainwater. Institutionally and non-institutionally educated people differ conceptually in this respect. However, the local Madrasah-educated population has a different perspective on rainwater than do the school- and college-educated population.

c4) Conventionally Educated People:

The literate or illiterate residents of this area, who receive their education informally, hold the belief that God created rainwater or sky water. He uses this rainwater to support and nourish the entire earth. They consider rain to be the world's first source of water.

c5) Concept of People with Institutional Education:

Members of this group believed that gravity was the reason why rainwater fell. They think that the hot sun's rays turn groundwater into water vapor, which then ascends to the sky to form clouds.

Because of gravity, the highly concentrated cloud melts when exposed to sunlight and descends as rain. In the same way, this water forms clouds. This phenomenon is known as the "water cycle." Additionally, they think that airborne water shapes the terrestrial environment and regulates the weather as a whole. Although it does not quite align with a true scientific explanation, the researcher documented this as the public's opinion. According to these responders, pollutants and industrial wastes are discharged into the environment. These days, block smoke is also emitted into the atmosphere. The environment is contaminated by these wastes. In addition, trees are planted carelessly. These causes are causing a progressive decrease in rainfall. They stated their belief that a region with enough forest cover experiences appropriate rainfall. Insufficient rainfall is likely to occur in a location with minimal plantation. They believe that people are destroying the natural environment and causing deforestation. As a result, regular rainfall is severely hindered. This decreased rainfall will have a negative impact on their community in the future. They voiced the opinion that extensive afforestation and social plantation programs in this area are necessary to accomplish something environmentally benign. Congenial conditions could be brought about by these efforts to control the current situation. Additionally, they cautioned against planting eucalyptus plants because they grow quickly and require a lot of water from the soil. The water in the soil quickly runs out.

c6) Concept of Madrasah Educated People:

People who have memorized the holy Quran have been discovered to create their own myth-based ideas regarding rainwater. The Alia Madrasah-trained individuals, on the other hand, maintained some scientific concepts in addition to their belief in the myth.

c7) People trained in Hafizia Madrasah:

People educated at this locality's Hafizia Madrasah believe that the angel Michael, one of the most significant four angels, causes rain from clouds in the sky on Allah's orders. Angel Michael is in charge of weather management and the allocation of various provisions to man on Allah's orders. Michael is impotent and only acts when Allah directs. These folks believe that rainfall has been significantly limited in recent days as a result of man's disobedience to Allah.

People educated from Alia Madrasah:

Those who received their education at Alia Madrasah (run by the Bangladesh Madrasah Education Board) in this area share beliefs with those who received their education at Hafizia. However, they simultaneously expressed the scientific idea. A few of them shared

what they knew about how clouds originate in the sky and how rain falls.

Classification of Water on the basis of Practical Use:

The investigator found that different people in this area have different classifications for water based on their own experiences with actual water use practices. For instance, according to her domestic experience, a woman from the Oraon community divides water into three categories: rainwater, well water, and hand tube well water.

a) Hand Tube well water:

In this area, hand tube wells were initially implemented in 1980. A settlement was founded in the Niamatpur upazila of the Naogaon district approximately two years ago, and all of the residents organized into groups to install hand tube wells in various areas of the hamlet. Lifting subterranean water for drinking and other purposes is a good usage for hand tubes. Because the subsurface water level is dropping, the hand tube wells in the same study area's Nachol upazila of Chapainababganj district are no longer functional. However, these tube wells that were used in various locations throughout the hamlet of Niamatpur upazila in the Naogaon district are still operational. Since hand tube well water is collected from

an underground source, residents of the area under investigation believe it to be pure and uncontaminated. They believe they may be free of water-borne illnesses and that this water is safe to consume. Many residents of this area also think that drinking this tube well water will help anyone stay healthy.

a1) Partisan interest in setting up tube well:

There is a hand tube well in every village area built around the government-owned ponds in the Niamatpur upazila of the Naogaon district. These tube wells were installed throughout the communities, with the local Union council and residents sharing the cost between them.

When establishing a tube well, the locals displayed partisanship or self-interest. Everyone aimed to install a tube well next to his house so that water could be collected easily. These tube wells will be easily accessible to the family's ladies and children. In order to convince the authorities to put the tube well close to their property, the opposing parties or individuals get very involved. For this reason, they also make an effort to build strong relationships with the tube well establishing procedure. In order to hasten the installation of tube wells close to their homes, they occasionally make an effort to keep cordial relations with the local public representatives.

a2) Local Politics and Tube well:

The competing candidates pledge to give free tube well amenities in their villages when there is sufficient political activity during local body elections. When certain motivated individuals travel from village to village to gather information about tube wells, local leadership begins to take shape. In order to maintain strong relations with local public figures, they also frequently visit the Union council headquarters.

In order to win the favor of the locals in the upcoming election, the local public representatives also assist the residents in digging tube wells in their hamlet. During election season, the competing political leaders become equally active in an effort to influence the people.

a3) Tube well owned by rich man:

Tube wells have long been a feature of the homes of the wealthy residents of Nachol upazila in the Chapainababganj area. The residents of these homes are not at a disadvantage when it comes to getting water from far-off locations because they may gather it from their own tube well. However, the majority of tube wells are no longer functional. Since wealthy people can only afford to install personal tube wells on their properties, these wells are seen as a sign of wealth

and aristocracy in the community. Therefore, having a personal tube well is regarded as a sign of the owner's financial stability.

a4) Tube well and the poor and Landless people:

Financially disadvantaged residents of this area lack personal tube wells and are dependent on community tube wells installed in various parts of their villages. All locals use the tube wells located throughout the entire hamlet. The majority of the residents in Niamatpur upazila in Naogaon district are impoverished and landless, and so are unable to install personal tube wells, which are expensive.

a5) Gender based conception and tube well:

Women are typically given the responsibility of gathering water for the family's drinking and other household needs. For women in the home, fetching water is considered a usual obligation. Water for the livestock must also be brought by the ladies. If their closest tube well is still broken, they may have to go far to fetch water. In their spare time, the family's male members may occasionally assist with getting water. Although they perform their duties under duress when the male members are occupied with irrigating the cropland, women often attempt to avoid using a tube effectively throughout pregnancy. During her menstrual period, a lady tries to stay away from the tube

well and feels uncomfortable if she must go fetch water for the household. She believes that this menstrual phase makes her impure.

a6) Tube well management:

Everyone in this area can obtain water from tube wells that have been installed at various locations around the Niamatpur upazila in the Naogaon district. In the event that a tube well in one area of the community breaks down, residents can use the tube wells in other areas to obtain water. The residents of a village section pay for the services of a tube well technician when a tube well needs to be repaired, but there is no formal management body for tube wells. As a result, every tube well in the village is constantly operational.

B) Draw well or pit well water:

In the past, drinking water from draw or pit wells was widely used throughout this area. Well water was thought to be more palatable than water from other sources and to be pure and sacred. Typically, deep pits are excavated close to residential areas, and their sides are maintained by installing sturdy rings made of cement or earth. Subterranean water fills the lower deep side and is gathered in buckets attached to a long rope. These draw or pit wells are among the community's oldest and most widely used drinking water systems.

These wells were crucial in the past for supplying water for the celebrations.

Although the well water was used for a variety of household purposes, these wells are currently no longer in use due to a drop in the subsurface water level. According to some elderly individuals, children were not allowed to approach underground wells since they had occasionally unintentionally fallen into them in the past.

b.1) Big well or Indira of Rich man:

Large or large wells, known locally as "Indira," were considered an indication of a man's strong financial standing. In the past, wealthy individuals with a lot of landed property would dig a large well or an Indira on their property. In the past, some people built large wells as a pastime or as a show of fancy. It costs a lot of money to build a large well, or Indira, with interior cemented brick walls. Thus, a large well (Indira) in the area could be owned by the wealthy.

b.2) Common well shared by the poor:

A little well that the impoverished share was set up with a shared fund. It was observed that the majority of these wells, which are still utilized by the descendants, were created by their ancestors. They were forced to share the same well-established by their ancestor

for personal use, even if the number of family members increased progressively.

b.3) People above sixty years of age and their outlook on well:

Respondents older than sixty told the investigators that there used to be a lot of wells in this area. The impoverished used to cultivate banana plants to help the affluent man create a cemented brick pavement around the well site. To guarantee clean drinking water, the wells were adequately cared for and safeguarded. To prevent any mishap, the kids were kept away from the well site. It was deemed a social offense for anyone to throw dirt or a dead animal's body into the well. In such a situation, the impacted individuals would seek advice from the local religious authorities in order to resolve the issue and obtain compensation.

b.4) Outlook on well of people below sixty years of age:

This small group of people reported seeing wells when they were younger. These wells are no longer in use. Many of them have heard from older people about the use of wells. A few of them admitted that they didn't know how wells were used. Young people under the age of thirty are unaware of wells or pit wells, which were once the main source of drinking water.

b.5) Use of wells and Gender issues:

The usage of wells for water collection and other purposes, such as bathing and washing clothes and utensils, was accompanied by gender awareness in the community. In the past, women were obligated to conform to a strict Purda or veil system, as the elderly respondents noted. The women were able to gather water without falling into any man's line of sight because the well location was appropriately walled. Women were given designated times to fetch water and take a bath if there were communal wells. In general, ladies who were menstruating were discouraged from visiting the well sites. People believed that if women happened to visit wells to bathe or collect water during this cycle, they would likely be influenced by an evil genie.

C) Rain Water:

Rain or aerial water is the term used to describe water that falls from clouds in the sky. Sometimes, people gather this water in big buckets or jars for usage around the house and for other uses. Rainwater is gathered and used for everything from drinking to washing. The respondents believe that rainwater is uncontaminated and pure.

Classification of water on the basis of it physical nature:

Peasants and other locals agreed to categorize water into three types according to its physical characteristics, which are as follows:

c.1) Liquid water:

The locals use their own terminology to define water. They are aware that water that is transportable across vessels is in a fluid form. In this physical state, everyone drinks this liquid water. Any kind of irrigation or washing can be done with this water. Although the locals use slightly different colloquial vocabulary, everyone refers to fluid water as water in general.

c.2) Gaseous or aerial water:

The respondents recognize that water exists in the air as a gas, which they refer to as "aerial water." Aerial water is water in the form of water vapor. When there is a lot of water vapor in the air, they think that the air is forceful. Because of the sun's heat, surface or ground water constantly evaporates and eventually combines with the air to form clouds. According to them, maintaining favorable weather conditions requires that the air in the sky be appropriately packed with water vapor.

c.3) Solid water:

The responders are aware that water solidifies into ice. Ice is formed when liquid water freezes. During a hailstorm, solid ice can occasionally fall from the sky. Examples of solid water include ice, which is typically used to preserve fish and consumed as ice cream.

Classification of water on the basis of religious belief:

The present team of researchers conducted interviews with a diverse group of individuals from various religious backgrounds and found that they categorized or classified water similarly according to their religious beliefs and practices. In this regard, the local Muslims, Hindus, converted Christians, and Aboriginal people all had similar perspectives. They divide water into:

Sacred or pure water: According to the participants, water is considered pure or inviolable when it is used to achieve both mental and bodily purity. For bathing, ablution, and religious rites, pure water is essential. They believe pure water to be clean, colorless, and odorless. According to the Muslim residents, a pool with twenty milliliters of water is considered pure.

Impure Water: The opposite of pure water is this kind of water. When the usage of water results in the loss of both bodily and mental cleanliness, it is considered unclean. To be suitable for carrying out religious rites, one must regain their cleanliness by drinking only pure water. When urine contaminates water, it is believed that purity is lost. They believe that when water is tainted with trash and garbage and smells bad, it is no longer pure. Ablutions and other religious rites cannot be performed with this water.

Classification of water based on its taste:

People in this locality categorize water based on its taste: fresh water or water without sally taste, and sally or saltwater water with sally taste.

a) Fresh or sweet water: Fresh or sweet water refers to water with a pleasant or sweet taste. Sweet water is defined as water that does not have a common salt or sally taste. Fresh water can be found in this area's rivers, ponds, pools, and marshlands. Furthermore, the area has deep and shallow tube wells, as well as pit wells, that provide fresh water. Fresh water is used for drinking, irrigation, and all residential purposes.
b) Saline or Sally water: The natives refer to water with a sally taste as saline water since it contains common salt. The water

at sea and along the coast is saline. People in this area are unaware of saline water because it is not readily available.

Classification of water based on use:

The participants categorized water based on its use as:

a) Drinking water: The clean and odorless water is utilized for drinking. It's also used to cook meals. drinking and cooking water is derived from a variety of sources.

b) Useful water: In addition to drinking, it is also utilized for agriculture, cleaning, and construction. Its agricultural applications include crop irrigation, fish culture, and animal care. This functional or useful water should be pure, odorless, and free of contaminants.

2.3. Existing Sources of water:

The research team captured the popular perceptions on the current sources of water and their use in the locality:
a.1) Rain water: Rainwater is regarded pure in the neighborhood. Rain or aerial water refers to water that falls to the ground during a rainfall. During strong monsoon rains, all rivers, marshes, ponds, pools, puddles, and empty creeks fill up with water. Respondents noted that rainfall has decreased in recent years, yet they still regard rain water to be the primary supply of water.

a.2) Use of rain water:

Rainfall is most common in the Bengali months of Ashar and Shrabon, but it can also pour heavily in the following months of Bhadra and Ashwin (August-September). The locals are historically and socially accustomed to using rainwater in their farming activities.

a.3) Irrigation and Rainfall: Farmers use ploughs to prepare their field for paddy cultivation during heavy rainy seasons. Locals have been farming for centuries. The use of rainwater and agricultural irrigation are related in the sense that when there is little rainfall, growers must rely on deep tube well water for payment or normal rates.

a.4) Rain water and less expenditure for cultivation:

The participants stated that whenever there is sufficient and timely rainfall, they can easily prepare their area and sow paddy seedlings. They wouldn't have to buy water from the deep tube wells. Under the given circumstances, they are able to save money for their intended purpose. In the event of a reversal situation, farmers will have to pay extra for deep tube well water for irrigation. Sufficient and timely rainfall decreases their reliance on deep tube well water, increasing their comfort.

a.5) Rain water and loan for irrigation:

Farmers can easily prepare their land for paddy cultivation when there is adequate and timely rainfall. They frequently anticipate a reverse situation with a prolonged drought and prepare to deal with it. They go to local usurers, money lenders, and NGO offices to obtain a high-interest loan to pay for irrigation water from deep tube wells. To receive irrigation water from deep tube wells, farmers must load their pre-paid cards ahead of time. As a result, timely and adequate rainfall protects them against local usurers and money-lending NGO's. Many people struggle to repay their loans on time. Usually, consumers avoid obtaining such loans from money lenders.

a.6) Use of rain water for domestic purposes:

The local people of this area see rain water as pure and harmless, and they use it for drinking and other domestic reasons. Locals gather rainwater and store it in big containers for future use. They believe that rainwater is clean and transparent, free of bacteria that cause water-borne ailments.

a.7) Rain water and tin roof:

Those who own houses with corrugated tin roofs can readily collect rain water. Rainwater runs down from the corrugated tin roof

and falls to the ground, where a number of large buckets and earthen jars are positioned to catch it. Within a few minutes, these containers are completely filled with rainwater and may be used for drinking and cooking. Those who do not have corrugated tin-shaded dwellings gather rainwater by placing a number of jars and buckets outside during the storm. Large open-mouth barrels are sometimes used to collect rainwater for bathing, washing, and drinking by cattle.

a.8) Rainfall and the Environment:

The community members emphasized that a better natural environment is dependent on regular and timely rains. Excessive rainfall can harm the environment by creating temporary flooding and inundation of homes and crop areas. Plants play a crucial role in sustaining a healthier environment. Normal and timely rainfall promotes the growth and development of plants in and around the locality. As a result, they regard rainfall as one of the most important environmental conditioning factors.

a.8) Rain water is the source of pond water:

Participants revealed that rainfall is the primary source of their pond water. During the monsoon, ponds become completely filled with rainwater. However, when rainfall is scarce or insufficient, the ponds stay partially full. Those that cultivate fish rely on rains to

maintain their ponds. Many shallow ponds dry up totally or partially throughout the summer, forcing pond owners to wait for the next wet season.

a.9) Rain water and cattle feed:

Plants and grasses grow appropriately and abundantly when there is enough rainfall. Cattle fodder becomes abundant on the grazing field. A pond full of water becomes available to cattle, birds, and other creatures. As a result, rainwater is closely tied to cow feeding and drinking.

a.10) Cooking with rain water:

Rainwater is utilized to cook meals when it is abundant. According to an aboriginal woman, cooking using rainwater improves the taste of the food. She stated that when cooked with rainwater, pulses can be boiled quickly. When rain falls during the monsoon season, the majority of local families use it to cook their meals.

a.11) Rain and Drought:

The area under investigation is semi-arid and prone to drought. Prolonged drought is visible when rainfall is scarce or insufficient. People suffer from a lengthy summer when there is little or no rainfall.

During this drought, most water sources, ponds, pools, and rivers dry up fully or partially, and standing crops in the field suffer significant damage. A severe drought in 1980 destroyed all standing crops in the fields of two communities in this region. The peasants are continually looking for adequate rains to produce better harvests.

a.12) Construction works:

The majority of the houses in this area are made of mud. It takes a long time to construct such a house with mud made from moist earth and rainwater. When the soil is damp or wet with water, it is thoroughly mixed before the walls are built. When rain falls and wets the land, people begin to prepare the mud. The mud wall is constructed layer by layer. When one layer of mud dries and hardens, another layer is added on top of it. As a result, mud-built houses take a long time to finish. As a result, rainwater is also extremely important for house construction.

a.13) Plantation and rainy season:

People in the area like to plant tree saplings during the rainy season because the ground dirt is still damp. Other seasons are relatively dry, making it difficult for seedlings to survive. During the rainy season, the people establish plantations in and around their homestead. Although locals prefer to grow indigenous plants on their

land, many alien species can be seen because government agencies donated saplings. The responders also stated that these exotic trees were planted several years ago.

B.1) Creeks and gully water:

The investigated locality has undulated landscape with ridges and furrows creating the land surface. The furrows between the ridges create deep creeks or gullies that may remain dry during the dry summer. During the monsoon season, these creeks quickly fill with rainwater, forming ephemeral streams. The extra rainwater from the adjacent highlands rushes down to the waterways. The creeks keep water for a long time and are regarded as the primary source of irrigation water in the region.

b.2.) Irrigation:

Crop areas on each side of the creek are primarily irrigated using creek water. Several kinds of locally manufactured equipment are used to raise water to the field. To lift a lot of water, half-canoe-shaped water lifting devices with a bamboo pulley are utilized. The peasants use rope-fastened buckets to lift water. These technologies are indigenous to the area. Creek water is used by the peasants in the village of Niamatpur upazila in the Naogaon district to irrigate their wheat fields.

b.3) Creek and purchase of water:

When the creeks hold enough water, peasants with farms near or in the area of the creeks avoid purchasing irrigation water from deep tube wells. Creek water is very crucial for increasing crop yield. Many peasants use creek water in their crop fields, which are located near the creeks but away from the deep tube well area.

b.4) Fishing in the creeks:

In the summer and during the rainy season, the locals fish in the gully creeks. The creeks fill up with rainwater during the rainy season and link to distant marshes, which allow fish to enter the waterways. During periods of high rainfall, the creeks overflow, making it easier for fish to escape from the ponds and reach the creeks. Diverse native fish species can be found in the creeks, although occasionally exotic culture fishes that may have escaped from culture ponds can also be found. During the summer months, the locals fish in the waterways in large numbers with joy and celebration.

b.5) Fish culture in cages in the creeks:

Some valuable local species of fish are cultivated in creeks in total confinement within cages. The cages are built of bamboo and

surrounded by a fine net to keep the fish from escaping. The cages are partially submerged in water, and fish food is delivered inside on a regular basis. This form of fish culture in cages lasts for several months until there is enough water in the creeks. To avoid cross-contamination, fish farms employ separate, clearly marked cages.

b.6) Creek water and soil fertility:

The local peasants argue that utilizing creek water to irrigate their land increases soil fertility and increases agricultural yields. They believed that rainwater from the nearby land, which had ample soil nutrients, runs into the creek. Therefore, following irrigation, creek water improves soil fertility and aids in crop growth.

B7) Limit of availability of creek water:

The majority of the local creeks dry up in the summer, but during the monsoon they fill up fully with water and hold onto it for a few months after the post-monsoon season. A significant amount of crop land is located far from the creeks, whereas a small number of people have their cultivable property close to the creeks. As a result, the majority of peasants lack access to creek water for irrigation.

C) Underground Water:

Since groundwater comes from deep underground, the people view it as internal water. The current technology is used to extract the subterranean water. Currently, the subsurface water is raised using both shallow and deep tube wells. Electricity powers the deep tube wells. People of Niamatpur upazila in Naogaon district and Nachol upazila in Chapainababganj district rely on the deep tube well water for drinking and other uses.

c.1) Underground water as Tap water:

The people living in Chapainababganj district's Nachol upazila receive their water underground via a conduit, and they gather it from a communal tap that is placed in a handy location. A 25,000-liter overhead water tank constructed by the Barendra Multipurpose Development Authority supplies water to the village through subterranean pipelines. The residents' only source of drinking water is this, and they are required to pay for it. In contrast, the residents of the village of Niamatpur upazila in the Naogaon district get water from both the village tube wells and deep tube wells for cooking and drinking.

c.2) Driving force of Agriculture:

The availability of water for irrigation at the right time is one of the most crucial factors for improved crop output. The Barendra Multipurpose Development Authority dug deep tube wells in this area to supply the residents with irrigation water. These deep tube wells provide the irrigation water that peasants need to grow rice and other crops. Since irrigation water is accessible throughout summer cropping, they don't have to worry about drought. Water bills must be paid by the local peasants using their pre-paid cards. Peasants suffer greatly when deep tube wells are unable to supply enough irrigation water, which could lead to crop failure that year.

c.3) Money- deep rooted in underground water:

Those who own the deep tube wells in this area profit from underground water. The residents are essentially forced to buy water to suit their drinking, household, and irrigation demands. ground water has emerged as the most valuable commodity in the area since the advent of contemporary technologies. Nine deep tube wells have been erected by the Barendra Multipurpose Development Authority (BMDA), and one seep tube well has been established in this area by a non-governmental commercial firm that supplies water to the local population. The aforementioned organizations have brought subsurface water to the local market.

c.4) Underground water for drinking and domestic use:

In this area, subterranean water is extensively utilized for a variety of household tasks in addition to being used as drinking water. Every day, this water is utilized to make food. Numerous factors, including as electricity outages and mechanical failure of the deep tube wells, could result in a shortage of groundwater. The residents are forced to relocate to alternative water sources in these conditions.

c.5) Processing of Agricultural products (Cereal):

A variety of lengthy techniques are employed for preparing the harvested crop in order to make it useable. A number of procedures, such as soaking the paddy in water for several hours and boiling the wet paddy to turn it into rice and flour, necessitate an adequate supply of clean water. The people use underground water for this type of processing. The soaked and boiling paddy is dried before being husked.

D) Pond Water:

Many of the ponds in this area have long been the primary supply of water. These ponds are seen to be the most essential to their

existence and historically satisfy the locality's water needs. In terms of this locality's water governance, the ponds are crucial.

D.1) Commercialization of Fish Culture in Ponds:

Commercial fish culture is practiced in the majority of the ponds in this area. In the summer, when it becomes necessary, shallow water pumps are utilized to raise the subterranean water to fill the ponds, even though they are rain-fed. Nowadays, commercial fishing is practiced in all ponds, no matter how big or little.

D2) Cleanliness and bathing in pond water:

People bathe in the village pond every day. They also clean their clothes, bathe the cattle, and wash their utensils in the pond on a regular basis. Many villages can bathe simultaneously in the same pond. To protect privacy, a village's common pond typically features separate bathing areas or wharfs (Ghats) for men and women. Clothes worn by newborns are cleansed in a separate ghat in the same pond.

D3) Pet animals and pond water:

This area is currently undergoing an increase in capitalist establishments in terms of socioeconomic conditions. Under the circumstances, many peasants indulge in pet animal rearing, such as cattle, buffalo, and goats. Sometimes they make a good profit from

cattle rearing. Poor peasants collect drinking water for their pets since they are unable to access deep tube wells, which are expensive to them.

D4) Construction work:

The majority of the houses in this area are made of mud. Enough water is necessary to create a soft, pulpy mass of mud for the walls of such houses. Because deep tube well water is expensive, poor people must collect pond water for such construction purposes. The construction workers transport enormous buckets of water from the pond to the construction site.

D5) Duck rearing:

The inhabitants of the water body have an opportunity to raise ducks. Ducks are amphibious pet birds that require water bodies to roam freely in search of natural food. Ducks move freely in the pond water, increasing the oxygen concentration of the water, which is necessary for fish to thrive. Furthermore, duck droppings in pond water serve as food for fish. As a result, fish cultivators support duck rearing among the pond's occupants. Duck rearing provides certain economic benefits to the families engaged.

D6) Cooking food with pond water:

Many families in this area prefer to cooking their daily meals using clear pond water when the supply of deep tube well water is halted or interrupted for a few days. They believe that pond water is cleaned by heating while cooking food and is safe to consume.

2.4. The causes of stress on water sources:

a) Rain Water: Rainfall is the primary source of water in this area. Historically, water management and governance have been concentrated on rainfall. However, rainfall has reduced significantly during the last several years. As a result, individuals rely less on rainwater.

a1) Intensity of rainfall:

Rainfall and industry were significantly higher ten years ago, but they are now about half as high. These days, the monsoon season seems to be the summer. Instead of relying on rainwater, the peasants and other people are forced to buy water from the deep tube wells.

a2) Belief on reduce rainfall:

Rainfall is seen by the majority of people as an indication of the Almighty Creator's kindness. Man has become disobedient to Allah and has lost faith in him. He has punished the disobedient by reducing the volume and frequency of rains. When people in the past raised their hands in prayer for rain, they received it right away as a sign of Allah's benevolence and mercy because they had a strong "Iman," or faith in him. As a result, rainfall has decreased to atone for human transgressions. The animals, birds, and other species benefit from the little rainfall that comes these days.

a3) Reduced afforestation:

According to the respondents, one of the primary causes of the decrease in the rate and intensity of rainfall in the area is the careless and indiscriminate felling of trees. Their two settlements hardly have any large trees. People still don't understand the effects of deforestation. They said that in their area, deforestation outnumbers afforestation. People believe that rainfall occurs because plants attract clouds. Trees and other plants are thought by many to produce favorable weather conditions for the creation of clouds. They added that, like other areas, this one had previously been covered in dense forest and experienced severe, frequent rainfall, which forced the locals to stay at home instead of going to work. However, rainfall has been scarce in this area even throughout the month of Ashar in recent

years. Rainfall is steadily decreasing as the amount of plant cover decreases. The general public thinks that the Government and Non-government organizations must start aggressive afforestation right away, and i n this locality, homesteading and social forestry ought to be supported financially.

a4) Industrialization:

According to the participants, industrialization in the closest urban region is harming the environment by leaking effluents into the land and nearby water bodies and adding black smoke to the air. Pollution of the natural environment is occurring. This indicates the pattern of rainfall. However, in relation to industrialization, tree-cutting continues unabated. According to the locals, these are the primary causes of the decrease in rainfall.

a5) Over population:

According to the information, there are now too many people living in their villages. As a result, people must grow more food, which puts a lot of strain on deep tube wells to supply more water for irrigation. They are losing the ability to use the inadequate rainfall when it comes to crop production. Rainfall has an indirect influence like this.

a6) Modern Technology:

According to the participants from the two field sites, the majority of the locals believe that the installation of deep tube wells is directly linked to the region's decreasing rainfall. The way of life in these communities has changed as a result of recent electrification, the operation of electrified deep tube wells, and the use of TVs and cell phones. People's perspectives on life are changing dramatically. To satisfy their increasing demand, the villagers are selling off a lot of their trees, which is having an impact on the ecosystem. Due to the deep tube wells' massive underground water withdrawal, the subsurface water layer is fast decreasing. The plants' ability to grow properly is being hampered by the top soil drying up.

a7) Water content of the soil:

The locals believe that the top soil's water content has significantly decreased, which could be the reason for the decrease in rainfall. In the past, water could be obtained by excavating a shallow hole in the top soil, but this is not feasible now. They assume that the operation of the deep tube wells has significantly upset the water balance of the top soil. The lack of grass and tiny plant cover has caused the soil to become depleted of water, which hinders the growth of large trees. Locals think this is another factor contributing to the region's lack of rainfall.

B) The Creek Water:

A natural drainage system has been established in the area by the creeks, which discharge excess rainfall to the closest river to they. Because of soil erosion, these waterways are constantly filling up. Therefore, the creeks are rapidly disappearing. The causes of the creeks' extinction are as follows:

b1) a. Encroachment:

According to the statements, the majority of creeks are currently in danger because of unauthorized encroachment by some individuals who own agricultural property next to a creek. The sediments carried down by the rainwater during the monsoon are filling the creek's bed as a result of ongoing soil erosion from the closest area. Year after year, the creeks' beds increase significantly and become shallow as a result of this sediment deposition. This situation makes it easier for encroachers to seize the shallow creek bank next to their property. The grabber attempts to occupy as much of the creek's side land as possible during the irrigation season. This kind of encroachment occurs on both sides of the creek, which causes the creeks to gradually narrow.

b2) Minimum rainfall:

Rain feeding the creeks, the volume and intensity of the water flow are determined by the frequency and intensity of rainfall. This area has seen very little rainfall over the last 10 or so years. As a result, there is much less water flowing through the creeks.

c3) Declining of river flow:

According to the participants, every creek in this area is connected to a river that is close by. Water was observed entering the agricultural fields through the creeks during periods of high and swift river flow. However, the stream water flows into the river when the river's water flow is weak and low. The creeks in this region have traveled a considerable distance before emptying into the Padma at a location close to *Godagari*. Islands known as Chars have formed in the Padma bed, and the once-powerful Padma river now flows weakly. Because the *Farakka* dam was built on the Indian bank of the river, the Padma has a long lean period outside of the rainy months. Due to the Farakka Barrage's control over water flows, several rivers and *khals* have either dried up entirely or partially. This region's waterways have also been negatively impacted.

b4) Restoration of creeks:

In order to restore creeks that are entirely or partially filled with eroded soil, extensive reform is required. The peasants have long used the creek water, but they haven't taken any action in this regard up to this point. Because they support agriculture, the streams are essential to these two settlements' water management system. Despite the fact that creek water irrigation plays a major role in controlling the agricultural economy of the studied area, the beneficiaries are not aware of any creek restoration reforms. According to the replies, the majority of people believe that a re-excavation drive ought to be started in order to restore the creeks. They also think that public encouragement, government support, and oversight are necessary for such a large-scale excavation effort. They also think this reform effort should involve the local community's stakeholders and beneficiaries.

b5) Pollution of creek water:

The creeks maintain a weak flow because they are partially filled with silt, alluvium, and degraded soil. However, all of these creeks are used to harvest water for irrigation of crop fields. The peasants are currently reluctant to use the still-polluted creek water. Numerous people litter the waterways with household and other waste. A lot of people who live close to creeks either throw their waste

into the water or directly facade in it. These methods contaminate and render the creek water unsafe for human consumption.

C) Underground Water in the locality:

The following is an overall overview of the stress on this locality's subterranean water source:

c1) Decline of water level:

This locality's groundwater level has significantly decreased in recent years. According to the participants, the deep tube wells' massive water withdrawals are to blame for the subsurface water level's sharp drop. In order to provide irrigation water for a variety of crops throughout the year, the deep tube wells must run constantly. Many deep tube wells are no longer functional as a result of this overwork. Many deep tube wells that are now in operation have reached their limit due to the decreasing water level. Meanwhile, the old wells in Chapainababganj district's Nachol upazila have already been abandoned. The village's shallow hand tube wells are no longer functional. More deep underground drilling will be necessary to set up a new deep tube well in the area.

c2) Over use of underground water:

This source of water is gradually being harmed by overuse or misuse. participants bemoaned the installation of deep tube wells, stating that "man is extracting all the water from the belly of ground by setting up deeps."

c3) Absence of proper planning:

The usage of groundwater and its upkeep are not clearly and firmly planned for in order to achieve sustainable water management in this region. In fact, there is no relationship between the usage of groundwater and that of other water sources. Regarding the usage of this traditional supply, there is no appropriate plan. Many thoughtful responses believe that the governance of the watershed locality should be planned faithfully and practically.

c4) Less rainfall and problem of recharging:

According to the participants, the primary cause of the dropping subsurface water level over these years is the rare and inadequate rainfall. They added that the majority of rainwater seeps through the top soil and replenishes the underground water system, from which deep tube wells receive water. They believed that the

subterranean supply was under extreme stress due to the deep tube wells' high water extraction and lack of adequate replenishment.

c5) Infusing water into deep ground:

There is a possibility of pumping surface water underground. This researchers were informed by two deep operators in the Chapainababganj district's Nachol upazila that underground pipelines drilled in strategic locations around India are used to pump excess rainwater into deep ground during the rainy season. In Bangladesh, it is not common practice to infuse or pour in excess rainwater through pipelines drilled into the deep earth. This type of underground water source enrichment as a simple recharge technique ought to be implemented in this nation as well. According to the answers, the country's river system is drying up and there is not enough rainfall, which makes the typical process of replenishing underground source extremely slow.

c6) Rising demand for the growing population:

The demand for water is increasing due to the population's rapid increase. They continue to extract excessive amounts of groundwater to satisfy their demands. Deep tube wells, personnel, and equipment used in the process are all under extreme strain as a result. Additionally, the subsurface water level is fast declining. According

to the answers, a family's need for water increases when a new baby is born.

c7) Negligence of other source of water:

The residents of the two settlements in this area place greater value on the underground water sources. They also show a great deal of indifference and disregard for other water sources, such as ponds, creeks, and rainfall. They pay less attention to maintaining the cleanliness and warmth of these surface water sources for extended use. In this way, groundwater supplies are becoming more and more stressed.

D) Pond as original water source:

In this area, ponds are surface water reservoirs that have been used by humans for ages. As outlined below, these original water sources are currently under grave danger of being harmed:

D1) Loss of depth:

According to the participants, the ponds in this area were significantly deeper ten years ago. However, in recent years, the depth of these ponds has decreased. Deposition of eroded material from the pond bank sides onto the pond bed is the primary cause of this depth loss.

Rainwater erodes the pond bank soil during the rainy season and then pours into the pond. The pond bed rises and becomes shallow as a result of the sedimentation process that occurs on the pond bottom year after year. There isn't any routine re-excavation to remove the pond bottom deposit. As a result, these ponds' ability to store water is being diminished. As a result, ponds are becoming less significant as water sources.

D2) Commercial Fishery:

Nowadays, the majority of the ponds in this area are used for intensive fish farming. Such a fish pond is being heavily fertilized with both organic and inorganic materials. As organic fish eat, poultry droppings are dumped into the pond's water. The pond's water gets soiled, turns discolored, and releases an unpleasant smell. Additionally, inorganic fertilizer is added to the pond water, which encourages excessive plankton development and gives the water a rich green hue. As a result, the pond water is totally unsuitable for anything other than irrigation. To get rid of the carnivorous and weed fish (non-culture fish), the pond is first treated with poison. Because of this, the water from the treated pond is unsuitable for usage for a few weeks. According to the participants, a lot of individuals have skin diseases that cause extreme irritation and disruptions. As a result, commercial

and intensive fishing is restricting the household use of pond water, forcing people to find alternative sources of water.

D3) Private ownership of pond and limitation of its use:

According to the participants, the majority of the ponds in this area are privately owned, and the general public has little access to these bodies of water. There are some sizable ponds in the village of Niamatpur upazila in the Naogaon district that are only accessible to common men. The utilization of culture ponds has also decreased due to intensive fish culture. The pond water is also somewhat contaminated by commercial fish farming.

D4) Filling up of ponds:

The deposition of sediment containing alluvium is causing the ponds in this area to progressively become silted up. The owners of these ponds are turning them into agricultural land. They are reclaiming some arable land in this way. Nevertheless, nobody wants to dig a new pond.

D5) Influence of deep tube well:

As a result of the groundwater being drawn out by electrified deep tube wells, the locals believed that the ponds were drying up. Deep

tube wells are causing the pond water to be drawn downward. They assert that following the installation of the deep tube wells in this region, pond drying up was seen. On the other hand, other individuals believe that the primary cause of the ponds' drying up is the shallow pump machine that uses the pond water for irrigation.

D6) Reduced rainfall:

The general understanding is that most rain-fed ponds dry up within a few months. According to the participants, it was discovered that the Mollapara pond in the Chapainababganj district's Nachol upazila was full of water all year long. However, because of less rainfall lately, it is still not fully filled.

D7) Use of insecticides:

In order to increase yield, pesticides are widely used in crop fields these days. When it rains, these dangerous chemicals wash into the ponds and contaminate the water. Numerous other concurrently utilized agrochemicals are also equally harmful contaminants for pond water. As a result, the local population avoids using the pond water.

D8) Garbage dumping:

The people wash their clothes and utensils, bathe their livestock side by side, and take baths in the pond water. They used to dispose of their agricultural and household waste in the pond water. Additionally, a significant amount of organic debris and litter are brought into the pond by rainwater. These factors cause the pond water to become contaminated and unsafe for human consumption.

D9) Sewage connection:

Residents occasionally link their sewage pipes to the pond, allowing feces to be dumped into the water. This contaminates the water throughout the entire pond.

D10) Absence of new pond digging:

People wash their clothes and utensils, bathe their livestock side by side, and take baths in the pond water. They used to dispose of their agricultural and household waste in the pond water. Additionally, a significant amount of organic debris and litter are brought into the pond by rainwater. These factors cause the pond water to become contaminated and unsafe for human consumption.

D11) Less importance given to ponds:

Deep tube wells are more important than ponds since the former may provide more drinking and irrigation water than the latter. The kids of Nachol upazila in Chapainababganj district stated that a well-planned and comprehensive pond management system is completely absent.

D12) The Causes of Water Pollution:

The locals identified the following reasons of surface water pollution in their community:

D13) Dumping of garbage and waster matter:

Locals believe that throwing rubbish, litter, residential and agricultural refuse into ponds or bodies of water pollutes the water. Without widespread awareness, this destructive practice cannot be stopped. Participants said that people should be taught about environmentally responsible activities.

D14) Cleaning utensils and textiles:

The locals around a pond believe that cleaning utensils and unclean cloths pollutes the water.

D15) Bathing of humans and cattle:

It is commonly believed that people who live near a pond bathe themselves and their cattle there. The filth from humans and cattle contaminates the pond water.

D16) Commercial fish cultivation:

Commercial intense fish cultivation in a pond begins with the use of poison to remove undesired non-culture fish, followed by the frequent addition of organic material as fish feed. Inorganic fertilizers are also used to promote plankton growth in the pond water. These processes permanently contaminate the pond water, making it unsuitable for home usage.

D17) Throwing dead animals into water:

Pets' bodies are sometimes dumped into open water bodies like ponds and creeks. The dead animals decay there and pollute the water, generating a horrible odor.

D18) Fecal matter in pond water:

It is normal practice to toss children's feces into ponds or brook water. Sewer or toilet lines are frequently connected to neighboring ponds. In other circumstances, people build a bamboo platform near the pond

bank and utilize it as an indigenous toilet. Common people believe that these activities completely poison the pond water and harm the ecology in general.

D19) Straw or Hay Roof:

According to the replies, some individuals believe that rainwater that travels down the roof eventually ends up in the neighboring pond. The hay or straw roof contains some partially decomposed dried debris, which may combine with the rainwater. Rainwater transports dirty water to the pond.

D20) Iron in water:

Common people believe that too much iron in water pollutes it and makes it unsafe to drink. They recognize that iron is a contaminant in water, especially drinking water. When iron levels are too high, it causes the water to turn red. People reject any drinking water that contains enough iron.

D21) Germs from human body:

Many people bathe in ponds. At the same time, numerous people with various diseases take a bath in the same pond. As a result, the germs of these diseases contaminated the pond water, causing harm to those

who used the tainted water. The responders believe that this is how the prevalent eye illness spreads.

D22) Women in session:

Some individuals believe that during menstruation, ladies bathe in the pond. In doing so, they risk polluting the pond water. It is normal for such women to bathe in the local pond.

D23) Industrial trash:

Disposing of industrial waste in water bodies might damage the water. In this area, hot water from rice mill boilers and dirty water from rice soaking reservoirs are discharged into ponds, creeks, and other bodies of water. As a result, the water bodies are polluted.

D24) Insecticides:

To increase agricultural output in this area, a variety of pesticides and agrochemicals are applied in crop fields. In the end, these dangerous chemicals pollute water by washing into streams, ponds, and other bodies of water. Rainwater that flows through the ponds' inlets allows these pollutants to enter.

D25) Hand washing:

According to the participants, washing hands to remove filth can occasionally render pond water unsafe for usage.

D26) Mixing of polluted water with pure water:

The locals of this area came to believe that contaminated water contaminates pure water and renders it unfit for human consumption when it enters a pond. Additionally, the pond water or reservoir water used for ablution and other religious purposes is contaminated by the waste water.

2.5) Overall Perspective on Water Misuse:

The general public in this area views water misuse from their own perspective. The following are the respondents' opinions on this matter:

a) Water share of others is abstracted: Everybody has a right to an adequate quantity of water. Therefore, anyone who misuses potable water or any other type of water always makes it more difficult for others to get water. The water that was wasted is

someone else's property. Therefore, any overuse of water is considered a rejection of another person's right to obtain water.

b) An act against the society: Misuse of water by any individual is regarded as antisocial behavior. In addition to hurting a specific person, this kind of water waste is detrimental to society as a whole. This social injustice cannot be supported.

c) Misuse of water and irrigation season: The peasants are cautious to ensure that no one abuses irrigation water by using too much in his crop land. They also keep an eye out for any collusion between a peasant and the deep operator to provide him with more water than he requires. Anyone who engages in such collusion in the discussion of excess irrigation water faces harsh condemnation from others and gains widespread animosity. To censure the culprit, a mass meeting is called by all peasants and stakeholders.

d) Effect on the underground water level: According to the participants, this underground source is under immense pressure due to improper use of water from deep tube wells. The underground water level will continue to drop as a result of the extraction of surplus water. This source could be endangered by needless abuse of underground water.

e) Future water crisis: Unrestrained water use eventually results in a severe water crisis in the coming days. Unrestricted usage of drinkable water will harm the current water supply.

According to the participants, the most important thing that can be done now to prevent a major water problem in the future is to utilize water wisely.

f) Drinking water scarcity: According to the the participants, drinking water shouldn't be utilized for irrigation or other tasks like washing. This lowers the amount of drinking water available to people and sets the stage for a global drinking water problem in the future.

g) Religious faith on misuse of water: According to the local Muslim population, anyone who wastes or abuses water is a companion or brother of Satan (the devil). They commemorate the untimely death of the Holy Prophet's (SM) grandson, Hazrat Imam Hossain (R), in Karbala due to a shortage of water. They believe that wasting or misusing water is evil and that it is definitely forbidden by religion.

h) Present crisis due to past extravagance: According to the participants, the area's residents have historically used water resources extravagantly, wasting a lot of water. The result of that past excess is the current water issue. They bemoaned their previous actions. Even though the water supplies were socially maintained in the past, they were not cautious about their use or maintenance. To prevent a future catastrophe in the

water industry, people should utilize water wisely and maintain the current water supply.

i) Destruction of water sources: Unplanned use and excessive water misuse reduce the efficiency of water supplies. The consequences of negligence on the upkeep of water resources were unknown to the public. As a result, wells and hand tube wells are no longer functional and the water in the pond and creek is contaminated. Ponds used for fishing are so extensively puddled and turbid that they are unusable.

j) Rich man and misuse of water: The majority of the participants said that wealthy individuals frequently consume more water than they actually require. The wealthy have enough of water to waste or plunder. Even for their everyday needs, the impoverished lack enough water. The respondents expressed apprehension about the likelihood of experiencing a water crisis in the near future. One respondent also lamented by saying

> *"We do not have enough water for our use then how can we misuse it? We do not have enough rice in our pot, what shall we then spoil?"*

k) Mechanical fault: According to the participants, the water supply network frequently experiences mechanical issues, such as underground supply pipe ruptures and distribution accessory breaks. This causes leaks that result in a vast amount of water. Repairing and replacing the accessories to restore regular supply takes a very long period.

l) Leak of vigilance of the authority: According to the participants, the village of Nachol upazila in the Chapainababganj district has an eight-member vigilant committee. This group maintains the village's water supply system and searches for any leaks or improper use of any taps. Any violator faces a fine or has their tap shut off until the fine is recouped. The vigilance committee's primary responsibility is to prevent any misuse of the drinking water provided by the deep tube well authority, and it performs its duties with extreme rigor. Water usage persists in the event that this watchful committee fails to act.

2.6) Minimization of the Use of Water:

The investigation team asked about reducing the amount of water used on a daily basis. Here are the opinions of the participants regarding the minimum amount of water used and its applicability.

a) Basic need beyond minimization: One fundamental and essential element of existence is water. It is impossible for anyone to live without daily access to water. The amount of drinking water that each individual requires varies from person to person. Every individual must consume water in accordance with his body's needs. Therefore, it is exceedingly challenging to determine how much drinking water everyone needs. Therefore, it is impossible to consider reducing the amount of drinking water that is typically needed. According to the respondents, attaining austerity in their drinking water problem cannot be achieved at the expense of a basic human necessity.

b) Domestic use of water: Every family in their community has a very high need for water for domestic usage. By taking certain significant local actions, the amount of potable water wasted for this purpose can be reduced. This covers all household uses of pond water, with the exception of direct consumption. Crop land can be irrigated with pond water. These actions could significantly reduce the amount of water that is drawn from deep tube wells. However, the ponds in the area are currently in such poor condition that their water is unfit for any home use other than irrigation. Strict social control over the ponds is required. Every village should have one or more ponds that are free of pollutants so that residents can easily use the water for household needs. It is best to carry out such activation activity in a social setting.

c) Use of rain water: Every households using rainwater will undoubtedly consume less water from other sources. Rainwater may be used safely for a variety of household tasks. In this area, rainwater harvesting during the rainy season and appropriate preservation methods ought to be implemented. Rainwater may be readily collected and stored for later use by any family. This approach can help the local population deal with the water shortage. Utilizing rainwater will reduce the amount of expensive provided water used.

d) Minimizing the need of drinking by the working people: Since the commercialization of potable water, it has become very dear to the labor class people. They are required to pay for a specific amount of drinking water. They occasionally find it quite difficult to buy the necessary amount of alcohol. Therefore, it doesn't matter to them if they use less drinking water than they require.

e) Multiple use of the same water: According to the participants, the same household water can be utilized on multiple occasions. For instance, fish intended for cooking may be cleaned in the same water that is used to wash rice before cooking.

f) Minimizing the quantity of irrigation water: The irrigation water provided by the deep tube wells is paid for by the peasants. To prevent abuse, the peasantry must be mindful of their true irrigation water needs. Because using more water equates to wasting their money. To reduce the amount of irrigation water

used, all peasants should make an effort to remain austere in this area.

g) Introduction of drought resistant seed: The peasants stated that they believed the government needs to step up and offer drought-resistant seeds that would require little water to grow. The entire region that is susceptible to drought should be covered by the introduction of these drought-resistant seeds rather than just a few chosen areas. In the end, this will reduce the amount of deep tube well irrigation that is required.

h) Tree plantation: According to the participants, environmentally friendly tree plantations are essential since they foster favorable conditions for rainfall. This will lessen the amount of water used for irrigation from deep tube wells. The cost of purchasing water will also decrease.

i) Fixation of irrigation time: Instead of maintaining irrigation for ten or twelve hours, it may be cut down to a few hours. To reduce water consumption, an irrigation schedule of six hours may be established. For fear of regularity failing, the peasants will not accept this proposition.

j) Time irrigation: According to the peasants, timely and consistent watering benefits the cropland. After extended periods, irrigation often dries out and requires more water to reach its full potential.

The soil in crop fields requires less moisture when irrigation is done on a regular and timely basis.

k) Social planning: According to the participants, the irrigation issue need to be under social control. For irrigation to serve the interests of the community, particularly the local peasantry, there must be suitable and efficient social planning.

l) Drinking water for pet animals: To relieve their thirst, the pets drink clean water. According to the peasants, the pet animal should be fed drinking water on a regular basis since thirst prevents them from speaking. All peasants believe it is their moral obligation to give their pets the water they require. There is absolutely no way to reduce the amount of water that the pets need.

m) Cautiousness about drinking water for pet animals: The amount of drinking water a pet animal receives should be carefully considered by the villagers. To ensure that extra water is not wasted, the manger should be stocked in accordance with the animal's needs. This prudence will reduce the amount of additional water that the pets need. According to the participants, every peasant should understand the water requirements of his livestock, which he might learn from long days of caring for them.

n) Some sexual behavior of pet animals: This team of researchers were informed by the responders about some intriguing pet animal sexual behavior. Pet animals, such as goats and cows,

usually drink water when it gets hot outside. When the cow is in heat, it exhibits restlessness, keeps mooning, and needs more water to drink. Goats behave in the same way. Until they mate, these animals will continue to drink water frequently to quench their restlessness. According to the participants, the pet animals return to normal after mating.

o) Relation between human life and water: According to the participants, water is essential to the natural ecosystem because without it, no organism can exist. For human life to survive, water is essential. Every stage of life, from conception to death, need water. Water is at the heart of every human endeavor. Agriculture, which includes plantations, crop cultivation, animal husbandry, poultry, and fisheries, need water. In order to cook, clean, flush, build a house, operate some machinery, and most importantly, drink, man needs water. Water is necessary for all of these activities, including agriculture. Water is vital for religious rites and caring the sick, in addition to home and agricultural demands. Every celebration and sad occasion in human society requires water. Participants emphasized that all human habitations and towns have been built in areas with an abundance of water. A human settlement's ability to survive and continue depends on the availability of water, and if the water crisis worsens, it will probably be destroyed.

Since they have adequate water on hand and understand its importance during even brief emergencies, the respondents chastised the irresponsible individuals who waste it carelessly. When the deep tube well water supply is momentarily interrupted by an electrical outage, the residents of Nachol upazila in Chapainababganj district face a water crisis. This kind of load shedding, which lasted for three days straight in this community, caused human life to become abnormal because there was no drinking water for people or pets. To obtain drinking water, the peasants had to endure terrible hardships by traveling to far-off communities. According to one respondent, a man is created from a drop of fluid and needs water when he passes away. Human life depends on water just as much as plants depend on carbon dioxide to survive. He goes on to claim that without water, human civilization would not exist and that it is the most valuable resource in the world. Another respondent shared his opinion that during ongoing water crises, people may engage in actions that destabilize society. In certain situations, those who are suffering can choose to relocate to areas with reliable water supplies. This may be considered conjecture, but the current human abuse of water will cause a severe water catastrophe for the next generation.

2.7) Belief, Values, Rituals and Formalities Centered on Water:

The present researchers learn about the religious faith and belief, values, rituals, rites, and formalities that revolve around water during this research. Below is a summary of these:

a) To utter *"Bismillah"*: Muslims in this area say "Bismillah," which translates to "In the name of Allah," and begin to sip water. They think that Allah will reward them for this statement, and he bestows his blessings on them in that water. When they finish drinking, they say "Alhamdulillah," which translates to "Thanks to Allah." They believe that Allah has given them water as a gift. They also believe that by making such statements, they will be able to win Allah's piety and moral greatness.
b) "*Isteska"*- Special prayer for rain: The Muslims in this community organize an Isteska Salat, a particular prayer for rain, after extended droughts. Under the direction of a devout religious preacher, Muslims congregate in an open field during periods of severe drought, where they pray for a long time in the blazing sun. Muslims hold that Allah is benevolent and that He may display His compassion and favors by sending rain. The extended drought in 1982 was described by the interviewees. People endured unspeakable hardships during

this drought. Due to a lack of irrigation facilities, the field's standing rice crop dried up entirely. It was impossible to raise any other crop. People had to endure famine, and peasants were forced to sell their ploughs, cows, and cropland for a pittance. In these conditions, the Muslims of five villages came together under the leadership of a local religious leader, *Moulana* Jahir, to offer the "Istesk" prayer for rain. Throughout the numerous hours of prayer, the attendees were in tears. No rain fell.

c) Mythological stories on water: Researchers learn about certain mythological tales that are very popular in the area they are looking into. These tales are as follows:

- Prophet Nuhu and the great deluge: According to the holy Quran, the Muslims in this area are aware of the account of the prophet Nuhu (A) and the great flood. According to the interviewees, they learned about the story from both public lectures by local religious clergy and from the elder generation. Prophet Nuhu (A) was commanded by Allah to teach his fellow citizens the religion He had prescribed. For many years, the prophet preached the official religion, but the majority of his contemporaries ignored his counsel. His peers were fully engaged in immoral and antisocial behavior. They

disregarded the prophet's teachings about Allah's will. They often made caustic comments and used foul language to attack him. The prophet was occasionally tortured inhumanely. The prophet and Allah's faith were opposed even by his wife and children. They used to constantly make fun of the prophet, just like other wayward people. Over the course of the prophet's many years of preaching, just forty men and forty women adopted his faith. The prophet was being so severely abused and tortured that he was at his breaking point. In prayer, he lifted his hands and prayed to Allah for forgiveness. The prophet constructed a huge boat that was 1,000 yards long and 400 yards wide as directed by Allah. The prophet was mocked by his fellow countrymen during the construction of this massive ship, who called it pointless because there was no flood and there was no reason to build such a ship on high ground. Allah commanded the prophet to bring each type of living animal aboard the ship in pairs when the construction was complete. Forty obedient men and their wives were also taken by the prophet. Then all of a sudden, Allah gave the earth the command to release water, and the sky began to reveal storms and severe rain. Initially, water began to pour from Nuhu's wife's hearth, and then there was an increasing amount of thunder. Before long, Nuhu's boat was afloat and the ground was submerged. The disobedient fellows attempted to swim to

safety but were unable to locate any high ground. Over the course of forty days, the entire country—including the tall mountains—was inundated with rain. The prophet's wife and son perished in this massive flood, along with all other men and women. After forty days, Allah commanded the sky to cease raining in torrents and the soil to absorb floodwater. Within a few days, the floodwaters had subsided, and Prophet Nuhu's boat landed close to Mount Zufi. After releasing all the animals on board, the prophet disembarked with his followers, who subsequently brought their offspring to populate the nation. According to the participants, the account of Prophet Nuhu and the great flood teaches us that water is life, but that Allah also uses this water as a form of punishment when people disobey him.

- The fountain of Ibrahim (A): The local Muslim community holds this narrative in the highest regard. The account was told by the responders with a great deal of formal respect and solemnity. Prophet Ibrahim (A) was once told by Allah to abandon his wife Hazera and baby son Ismail in the desert, close to Kaba. The prophet obeyed Allah's command right away. There was no water supply and no human presence in the area. They soon ran out of food and water and began to go hungry. Hazera searched for water for the infant seven times between Mount Safa and Maroa, but there was none. In order

to preserve the child's life, she then began to pray to Allah for water. The angel Jebrael was sent to them by the benevolent Allah. A water hole appeared where the angel's leg was pressed up on the infant. The angel requested that Hazera and her kid use the water, which appeared as a fountain, to relieve their thirst. This well, also called "Abe Jumjum," is still in existence. This water is precious to all Muslims worldwide.

d) Purity and sacredness of Jamjam water: Since the water of Jamjam is considered the purest and most sacred, anybody returning from the "Haz" pilgrimage always brings enough Jumjum water with them. To obtain a tiny amount of the holy water from the Hazi Saheb, a large number of people from the neighborhood congregate at his home. A man must wash his hands before consuming this sacred water. The villagers firmly believe that Allah satisfies a man's sincere wish if he drinks this water while standing.

e) Sanctified water: Drinking holy water is a popular social culture in the area. According to these folks, sanctified water can save a person who is possessed by a malevolent genie and cure a variety of illnesses. By reciting passages from the holy Quran and whiffing on the water, a devout Muslim cleric sanctifies the water in a container. When ill, the Muslim residents of this area would seek medical attention and apply sanctified water to aid in their recovery.

f) Social Taboo regarding water: In the area, there are several social taboos related to water. It is advised that women who are menstruating stay away from any water sources. When such ladies touch the container, even drinking water becomes unholy. The researchers inquired about the locality's pre-commercialization water management practices. The elders in the area shared information about this matter.

g) Purity of water: The purest and holiest substance in the world is said to be water. People believe that water purifies everything and cleanses the human body and possessions of all impurities. Before praying and reciting the sacred Quran, one must do an ablution with water. Water is necessary for man to become pure from various forms of filth. It is usual and required for every member of the Muslim and Hindu faiths to attain purity by using water in a specific manner before to undertaking any religious rites.

h) Prayer for rain: In the event of severe drought and desiccation, the Muslims in this area recite a particular prayer following every Friday Juma congregational prayer. Following Juma prayer, all of the congregation's followers say a special prayer, led by the Imam (priest), asking Allah's benevolence and mercy to deliver them from this natural disaster. This particular prayer is typically held during the dry

spell. At this period, the Sallapara mosque in the village of Nachol upazila of the Chapainababganj district of the area hosted a regular "Milad Mahfil," or assembly for prayer and religious desiccation. It is uncommon to see this kind of gathering these days.

i) Promise to Allah: Making a sincere promise to Allah for rain is a custom in Muslim society. Peasants swear to Allah that they will fast for three or a specific number of days or donate a specific amount of money as charity to the local mosque or madrasah (religious institution) if the drought is ended by abundant rainfall. Many wealthy persons occasionally pledge to dig a well or pond for the common people once Allah alleviates their hardships brought on by the protracted drought and desiccation. They are confident that Allah always answers their prayers for rain.

j) *Oshor* (Zakat of Agricultural Product): Rich Muslims do oshor, or zakat, of cereals, particularly wheat and paddy, as a required religious rite. Ten percent of the crop must be distributed to the impoverished if it is cultivated with irrigation, and twenty percent must be distributed if it is grown with rainwater. Additionally, these crops can be given to any charitable organization. It is said that some wealthy men carry out this religious obligation.

k) Defecation in other's premises: The Santal people of the village of Niamatpur upazila in the Naogaon district think that secretively leaving one's face in another person's home and defecating there could cause heavy rains. A Santal community member said that discreetly dumping waste into someone else's home or property causes instant rain.

l) Marriage ceremony of Frogs: To attract rainfall, the locals stage a fictitious frog marriage. They think that by doing this, favorable conditions are created for drought to be ended by immediate rainfall. The villages of Nachol upazila in Chapainababganj district and Niamatpur upazila in Naogaon district are frequently the sites of this ceremony. In the Niamatpur upazila in the Naogaon district, among the Santal group, this mock marriage is still popular, but it has become uncommon in the Nachol upazila of the Chapainababganj district. During drought years, the aborigines of Niamatpur upazila in Naogaon district stage a frog sham marriage. However, occasionally every community in the area plans this ritual with great zeal and fervor, in which everyone participates.

Everybody contributes money as a subscription to the ceremony during the drought in the month of Ashar, which is the rainy season. The marriage ceremony is solemnized with tremendous fervor after two frogs are captured from a marshy area and brought to the ceremonial platform. After that, the frogs are let go in a body of water.

A lavish feast is served to all guests after this. To the rhythm of the drums, the Santal women and men dance. During this event, they consume Haria, a liquor that is made at home. Hindus apply vermilion to the frogs' bodies at this fictitious marriage, but some Muslims apply turmeric powder in its place. An illustration of the traditional indigenous culture that predominates in this rural society is the fictitious marriage of frog pairings.

m) Bishkurum: Before drinking water, the indigenous communitirs of Niamatpur upazila in the Naogaon district, particularly the Santal and Munda people, say "Bishkurum." However, it was discovered that certain Santal males would constantly say "Omm Kanhaia" while enjoying a glass of water.

n) Recitation of special holy words or Doa for drinking water: As taught by their religious teacher, several participants used to say a special "Doa" before drinking water. "Rabbahum Sakahum Saraban Tahura" is this.

o) Eating stolen stale rice: According to several participants, some men think that if someone consumes stale rice that has been soaked overnight by stealing it from another man's home, rain may fall.

p) To break and earthen pot or break a hearth: Many people believe that if an earthen pot or hearth is shattered, rain may fall.

q) Irrigation by women: It is believed that if women use cultural practices to water the land, rains may occur.

r) Festival, rains and worship: According to a member of the Oraon indigenous community in the Naogaon district's village of Niamatpur upazila, "Pachani" is necessary for each festival. Stale rice is soaked in water for a few hours until it ferments to make pachani, a homemade liquor. In the month of Shrabon, Mundas and Pahans perform puja for rain. On the eleventh moon day of the month of Bhadra, they also perform Bhal puja. After offering a cat or cock sacrifice next to an unidentified tree, they do puja in the name of Karna Dharma. The indigenous community members assert that the downpour begins right away following this pooja. Furthermore, they assert that rain always falls during pujas and other acts of worship. They used the rainy seasons of "Lakshmi puja" and "Kali puja" as examples. They hold that their worship and sacrifices make God happy, and that rain is a sign of God's generosity.

CHAPTER: THREE

From Commons to Commodity: Tracing the Political Economy of Water in the Barind Region

This chapter analyzes the historical and contemporary processes through which water has transitioned from a shared public good to a marketable commodity. It examines the institutional, policy, and infrastructural shifts—such as privatization, tube well monopolies, agricultural intensification, and development interventions—that have contributed to water commodification. Through a political economy lens, the chapter unveils who benefits, who controls, and who is excluded in the evolving water governance landscape.

3.0. The period before the development of authorities' dominance of price value of water

The current study has identified many stages of water marketization based on the interpretation of the data gathered and additional conversations with a number of selected participants. Here, consideration has been given to the kind of ownership dominance in water governance or management. From historical stages of the development of marketization of water, the pages present the most active driving factors associated with the current water governance

system, which is centered on agricultural production and the type of ownership of the production material in the investigated society.

3.1. Social management of water

The research team make reference to the time frame prior to the British colonial ruler's imposition of permanent settlement in 1743. During that time, society controlled the management of water. Following the establishment of permanent settlement, this social management of water collapsed, and a feudal aristocracy emerged to support colonial control. There was a clear division in the society between subjects (common people) and Zamindar (land ruler). Water social management is an ancient system that can be described as follows:

- Plenty of water was available in nature from spontaneous sources.
- All sources of water were under social control.
- Absence of private ownership of sources of water.
- Free access for all to the sources of water.
- Presence of joint ownership and group based production.

3.1. a). Management of free water

Water in this area was free of charge prior to the establishment of deep tube wells and the Barendra Multipurpose Development Authority (BMDA) in 1982. There was no cost associated with using any source of water. Without any opposition, they were able to gather water from any source. The idea of turning water into a commodity of trade was unknown to the populace.

3.1.(b). Water- from plenty to Paucity

Water was not considered a commodity of trade, and there was an abundance of it in this area. However, as time goes on, the population continues to rise as well. More food must be produced in order to feed the expanding population. Therefore, the excess agricultural output required extra water. The existing water management system was losing equilibrium with the expanding production system. Apparently, there was no longer any correlation between the two systems. As the situation changes, the water marketization system takes center stage.

3.1.(c) Social ownership of water sources

Water sources were subject to social control prior to the advent of water mechanization. Some water sources were owned by a single

person at the time, but there was no sense of ownership. The water sources were open to everyone.

3.1.(d) Permission for access to water sources was not necessary

The owner of the water source did not have to give permission to be able to use it. Neither the owner nor the user ever considered the formality of requesting authorization to utilize the water supply. Despite the fact that some people owned the water sources, there was seldom any ownership consciousness and everyone had the social right to unrestricted access to any water source. Permission to access any water source was out of the question because of the social order. Everyone had unfettered access to all sources of drinking water, regardless of who controlled them.

3.1.(e) Old system of water management and irrigation

Before water was mechanized, there was an outdated system of water governance. In order to irrigate their cropland, the present relied on rainfall. Because of the favorable environment in the past, rainfall was timely and regular. As a result, the peasants did not think that they needed any more irrigation. They had no notion how to buy water for irrigation because this natural supply was so abundant, and they adapted their farming to monsoonal and extra monsoonal rains.

3.1.(f).Application of Indigenous knowledge on Climate

Before the invention of machinery, community members utilized their traditional wisdom to predict the weather. For their agricultural output, they were dependent on rainfall. By looking at the cloud's color position in the sky, they could determine whether there would be rain and whether farming would be possible. According to the participants, the peasantry used to store rainfall in water holes that were already excavated in an appropriate location on their cropland. This allowed water to be extracted from the holes and utilized to irrigate the agricultural field that needed it. It was discovered that their water holes held water all year long.

3.1.(g) Well- the main source of drinking water

Prior to the installation of deep tube wells, the wells or ground wells served as the main source of drinking water for every family in the area under investigation. The village wells were open to everyone without charge.

In order to create a permanent pavement, wealthy people used to cover the area surrounding the well with bricks and cement. A cement ring well surrounded the well's mouth. The well was surrounded by bamboo or banana-plant fencing for the average person. Water was available all year round, and the wells were typically fairly deep. Near the well, a bracket secured with a long rope was always available for

anyone to use to raise water. When choosing a location for a well, the people took care to ensure that everyone could easily use it.

Because of the conservative nature of the community and the custom of women wearing veils, special arrangements were made for them to use the well that men were not allowed to use, especially when taking a bath.

3.1.(h) Joint water management

Before water was mechanized, a family group worked together to operate the wells. The clams male shared the well with the entire clams group. Every Lurch family group used to share equal ownership and cares for a pond. They everyone had free access to their water supply. Everyone used the water from these jointly owned sources amicably and it was not marketed.

3.1.(i) Cordial relations on water issue

Over the past year, community members has consistently maintained friendly relations regarding the use of water sources. To them, any disagreement on this matter was entirely nonexistent and unimaginable. In the past, everyone prioritized making sure that everyone had access to clean drinking water. There was no such dispute in society when it came to joint as corporate agriculture

activity. The general populace tended to communicate their endeavors to preserve harmony and goodwill within their community.

3.1,(j) Ritual based water management

The local population used to engage in a number of water-related rituals. During the ritual, a young man is brought to the pavement of a large masonry well by his kinsman to be bathed in the well's water. Only the relative with whom there is a playful relationship can play pranks and engage in marriage jacking during this ritual performance (with the bridegroom / sister-in-law, brother-in-law, etc.). Other significant customs that are still popular in this society include frog marriage, mass praying for rain, etc.

3.1.(k) Social Vigilance

Social vigilance was in place to safeguard the water sources and ensure that there would always be drinking water available before the marketization of water was established. Everyone continued to exercise caution regarding the sources of drinking water's safety and cleanliness. It is totally forbidden to dump any dirt into the wells. in the event that a domestic animal dies by accident from falling into a well. On the recommendation of the local religious leaders, the well was either fully or partially dewatered. For the Muslim women who

observed purdah, a well-fenced bathing area was constructed, and a large shed with tress was planted around the well site.

3.2. Introduction of Lease System

The usefulness of water became evident as the productive activity centered on its use continued to progress from the prehistoric society. The idea of private ownership of water supplies is still becoming more and more prevalent in society alongside these socioeconomic shifts. After the British colonial rulers established permanent settlement, a land lord (Zaminder) clan emerged. For many generations, these Zaminders ruled the land. A feudal land system emerged after the ancient land system collapsed. The Zaminders get ownership of the natural water sources under this system of feudal land. The peasantry received these bodies of water in return for paying land taxes. The social ownership system of water management was quickly replaced by a lease-based ownership system.

Salient features of lease system

- Both land and water supplies were acquired by the Zaminders, who then granted the peasantry the right to utilize them in return for tax payments.
- Previously, the lease holders provided irrigation water in exchange for a percentage of the crops that were produced.

- Certain ponds, such as Saraola Dighi of Miah Zamanders of Nachol upazila in Chapainababganj district, were maintained as sources of drinking water under the lease system.
- The Zamanders also collected taxes from the populace and offered possibilities for access to drinking water.
- With the introduction of the leasing system, the previous water management system progressively vanished.

3.2.(a) Pond based water management

The local ponds served as fully operational water sources in the days prior to water mechanization. In addition to being used for cooking, pond water was drinkable. The water in the pond was clear, pure, and toxic-free. Women used the numerous wharves (ghatt) on each side of each pond to wash and clean their utensils. On each side of the ponds were fruit plants. The bulk of the homes in the area under investigation are made of mud, and each one has a pond that was excavated to use the dirt for building. Family-owned ponds can also be found here. Raising domestic animals also required pond water. In this area, the ponds were thought to be the only viable source of water.

3.2.(b) Open joint agriculture

In the past, open cooperative cultivation was the norm. There was very little disparity in the peasants' access to cultivable land. They

supported one another as they farmed their land. Everyone cherished what appeared to be identical water demands because crop cultivation depended on rainfall and water was not a commodity of trade.

3.2.(c) Joint family

In the medieval farm production system, more agricultural workers were required, which aided joint families in expanding their family size. Prior to water mechanization, farmhand labor investments were made through joint families as part of agricultural enterprise. The number of individuals in joint households increased in order to supply additional labor for the farming industry. Even still, agriculture salaries were somewhat financially advantageous.

3.2.(d) Unexpanded and backward capital in Agriculture

The post-feudal capital in the agricultural sector was primitive and underdeveloped in the years just before to the marketization of water farms and their characteristics. There was no surplus agricultural production to support the growth of agro-based capital because, at the time, profit-based commercial agriculture for the expansion of capital wealth had not been conceptualized in this locality under investigation. On the other hand, agricultural production was static to precisely fit the needs of the peasant. The agriculture-focused marketing strategy was outdated.

3.2.(e) Backward Agricultural production

In the years after feudalism, agricultural output was at its lowest. In order to farm their land, people had to rely on the rainfall. The agricultural field might yield up to 10 monds of padely per bigha (33 decimal places) if it were rain-fed. In the crop field, only one crop (padely) was cultivated each year. The landowner receives half of the crop when it is grown jointly.

3.2.(f) Uninhabited field and Ponds of village of Niamatpur upazila of Naogaon district

According to the participants, Niamatpur upazila in the Naogaon district has a large, deserted field devoid of any human habitation. Under the supervision of a central farm house, the ordinary people used to cultivate paddy crops in the vacant field. All of them shared the product. Two years ago, a group of landless individuals moved into areas near some sizable ponds that were held by the government. In the past, people used water from nearby creeks to irrigate their crop fields. To make irrigation easier, however, some fresh ponds were excavated here. The water management system was social and agro-based prior to its commercialization.

3.3 Technology based commercialization of water

Tragic land ownership disputes between the Zaminders and the subjects erupted throughout the entire region under the feudal system of leasing out lands. In the end, this land dispute resulted in a violent mass uprising of the Santal community, led by socialist peasant leader Ila Mitra. The Zaminder system was abolished by a law issued by the Pakistani government. As belonging to the persons who farmed it, the land was listed in their names. In addition to helping to establish the proper owner of the property, this government action also contributed to the development of the idea of private ownership of the water bodies throughout the entire region, including the area under investigation.

The entire Briand region experienced a severe drought in 1982. Crop production completely collapsed during that intense and protracted drought, and inhabitants in many areas had to deal with a significant shortage of potable water. In light of the situation, President Ershad's administration chose to drill deep tube wells in the Barinda region. In order to carry out the deep tube well project in the Barinda Zone, the government formed the Barinda Multipurpose Development Authority (BMDA). In the area under investigation, the village of Lakshimpur agreed to pay for a water change in exchange for a deep tube well. The current research team refer to this arrangement as water commercialization based on technology. According to the participants, the practical value of water was transformed into a

commodity of trade under a new exchange system due to the intrusion of modern technology.

Salient features of the Technology based marketization system

- With the introduction of water-related technology, a new era of mechanization has begun.
- The technology's owners assumed control over water management.
- The technology owner gained the power to set the water rates.
- People were forced to buy water from the owners of the technology.
- Accessory materials (such as fuel, electricity, and spare parts) became indispensable.
- Under the water management system, there was a spontaneous certainty of a new profession.
- It was evident how the new water management system and the eroding social system coexisted.

3.3.1 Beginning of the water trade

In order to meet the diverse needs of the local population, water has turned into a marketable commodity. The following describes the noted causes of the marketization of water.

(a) Water for existence

This locality's agricultural output is reliant on rainfall. However, rainfall was inadequate in this semi-arid and drought-prone region. Agricultural crops, particularly Amon Paddy, failed completely or partially during every drought period. The people's most basic food necessity was constantly in danger. Because of the situation, the locals had to find another way to get irrigation water.

(b) Historical reason – drought and crop safety

The field's slanding agro-crops were burned and left to waste during the protracted drought of 1982. The crying, completely distraught peasants were desperately searching for water. Throughout the entire year without rain, every community kept up their religious practices of prayer. The peasantry had to discover a new, reliable supply of water in the given conditions.

(c) Aridness and soil fertility

The soil fertility kept declining as a result of the protracted drought. The engine land fractured, and many areas of productive cropland became dry and hard. Peasants became optimistic about the availability of irrigation water from this reliable source when they learned that deep tube wells had been established in their area.

(d) Commercial agriculture (commercial farming)

Peasants used to cultivate their land just to meet their family needs. They didn't consider overproduction. However, peasants began producing more paddy on a commercial basis after agriculture commercialization was introduced. It was easy for them to market their excess production. As peasants started growing summer and winter vegetables in addition to cereal, agricultural output grew more varied. As a result of this agricultural boom, more water was required. The deep tube wells became a reliable source of water for the peasants.

(e) Need for IRRI cultivation

In the nearby area, the IRRI rice variety was first cultivated. However, the landscape in the studied area was undulating and untrimmed, which prevented the peasants from engaging in IRRI farming. However, the peasants were forced to lean on IRRI farming due to the strain of population increase and the need to keep up with the trend of increasing marketization. Additionally, IRRI farming expanded in their Northern zone regions. The villagers were persuaded to begin IRRI farming in this area by these causes. Therefore, the introduction of the IRRI farming culture increased the demand for mechanized water in this area.

(f) Agriculture loan and risk of the Capital

This community's peasants obtain loans well in advance of the growing season. This loan for agriculture comes from the following sources:

1. Loan from relations

As an agro-loan source, the relatives became increasingly significant. For this agri-loan to be repaid with or without interest following the harvest, he needs peasants to visit their wealthy relatives. However, in most situations, an unwritten interest charge is applied to the loan amount. As the borrower repays the debt in kind, the borrower provides the lender paddy at a predetermined price.

2. From friends and money-lender

In order to meet their needs, peasants used to borrow money from moneylenders and personal friends. However, the moneylenders charged certain interest rates.

3. Trades of agricultural essentials

Additionally, the peasants obtained loans from various trades on the understanding that they would repay the loans in kind. Before the

harvest, the moneylender can be the standing crop. For instance, the ready peasant purchases fertilizer from the fertilizer trader on credit.

4. Institutional loan or loan from corporate bodies

The agricultural development bank or a few local non-governmental development organizations offer agricultural loans. Within a specified time frame, the borrower must return the loan balance plus interest. After repaying a bank loan or one from a corporate entity, the peasants occasionally had to make drastic sacrifices to pay for irrigation water changes.

3.3.2 Sale of land, domestic animals and valuable house hold articles

The standing crop in the field was totally destroyed by the severe and protracted drought in the 1980s, and the locals and others living nearby faced serious financial difficulties. Unsurmountable hardship forced the peasants to sell their landed property for a very low price in order to pay back the agriculture loan and cover their family expenses. The majority of the domestic animals in this area were bought from the local peasants by a few wealthy and successful businessmen from the nearby Chapai district during this difficult period. In the same

instance, the peasants were forced to sell the gold jewelry that the family's female members owned.

3.3.3 Introduction of technology

Varendra multipurpose development authority (BMDA)

When local residents were unable to find a solution to the ongoing natural adversity, they turned to local and zonal public leaders in an attempt to find a long-term solution. The BMDA established a deep tube well in this area with public financial assistance as a result of persistent efforts and the public representative's persuasion. In order to address the demand for agricultural water, the deep tube well method of lifting subterranean water was first implemented in Nachol in 1982. To provide irrigation water to the peasants, the Deep Tube Well Authority implemented a serial system. Water change was paid for by the peasant at a set rate. With the advent of agricultural technology, water has thus turned into a commodity of trade.

3.3.4 Marketization of irrigation water

The deep tube well authority required the recipient peasant to obtain pre-paid cards, which they then had to keep track of in order to receive irrigation water changes from the deep operator. The deep operator

used to realize the water change at a predetermined rate and adjust the recipient's pre-paid card. throughout order to irrigate the entire land, the BMDA quickly installed eight deep tube wells throughout the area. The commodification of water in this area was made possible by this arrangement.

3.3.5 Share cultivation and paid irrigation system

The majority people in this area work in shared agriculture and are required to give the landowner five or six monds of paddy annually. The land rent for this amount of paddy is paid. In order to increase crop yields, share cultivations had to buy irrigation water following the coproduction of deep tube wells. Water changes are not paid for by the landowners. In order to increase production for his personal benefit, the share cultivator had to focus more.

3.3.6 Deep tube well intra-structure development on peoples express

The BMDA required community members to pay for the installation of deep tube wells. Two hundred bighas, or 66 acres, of cropland are typically under the control of a deep tube well for irrigation. The cost of developing the infrastructure and setting up the deep tube well had to be covered by the landowners or peasants in this irrigation area. The cost of irrigation water supply pipes was also borne by the peasants.

The cost of buying replacement parts will be borne by the villagers in the event that the deep tube well machinery breaks down.

3.3.7 Ineffectiveness of old system of water management

There has been a noticeable shift in the patterns of rainfall in recent years. There have been changes in this semiarid, drought-prone area, most likely as a result of climate change. Over the past year, drought has become a common occurrence. This has led to a significant setback for rainwater-dependent agriculture each year. The creek and ponds in the area stayed nearly empty due to the year's lack of rainfall, and the irrigation system that relied on it became irrigative and generally broken.

3.3.8 Loss of interest on well water

Wells and draw wells have long been the main sources of drinking water in the area. However, the constant propaganda and television and radio advertisements against well water caused the public to lose interest in it. The media informs people that drinking well water is unhealthy and that anyone can contract a water-borne illness. The public's perception of well water as drinking water changed as a result of this advertising. People began looking for other sources of drinking water.

3.3.9 Initiation of hand tube well

People used hand tube wells in these disorders. The installation of hand tube wells was initially started by the local Nizampur union-4. Hand tubes quickly gained popularity due to media coverage of their safety and effectiveness. To this goal, the Rajshahi radio station and BTV provided services. The use of hand tubes as a dependable source of drinking water spread quickly throughout the region. At the time, having a hand tube well was seen as an indication of the owner's sound financial standing.

3.3.10 Environmental change- decline of underground water level

It has become common practice to utilize hand tube wells for drinking water and deep tube wells for irrigation. As the usage of subsurface water has increased, groundwater consumption has been neglected. The underground water level decreased as a result of the continuous drawl of water from deep tube wells.

3.3.11 Introduction of new technology and marketization of water

Capital investment in the water commodification process occurred against the backdrop of deteriorating social water management system modifications and the development of technology-based water

management systems. The government established BMDA to supply irrigation water in the region by installing several tube wells following the severe drought of 1982. The cost of installing deep tube wells had to be covered by the local peasants. Thus, a technology-based water management system has developed employing the meager resources of the peasants. People began using deep tube wells for both irrigation and drinking water when wells as a source of drinking water became inefficient. In addition, the newly installed hand tube wells in the village of Niamatpur upazila of Naogaon district were still functioning. It is now clear how much water is worth in terms of money. In order to give drinking water to every Nachol home upon payment of water changes, a top water supply system was implemented. Prior to two years after the village of Niamatpur upazila in the Naogaon district was settled, the residents gathered their drinking water from the pond which was unclean and murky. In cooperation with the local union council, the village's residents installed a hand tube well. Public politicians were also actively involved in this matter. Two deep tube wells have been built in this village over the past few years to provide irrigation for the crop fields in exchange for a set rate of water changes. One of these wells is privately owned, and during its construction, public representatives objected to it on political grounds. They can utilize their power to install deep tube wells under government supervision, which would boost their political standing. According to the participants from

Chapainababganj district's Nachol upazila, the region's technology-based water management system has intruded because of the lack of sufficient water, the food crisis in agriculture, and the fast population expansion. Water has started to get commoditized alongside this system. In exchange for cash, a number of wealthy locals dug a private mini-deep tube well to deliver water.

3.3.12 Old system of water management

Prior to 1980, this region's agriculture relied heavily on rainfall. In the past, peasants would only begin farming when the rainy season officially began. A water hole was excavated in a corner of the agricultural field to collect rainwater, which was then extracted and used to irrigate the area as needed. People used enormous masonry wells or wells to gather their drinking water. The well water tasted fine, according to the participants. Water from ponds was used for bathing as well as raising household animals. Prior to the beginning of commercial fish farming, the pond water was transparent and clear. Water conflicts among the stoke holders resulted from the usage of creek water for agriculture during that period. Water was never considered a marketable commodity at the time, and there was enough rainfall. It was only until BMDA installed deep tube wells in the area that water became a commodity of trade.

3.4 Commercial commodification system of water

The deep tube well authority's implementation of technology-based water management marked the beginning of the commercialization of water in this region. People began to view water as a commodity that could be used to make money, and men considered it to be the most valuable asset. A new commercial system has emerged as a result of water being a commodity for marketization in addition to deep tube well management.

Salient factures of water commercialization

- This system is based on profit.
- Business with water originated.
- Possession of water become important like other properties.
- Tense competition between persons to keep the water sources under control
- Drinking water has become merchandized
- Commercialization of water affected the kinship relations
- Technology based marketization system, eroding social system and commercial system of water management continued to co- exist.

- ❖ Among these three systems (Technology based system, social system and the commercial system) the commercial system of mechanization become gradually dominant and the social system become insignificant

3.4.**1 Break down of hand tube well and severe scarcity of drinking water**

As the underground water level significantly decreased, the hand tube wells started to work. Due to indoctrinate use and lack of rest, the majority of the hand tube wells also broke down. Because of this, there was a significant lack of drinking water in the area, and women in the families had to put in a lot of effort to fetch it from far away. In the end, the sources of drinking water were out of the general public's hands.

3.4.2 **Wells> tube ura > Top: Commercialization of drinking water**

By giving people access to drinkable water, the BMDA aimed to lessen their suffering. In order to provide piped water to the households in the village of Nachol upazila in Chapainababganj district, the BMDA authorities constructed an overhand water task

with a capacity of 25,000 tetra near the deep tube well. Five families were supplied with water from each tap when water changes were paid for on a regular basis. When regular payments are not made, the water supply is cut off, and the tap is sealed until the back payments are paid.

3.4.3 **Increment of water price**

Depending on the season, the water pressure varies. Prices are higher in the summer and lower during the monsoon season. When it comes to irrigation water requirements, the peasants get down and make a list of priorities. To ensure timely water provision, the peasants must get a pre-paid card from the deep tube well authority. The cost of water is rising under the current system. In this regard, a peasant reported that he had to pay seven hundred taka for a water change for a rice seed bed in Katha, although the previous year, it had only cost two hundred taka.

3.4.4 Higher growth of population, rise of water price and reduction of allotment

The increase in population is well rewarded. As a result, the water supply is steadily declining. The water supplies are under pressure due to the population growth. As a result, the water share per person is declining. However, the ancient native water supplies have already been depleted.

3.4.5 Commercial deep tube well.

Two years ago, the BMDA drilled a deep tube well in the Naogaon district's village of Niamatpur upazila. In the meantime, a deep tube well has been installed in the same area by the private company ZECO Enterprise. This is the first private deep tube well in this area that provides water to the peasants upon payment of a water price set by the private company's owner. The method of supplying water for agriculture and setting the water price are decided by the private enterprise. the cost of water during various seasons. According to a local housewife, during the month of Jaistha (summer season), they must pay Taka 250/-per hour for irrigation water.

3.4.6 Opinion of the private Water traders

The private company discovered that Toktokie's main cropland is outside the BMDA deep tube well's supply limit, despite the significant demand for irrigation. Water management in the noncommercial social system is now essentially ineffectual. A private company invested 2.1 million Taka to install an electric deep tube well against this backdrop in the hopes of turning a healthy profit. The private company's supervisor asserted that the government's increase in electricity tariffs forced them to hike the price of water. Additionally, they must pay more for their official. In addition to guaranteeing safety and protection, the worker is in charge of

managing the infrastructure's upkeep and repairs. The supervisor reported that the deep tube well's motor had been burned in the interim and that the cost of repairs was quite high. For all of these unfeasible situations, they must pay the price of water. Thus, it is evident that the private company's management retains the authority to set and modify the water price, and that customers have no influence over it.

3.4.7 Price of water - Past and present

The results of the current study show that the cost of water is rising daily. The cost of water from oil-operated deep tube wells in the previous year differs significantly from that of water from deep tube wells that are currently powered by electricity. Here is a description of the rising water rails.

a) Fifty taka per hour

The BMDA authorities installed the first deep tube well in this region in 1982. The water rate in this deep tube well was set at Taka 50/-per hour and it was powered by liquid fuel. At the time, the price of fuel was Taka 14/- per hour. According to the government handout, water prices were set to cover associated costs such as the price of oil.

b) Taka sixty per-hour

When electricity arrived in this region in 1996, the deep tube wells were instantly energized. The water fee was increased by the BMDA, who set it at Taka 60/-per hour.

c) Taka Seventy per-hour

The water tariff was set at Taka 70/- per hour after the government raised the price of electricity. According to the participants, the cost of water increased approximately two years after the deep tube wells were electrocuted.

d) Ninety taka per-hour

The authorities has set the current water charge at Taka 90/-per hour. Using their pre-paid cards, the peasantry pays for irrigation water.

3.4.8 Effect of water price rise: Consumers reaction

According to the participants, the majority of people believe that their family's financial situation is being impacted by the ongoing increase in water prices. The availability of other consumer goods increases as the price of water rises. The following are the effects of rising water prices:

a) Expenditure of the consumer rises.
b) Consumption of other necessary items reduced.
c) For many peasants the amount of loan increases.
d) Other needs remain unfulfilled.
e) Family peace in adversely affected.
f) Participants identified the following causes for the increase in water prices:

(a) BMDA : Neo East India Company

According to the participants, the BMDA operates under the guise of providing public utility services. In an effort to alleviate the people's suffering by addressing the water shortage, this authority is expanding the state capital. The BMDA keeps raising the cost of the water they provide. The participants added that that the BMDA sets the water tariff on its own. The community members find this water price increase intolerable, and they frequently refer to the BMDA as a Neo East India Company in this area.

(b) Price rise of Electricity

The price increase of electricity is the main cause of the rise in water prices. The price of water increases right when the price of power

does. As a result, customers must pay extra for water. Every time electricity prices have increased, the cost of irrigation water has increased from 50 Taka to 90 Taka per hour. The participants assume that once the rapid leasing method of electricity production is installed, prices will increase once more.

(c) High cost of Water technology

An installation of a deep tube well now costs twice as much as it did in the recent past. As a result, water prices increase. According to the replies, the high setup costs of this water technology are a direct result of rising water prices.

(d) High price of accessories and spare parts.

The most important components required for underground water lifting, as well as its supply and other accessories, including the spare part required for repairs, have grown extremely expensive. They are also to blame for the increase in the cost of water.

(e) Repairing cost high

Deep tube well motors and all of their accessories are now quite expensive to repair. The motor and tube well meter frequently experience burning. ZECO Enterprise had to incur significant losses

to replace its deep tube well motor after it was burned twice. The private corporation has since increased the cost of water.

(f) Devaluation of Taka

Some of the participants believed that the water price had to be increased as a result of the devaluation. Prior to 1996, they had to pay fifty taka per hour for irrigation water. However, they currently pay a good taka for the same. Therefore, 50 Taka was worth more than 90 Taka now. As a result, the cost of water is increasing in tandem with the taka's devaluation.

(g) Growing demand for water

Water prices rise as a result of massive agricultural expansion and population growth. More irrigation water was required as rice production increased. Furthermore, irrigation was necessary throughout the year for Rabi and Kharif vegetable cultivation. As a result, the price of water increased due to the constantly growing demand for it.

(h) Rising price of agricultural products

According to the the participants, the cost of chemical fertilizer, herbicides, and seeds has increased significantly. At the same time, the cost of water is rising. Consequently, the cost of all agricultural

products is trending upward, which would be detrimental to the peasants' ability to survive.

3.4.9 For whom water is purchased

Family members, especially the older ones, are responsible for paying the water bill to the proper authority on time. Water is purchased for the family members.

a) Responsibility for the family

Community members believe that the head of the household should be responsible for paying for routine water changes. The family's income-generating members all make combined contributions to cover the water bill. It is believed that the family's leader should be in charge of buying water for the household and paying for it. His neighbors and relatives start criticizing him for every failure to perform his tasks.

b) Male dominance

The family's earning the head is in charge of all matters pertaining to the family's water purchases and water change payments. The family's head is always the recipient of any official notice regarding the payment of area dues for the top water supply. According to the

participants, the family's guardian should pay for all of the family's expenses, including water changes.

c) Kinship based purchase of water

Water changes are paid for by the young ladies in the household in Aboriginal society. Water is purchased for his children by the earning father. For his wife, the husband purchases water. The sons must cover the cost of water for the entire family if the daughters and sons depart with their parents.

d) Purchase of water for own self

The joint family arrangement is primarily still in place in this area. However, occasionally one of the elderly parents cohabitates. As a result, he or she must buy water for themselves.

e) Water for children

Since their growing children require a certain amount of water, the guardian must pay the water bills.

f) Social purchase of water

There are times when a village's families buy water collectively to replenish their nearly empty pond; this is known as the communal purchase of water. At the end of winter and the beginning of summer, the pond water continuously recedes, which is extremely high. In order to pay for water for their village pond, eleven families in the Niamatpur upazila of the Naogaon district register for taka 200 each and collect taka 2200. The host must prepare age-appropriate water for the visitors during any festival or social gathering, including marriage ceremonies and religious gatherings.

3.4.10 compulsive necessity for peasants to purchase water

The peasants of this locality are under compulsion to purchase water for the flowing reason:

a) Water for *Amon* rice cultivation

Ample rainfall is anticipated during the months of Ashar and Srabon, which is when *amon* is grown. If there is enough rainfall, the peasants use deep tube well water as their only source of water. The peasants choose to buy water during the regular Amon rice cultivation period since they are unsure if there will be enough rainfall during the season. A peasant must pay taka 4000/- (taka four thousand) per bigha (taka 12000/- per acre) for irrigation water for the whole Amon period.

b) First tillage

When the first tillage occurs, the cultivable land should be adequately moist. Plowing dry ground to correctly turn up the soil is exceedingly challenging. This tillage issue is resolved by timely rainfall. Because of the situation, the peasants must buy water to irrigate the hard, dry soil for smooth plunging.

c) Application of fertilizers and pesticide

In order to use pesticides and fertilizers to the rice field, landing water is necessary. If the agricultural field doesn't have the necessary amount of standing water, the application might not work and the crop output might suffer. As a result, the peasants are forced to purchase irrigation water from deep tube wells. It costs a lot of money to produce crops continuously.

d) Irrigation for the standing paddy plant

To prevent crop failure, early varieties of paddy require multiple irrigations till harvest. Standing water is required by the IRRI field. While winter rice farming demands multiple irrigations, a standing rice field requires two. All of these crops require water from the peasants.

e) Rabi crop cultivation

In the month of Agrahyan (early winter), the local peasants begin growing winter crops like as potatoes, wheat, mustard, lentils, etc., and continue until the month of Magh (mid-winter). A number of irrigations are required. These rabi (winter) crops are irrigated by the villagers using water from deep tube wells.

f) Seed bed preparation

The preparation of seed beds, particularly in early rice parishes known locally as Bhadui and Aguna Dhan, requires irrigation. Three different types of rice require adequate water for seed feed, and the peasantry must buy water from the relevant local organization.

g) IRRI Cultivation

Following the rabi crop harvest, the land is ready for chaitali, or early summer rice cultivation, or IRRI cultivation in this area. Since IRRI cultivation relies on irrigation, the cultivations are forced to purchase water. Peasants who are unable to purchase water due to financial constraints or whose entire land is outside the deep tube wells' supply limit abandon the land.

3.4.11 Water trade based on sources

A discussion of water mechanization based on its sources is shown below.

a) Rain water

The research team was not provided with any information regarding the local rainwater trade. The harvesting and storing of rainwater for later use is unknown to the populace. Rainwater is not directly sold or purchased, rather it is traded indirectly. During the wet season, the rain-fed ponds swell up. By selling some of the pond water to the peasants who own crop land near the ponds, the pond owners profit. The peasants bargain to buy the pond water at the start of the summer. Except for rich landowners, all peasants benefit from timely and adequate rainfall. Large landowners receive more rainfall than others, and the extra water is saved for later use in enormous water holes they dig in their property. As a result, they can save enough money to invest elsewhere instead of having to buy water for irrigation from deep tube wells. Rainwater benefits share agriculture and small landowners equally.

b) Creek water

As of right now, the creek water is not being marketed. The government owns the creeks, and anyone is welcome to use the water for cultivation. Typically, the water can be used for farming by the peasants, who own arable land on both sides of the stream. Since it is difficult to transport water so far from the creeks, the land cannot be used for irrigation.

c) Pond water

The mechanization process is gradually affecting the pond water. Everyone has the right to bathe and wash clothes in the pond's water. The pond can also be used to obtain drinking water for household animals. However, the peasants must purchase pond water for restricted irrigation during the following summer when rainfall is either minimal or nonexistent. After extensive haggling, they are forced to pay a higher price for pond water. The pond owners are taking advantage of this pond water trade as a way to earn money. Furthermore, the fast expanding fish farming in the ponds in this area has made the already dire water issue much worse. These days, pond water is highly valued for irrigation.

d) Underground water

Since the ground water level is dropping, shallow hand tube wells in the area become useless, and residents are forced to rely on piped water from the BMDA deep tube wells. A significant amount of the subsurface water that is drowned by deep tube wells is now mechanized. Although there are still a few hand tube wells in the Niamatpur upazila of the Naogaon district, the residents of Nachol rely on the tap water that is provided to them for drinking after they pay water bills on a regular basis. Crop workers obtain irrigation water from the deep tube wells in Niamatpur upazila of Naogaon district, while peasants pay for water using their pre-paid cards. Apart from the BMDA deep tube wells, private companies ran deep tube wells to supply irrigation water in the Naogaon district's Niamatpur upazila, where the private company sets the water price. The establishment and infrastructural development of BNDA deep tube wells are entirely funded by the local population. To irrigate their own cropland and sell water to nearby landowners, a few wealthy men have installed a private small deep tube well. The price of water is changed to reflect the increase in power.

3.4.12 Problems for the availability of merchandized water

In the Niamatpur upazila of the Naogaon district, where there is a daily rush to collect water from hand tube wells, water scarcity is a

continuous issue. For domestic use, the villagers gather water from hand tube wells. However, these tube wells don't work at all during the summer. The majority of this area's arable land is located outside the BMDA deep tube wells' supply limit. Peasants who own cropland inside these deep tube wells' supply limits must maintain sterility for irrigation water, which frequently fails because of mechanical failure or power outages. Owners of private deep tube wells may charge a very high price for a limited supply of irrigation water. These circumstances lead to widespread crop failure in the Naogaon district's Niamatpur upazila.

However, the village's pond water is consistently murky throughout the year, and the majority of shallow ponds are left empty because re-excavation is not done. Due to the severe lack of drinking water at the moment, residents of this community must fetch water from far-off locations. Due to a lack of pre-paid cards, the majority of residents in Niamatpur upazila in Naogaon district are unable to obtain water. However, the residents of the village of Nachol rely on the BMDA-provided tap water for both household and drinking needs. Once a day, piped water is delivered, and the deep tube wells' water supply is frequently interrupted by mechanical failure and power outages, leaving the demand for enough water unmet. The majority of Nachol's arable land, like that of neighboring communities, is located outside the deep tube well supply restrictions. The peasants gather to determine how much land each of them will have fallow for the

current year in order to maintain the condition water. Water constraint is also contributing to a decline in domestic animal rearing. A sufficient amount of water is expensive due to water mechanization, and individuals are reluctant to keep domestic animals in commercial quantities.

CHAPTER: FOUR

Unequal Currents: Social and Political Impacts of Water Marketization on Barind Communities

This chapter examines how market-driven access to water has changed power dynamics, social hierarchies, and community dynamics, with a particular focus on the effects of water commodification. It draws attention to how marginalized groups—such as women, indigenous people, and smallholder farmers—have dealt with water scarcity and growing expenses. In addition, the chapter examines new forms of resistance, adaptation, and community-led alternatives, shedding light on rural society's resilience as well as its divisions.

4.1. Transformation of Agriculture system

The agricultural system has been rapidly changing since water became a commodity. The final relic of the former feudal agricultural system is no longer there. The availability of enough irrigation water for the cropland is the primary driver of agriculture. The direct display of capital entered the agricultural economy as soon as water became a commodity of trade. Following the establishment of the technology-based commodification of water, the agricultural sector underwent a capitalist shift.

The productivity of the crop field has changed significantly since the advent of irrigation water. Historically, agricultural operations were intended to meet the needs of the individual families. Today, however, agriculture production is viewed as a commercial endeavor. Three crops can be grown on the same plot of land each year. The peasants are therefore occupied all year long. Winter veggies or Rabi crops are produced to increase family income. Commercial agriculture is used to raise winter vegetables because marketing them is very simple. There has been a noticeable shift in agro-based relationships as well as the development of commercial relationships among farmers as a result of the water governance system transformation. The ruler problem and the urban businessman have a commercial relationship based on the production of agricultural crops and their sale, which has frequently impacted the familial ties in the community. Small unit families are emerging from the combined families. Drinking water collection from the same supply source has become highly competitive and frequently results in unwelcome situations between village residents. The agricultural system has changed in numerous ways as a result of the commodification of water, which are outlined below.

4.2, Change in food crop cultivation (Changes in the pattern of cultivation)

People's food habits and crop production have changed, as has the diversity of water management systems. There used to be only one paddy crop grown in the area each year by the villagers. To suit their needs, they grew paddy and saved the seed for the following year. They are aware of the preservation and search procedures for different crops. The peasants in this area grew a number of high-quality rice varieties, such as Jhingasile, Roghusile, Bhasa manik, Malsara, Lalibsola, etc., despite the fact that agriculture was dependent on rainfall. Despite the relatively modest yield per area, these premium rice types were well-liked across the nation. Next are the foreign types. Following the introduction of imported rice types in addition to the newly invented BARI kinds, a new water management system emerged. Gradually, the low-yield, high-clam rice cultivars were no longer grown. Over the course of the nation's ages, the peasants have abandoned the upkeep of those rice cultivation kinds' seeds. In order to increase profits, the agriculture sector shifted to a production-oriented model under the new water management system, and running capital entered the market for agricultural output. IRRI, BR-28, Kalazira, pakija, katari, and other high-yielding rice varieties were first cultivated by the peasantry.

The peasants became totally reliant on the corporate businesses for seeds in order to cultivate these high-yielding hybrid rice. As a result,

they lost the rights to the seeds they had for ages. These hybrid rice varieties, along with the potatoes they currently generate, have become part of peoples' everyday diets. Additionally extinct are the early native rice varieties that were grown in the Niamatpur upazila of the Naogaon district. According to the responders, growing hybrid rice types necessitates additional irrigation, chemical pesticides and fertilizers, and other agrochemicals, raising the cost of production. Instead of the growers, the traders of agricultural products profit. They added that the indigenous fish species, such as the Shigi, Magur, Koi, Tengra, and Moya, have been displaced by the fast growth of so-called contemporary fish culture techniques. People here are forced to rely solely on a few native and numerous exotic culture fishes because species like Shoil, Boal, Puti, and Patasi have all but disappeared. The everyday food choices of the average person have also changed as a result of this aspect.

4.3. Drinking water and changes in the domestic activities

There have been noticeable shifts in people's attitudes on water use since the commodification of water. They have made it a practice to use drinking and household water sparingly, and they refrain from any kind of waste or extravagant use. due to the fact that water is a resource that can only be obtained through payment. When a person drinks water, they are constantly considering the needs of other family

members. The primary supply of drinking water in the past was the now-defunct drown wells. People are now only able to rely on the BMDA deep tube wells' reimbursed water once a day. As a result, there is a rush to gather water near the public water taps. Given the current state of the water issue in society, most households attempt to maintain a certain level of water quality for their domestic activities.

4.4 Stress on rearing domestic animals

In the days before commercialization, the area only produced one paddy crop every year. The entire field was left fallow and empty following the harvest until the following crop was planted. From sunrise to sunset, the cattle were free to graze on the entire area. Therefore, raising domestic animals such as cows, goats, sheep, and buffalo was quite simple back then. However, irrigation water became available after deep tube wells were installed, and the area eventually became adequate for three rice crops each year. Additionally, a substantial amount of seasonal vegetables are farmed. As a result, the cattle no longer have a free grazing area, and the entire field is kept under cultivation all year round. Peasants found it challenging to raise domestic animals in confined surroundings.

People are no longer raising domestic animals on a wide scale because of the lack of potable water and cow feed. They now only retain a pair of cows or buffalos for plowing. Domestic animals are raised on a

modest scale in Niamatpur upazila, Naogaon district, where cattle owners gather pond water for their animals. Furthermore, peasants are still working in the fields and do not have enough time to care for their domestic animals. Sometimes, during the irrigation season, the impoverished villagers are forced to sell their cattle to cover the water charge. Gathering drinking water for big animals like cows and buffalos can be challenging at times. To avoid having to buy a lot of water, the peasants are suddenly interested in raising sheep and goats. According to the participants, this is the current state of agriculture, including agricultural and animal husbandry, following the recent commercialization of water.

4.5. Commercial cropping-some obstacles

The peasants have adopted a commercial mindset in agricultural production since the commercialization of water. Their goal is to generate more for the market than for their own use. Because of this, they have shifted their focus from growing high-quality, low-yielding native rice types to high-yielding hybrids. When growing some of the most important Rabi crops, such as wheat, maize, potatoes, muslard, tomatoes, pulses, and many other winter vegetables, the high-yielding rice types need additional irrigation, chemical fertilizer, and pesticides.

These crops are grown during the months of Asharin and Magh (mid-September to March), when the temperature and relative humidity are quite low and there is virtually no rainfall. Therefore, moderate irrigation is required for the Rabi crops. The winter vegetables and Rabi crops are grown commercially. There are peasants that choose not to cultivate Rabi. According to them, the land is left extremely wet and waterlogged after paddy harvest, making it challenging to prepare it for Rabi crops. Nonetheless, the peasant identified the following challenges they encountered when growing Rabi crops in the area:

- Absence of cold stores for the preservation of agricultural products in the locality.
- Absence of arrangement for proper counseling and guides Rabi cultivation.
- Absence of proper motivation encouragement by any agency.
- They do not get proper information on marketing of Rabi at the proper time.
- Agriculture loan is meager.
- The land owners compel the share cultivators to cultivate rice and discourage Rabi crops.
- Production cost is high which many peasants are unable to bear.
- Most of the cultivable land in the locality is not within the irrigation limit of the BMDA deep tube wells.

4.6. Related matters on supply of water Approval

Irrigation water supply, capital allocation, and other associated aspects are regulated and controlled in the following ways:

a) Decision of the deep tube well owner

The decision of the owner of a deep and mini deep tube well determines the irrigation water supply to the peasants. Once their personal needs are met, the owners provide water to the peasants. The following factors are taken into account when setting the price and supply of water:

- Expenditure for the establishment of deep tube wells: and infra-structure
- Price of electricity
- Salary of employers
- Security and safety of machineries
- Repairing expenditure
- Probable price of water and profit
- Personal relation of the water recipient and the deep owner.

On the basis of priority, the deep owners occasionally provide water to certain recipients who receive more than they require. Sometimes

they are given water on credit. The owners and these individuals have a relationship that is both overt and hidden, and it can be identified as follows:

- In case of any conflict between the deep – owners and others. They always take the side of the deep – owners.
- They inform everything about the other water recipients to the deep – owners. They work as spy of the deep – owners.
- Sometimes they give some quantity of Agro – product and better cooked food to the deep – owners as gift.
- They work is the crop field of the deep – owners as labors.
- They receive guidance from the deep owners about their family and social activities.
- They support and work for the deep owners in local and national polities.
- The deep – owners can influence the decision of these people.
- They maintain a good relation with the deep operator.
- The deep – owners pay visit to houses of these people which is regarded as a reciprocal relation.
- They are more or less influential people in the locality.
- They have relation with the urban people in connection with business and other matters.
- They have some rich influential and well placed relatives in or outside the locality.

- They always keep unity to serve their class interests in relation to agriculture and various social issues

e) BMDA.

The BMDA makes final decisions about the distribution of irrigation water to the peasants who receive it from the deep tube well authority. The peasant committee will handle issues pertaining to the village's residents' access to tapped water.

e) The local government

The local union council gave their approval for the installation of hand tube wells in the Niamatpur upazila of the Naogaon district. The community members contributed funds to establish these hand tube wells, which were overseen by the union council.

In order to speed up the BMDA authority's setup of deep tube wells, the local union council served as a mediator. Community members then invited the current chairman of the union council, to his homes in the Nachol upazila of the Chapainababganj district to talk about their issues with deep tube well irrigation. The Chairman, who has profound authority to address their issue, meets on a frequent basis.

f) Co-existence of social and merchandized water management systems.

The social and merchandized systems of weather management are complicated issues that are ingrained in the community. The two systems are incompatible and insufficient on their own. The research team observed that the two systems coexisted. Some water sources continue to operate alongside the current system. For irrigation, the peasants buy water from deep tube wells, but they also rely on rainfall to some extent. Village ponds are still used for domestic animals' drinking water, bathing, and washing. Commercial fish culture has helped people, even while intense fish farming has decreased the opportunity for people to use pond water. These ponds can be used for limited irrigation, and the deep tube well water and pond and cracks are still being used as irrigation water sources. Alongside the deep tube well water, hand tube wells are also in service. While hand tube wells provide drinking water in Niamatpur upazila of Naogaon district, top water is available in Nachol upazila in Chapainababganj district. The community members are forced to depend on BMDA and private commercial deep tube wells because the hand tube wells are inoperable during several seasons of the year due to the drop in the underground water level. People's reliance on commercial water is growing as a result of the traditional water sources being gradually abandoned. Here, both floating and fixed capital have entered the water market.

4.7. Approval to use water from different sources

The process for obtaining prior permission or approval to use or lift water from various sources varies and is not always the same. This approval process is modified when water is moved from one source to another.

a) Pond water

In this area, permission from the owner is not required to use or remove a modest amount of water from the private pond. However, when the ponds are used for commercial fish farming, the lease holders must be asked for permission to use the water. In most cases, people are only allowed to utilize the culture ponds' water for everyday household purposes. Similar circumstances exist if the ponds are owned by the government and managed by the union council, which is the local government. To lift water for limited irrigation, the peasants must first obtain permission from the union council. Typically, landless share cultivation receives approval.

b) Rain water

Rainwater is considered a providential blessing. Additionally, it is considered social water, and all living things are entitled to utilize it.

The owners of the crop fields welcome the possibility of rainwater flowing from one to the other for their own natural benefit. The creeks get the surplus rainwater.

c) Creek water

In this area, creeks serve as a natural drainage system that transports excessive rainfall to a bigger system. All year round, the creeks are still full with water. Without anyone's consent, landowners on each side of the creek get priority when it comes to raising the creek water for irrigation.

d) Underground water

The community at large considers the water from the deep tube well as their underground resource. The deep tube well authority retains the jurisdiction to determine the best course of action for setting the water price and providing the peasants with drinking and irrigation water. A list of the peasants who will get irrigation water is prepared by a general meeting of the peasantry and approved by the deep tube well authority.

4.8 The organization involved in water-trade

The local commercialization of water is being run by the following public and private entities:

a) BMDA

In 1982, deep tube wells were implemented in this area by the Varendra Multipurpose Development Authority (BMDA). Since then, the local water supply has started to become more commercialized. BMDA now runs eight deep tube wells in the Chapainababganj district's Nachol upazila and one in the Naogaon district's Niamatpur upazila. Only 200 bighas of cropland in Niamatpur upazila of Naogaon district can be irrigated by the BMDA deep tube well, which is significantly less than enough. Peasants receive irrigation water from the BMDA deep tube well authority based on priority serial numbers, and they pay for it using credit cards that they have previously gotten from the deep authority. Through a system of underground supply pipelines, the BMDA tube wells provide drinking water to people living in Nachol upazila in the Chapainababganj area. This tap water is collected by residents, and payment is made once a month. Since their taps are instantly sealed, those who violate are not permitted to collect water.

b) ZECO Enterprise

In 2010, a private company named ZECO invested over 21 lakh taka to dig a deep tube well in Niamatpur upazila of Naogaon district. Only

200 bighas of cropland nearby can be irrigated by this deep tube well. The deep tube well owner determines the water price and the water recipient's priority based on their own preferences. After the supply, payment is made for irrigation water.

c) Tap committee

In Nachol upazila of Chapainababganj district, an eight-member tap committee handles issues related to the supply of tap water, consistent payment of water bills, and repairs.

d) Mini-deep tube wells

There are a few mini-deep tube wells running in this area. The majority of these mini-deep tube wells have joint ownership and supply water.

4.9 Impact on the Environment

The participants expressed their serious concerns regarding how the new water governance structure will affect the enter-zone's ecology. Deep tube wells are now the only source of merchandized water for agriculture. In the area, hundreds of deep tube wells are in operation, drawing vast amounts of water from the underground. The underground water level is fast dropping as a result of the deep tube

wells' careless removal of underground water. New deep tube wells are being built to extract water from deeper areas as the majority of existing deep tube wells become unable to function. Surface water sources are likewise drying up as groundwater water levels continue to drop. Ponds, creeks, and draw wells are becoming dried up. Aquatic ecosystems are being destroyed as a result. Only a small portion of cropland can receive irrigation water from the deep tube wells. The soil outside of this area has lost its plant cover and is still dry and fallow. There are also indications of soil degradation on the land that is irrigated by deep tube wells. Their land's soil texture has deteriorated and lacks improved characteristics.

The region's overall dry and semi-arid conditions are being exacerbated by the aforementioned environmental changes. These environmental changes also affect the entire area, including the research site. Prolonged drought and desiccation are becoming more likely in the area as a result of ongoing deforestation, a lack of fresh afforestation, and soil cover depletion brought on by inadequate rainfall. The fertility of the carefully chosen crops grown in the deep tube wells' supply limit area is steadily declining. Due to a shortage of water, the fertile land beyond the deep tube well irrigation boundary remains fallow. Those peasants are unable to purchase water for deep irrigation. It's unclear if they rely on rainwater or fallow ground. In this manner, the community members worry that a discriminatory land system will develop in the area, which is likely to disrupt the social

environment. By carelessly applying both organic and inorganic fertilizers, intensive fish farming is endangering the ecosystem and contaminating the water in the ponds where the fish are farmed. Before fingerlings of certain culture fishes are released, pesticide is used in ponds to kill all culture and non-culture fishes as well as all live biota.

This act of fishing is utterly harmful to the pond environment, which is either fully destroyed or destabilized by killing the remaining biota, including valuable local non-culture and weed fishes that were essential components of the ecosystem. The participants were depressed about how agriculture has become entirely reliant on irrigation water from deep tube wells. Since the aquifer's underground level is rapidly dropping, these deep tube wells are gradually losing their effectiveness. Underground water will soon run out, which will be a major blow to agriculture that depends on irrigation; the social environment will be endangered, and people's everyday lives will be in danger. According to them, the commercialization of water in this area has made life more difficult for the common people. These people now have limited access to drinking and domestic water, and they are constantly stressed and in a desperate situation. Therefore, these people are incapable of considering the environmental issues that have been in this area for the past thirty years.

4.10 Influence of racial discrimination for the access to water

Here, there is active racial discrimination in access to water. Individuals in this community have differing opinions about the natural exchange of drinking water, the purchase of water, and its container.

a) Financial ability

Water is supplied to both Bengalis and Indigenous people upon payment of a fee. Only those who can afford it can buy water, and there is no direct racial discrimination at play here. But Bengali and Indigenous people generally do not use same glass to drink water.

b) Land owners and racialism

The majority of the cropland is owned by the local Bengalis. A minor amount of leaded property is owed by the opposite ethnic group. Therefore, the local Bengalis here are the ones who make all decisions about the distribution of water. While share cultivators arrange for their own irrigation water delivery from the deep-authorities, the local Bengalis propose the water receiver to the water supply authorities. Here, racial discrimination is practiced both overtly and covertly.

c) Communal outlook on the use of water Container

Separate water cups are used by the local Muslims, Hindus, and indigenous communities instead of sharing one glass. Every tea stall in Niamatpur upazila of Naogaon district has a separate water glass, and the proprietor of each booth takes care to keep them that way. The owners of the tea stalls are asked to keep separate water glasses for the deep tube well staff. I f any non-Bengali people or workers from indigenous communities are employed in a Bengali owner's agricultural land, d rinking water is served with separate cups.

d) Reciprocal out look of Bengalis and other

Non-Bengalis and Bengalis share a similar perspective on one another. Sometimes, when the Bengalis offer them water, the Santals hesitate to do the same.

e) Authoritative out look of owners of water sources

The Bengalis are in charge of the water sources used for irrigation. As a result, the local indigenous communities and non-Bengalis always attempt to avoid any sort of dispute with the Bengali owners. The research team found that a deep tube well manager once requested firewood from a Santali village but was turned away. When the Santali man arrived at the deep tube well to retrieve water, the deep manager responded by turning off the deep water.

4.11 New structure of kinship relations

The new system of merchandized water governance in the area has resulted in certain alterations to kinship relations. As capital has entered the merchandized water market, the long-standing familial relationship is changing.

a) Feelings between kinship man lessening

Since water supplies were accessible to them, a strong sense of togetherness amongst relatives is crucial for the simple availability of water. But ever since water became a commodity, demand for it has been steadily rising. Being considerate of others is not particularly significant because everyone must buy water for their own use. The way that people think about their water demands has become more personalized. The members of the kindred no longer divide the water among themselves. Even visiting family members are reluctant to request drinking water.

b) Nepotism

Participants expressed dissatisfaction about the severe nepotism and partiality in the deep tube wells' irrigation water supply. By displacing other recipients, deep tube well operators attempt to provide his

families with additional water. By ignoring the permitted list, deep tube well operators occasionally provide irrigation water to their friends and family members who are peasants. Conflict between the general peasants and the favor seekers, as well as between the peasants and the deep authorities, is encouraged by this kind of favoritism. The community's neighborly relations are impacted when some residents attempt to persuade the deep tube well authority to install supply water taps close to their homes.

c) Role of relatives in a conflict for water

Occasionally, a dispute between two or more parties arises over control of a surface water source or over priority in the deep tube well water supply. The relatives of the opposing group give their unwavering support to the group or party in question. It creates the conditions for social discord, ongoing conflict, and division.

d) Money versus kinship relations

The current merchandized water management system has made water the primary consideration when determining whether to maintain familial ties. Kinship members frequently engage in heated competition or conflict over irrigation water. They compete with one another for the right to supply their crop fields with water first. When paying for water changes, kinship relationships are not taken into

account. Each member is responsible for paying for their own water. Joint families are dissolving as a result of this circumstance.

e) Selection of bride and bride groom on the availability of water

When deciding whether to marry their daughter, the local indigenous communities take the availability of water very seriously. They always assume that once they are married, their daughter won't have any problems getting water. Typically, the ladies fetch water from a distance. Having enough drinking and household water on hand is expected of a decent bride-groom.

f) Water for the seek relative

The ethnic communities believe that it is morally required to provide enough water to the sick individual or the impacted family when someone becomes unwell or a relative passes away. Giving water to someone in need is always seen as a tremendous deed. However, since the water commerce started in the area, the current situation is very different. A Santal man showed his intense annoyance by asking how someone can provide water to others when he is nearly dehydrated himself. According to the participants, social bondage has been steadily eroding and water scarcity has been worse since water in this area became a commodity.

g) Exchange of water between the relatives

If there is kinship amongst the pond owners, they share water. In an emergency, a relative might even sell pond water on a small scale for irrigation. Such an option is typically not available to non-relatives.

4.12 Partisan local politics on water

Local politics on the waters was denied by the local community. They weren't too interested in talking about this. However, a careful examination and conversation with the participants demonstrated the presence of water-related local politics.

a) Conflict for serial

Long before the irrigation season effectively begins, a serial list of irrigation water receivers is prepared. This list is prepared at a general peasant meeting and approved by the deep tube well authority. In order to have their names added to the serial list ahead of others, some powerful recipients attempt to form a covert relationship with the deep tube well operator. In the neighborhood, this irregularity leads to a great deal of strife and chaotic chaos. To find a peaceful solution, the parties involved gather to talk about the problem.

Deep tube well operators occasionally violate the serial list and provide water to anybody they choose. This can lead to local conflict,

which is lessened when the operator acknowledges their mistake and extends an apology to the complainants. Despite these realities, deep tube well operators attempt to use their power to violate the serial list in order to favor one individual over another in exchange for a present or a bride. The prominent local peasant organization consistently attempts to place their names at the top of the serial list. However, this approach is thwarted by the regular recipients' unwavering attention to detail. As a result, the parties in the area are often at odds over irrigation water.

b) Social position of technology owners

Owners of deep tube wells and mini-deep tube wells enjoy a unique position in the community since they are wealthy and possess the water technology that the peasantry needs. Most people in the area hold them in a high value and are obligated to buy irrigation water from them. In addition to maintaining a surveillance group to keep an eye on the movements of the common peasants, they also maintain a supporting group for their own gain. The deep tube well and mini deep tube wells owners maintain a rift among the peasants over their water trade in this way. This dynamic of divide and conquer can occasionally degenerate into open conflict.

c) Open conflicts – its impact

The irrigation season begins during the summer. Every peasant needs water for his cropland during this time. All of the recipient peasants rush to the deep spot and compete with one another to acquire water first. To evade the rush, the deep tube well operators hide and keep the deep pump going. The recipient peasants are now fighting among themselves over priority, disobeying the serial list. In the irrigation season, this kind of event has grown commonplace. When family members of the disputing parties become engaged in the dispute, things can occasionally get worse. The social bond is thus negatively impacted.

d) Intrigue for installation of water top

The BMDA authority assigns water tops to be installed in various village locations under its purview. The village's powerful individuals want a water tap placed in front of their homes. Thus, these individuals engage in a covert attempt to convince the installation technician to follow their zeal. Sculptures, meals, and presents are occasionally given to the tap technicians as entertainment. The village of Niamatpur upazila in Naogaon district faces a similar predicament to that of Nachol upazila in Chapainababganj district.

Case Study – 1

In the Kalibrity area in the village of Niamatpur upazila in the Naogaon district, there are two powerful opposing groups. These groups are referred to as the Girish and Upen groups. Both of these groups are members of the local Munda ethnic community. Water for irrigation is the point of dispute for these groups. These groups act against one another in secret rather than publicly displaying discord. Therefore, it is impossible to observe this violent fight from the outside. Upen Munda left Natore to live in the village of Niamatpur in the Naogaon district's upazila. He attempted to buy land for a house from a non-local who owned a makeshift farm house close to Niamatpur upazila in the Naogaon district.

In opposition to Upen Munda, the Girish faction became active. Girish Munda's agents convinced the owner to increase the land's price. Upen Munda was forced to pay the higher price for that land. When the irrigation season starts, these two opposing factions always attempt to disparage one another. Both groups attempt to utilize the deep tube well authority to obtain water before the others, and they frequently claim that the peasants of the other group are poor farmers and should not be given priority when it comes to receiving water for their cropland.

Both groups attempt to persuade the deep tube well owner and deep tube well operator to provide them with water sooner rather than later. When a new hand tube well was being sunk in their sector

(Para), both of these groups swarm to the local Union council to ask the chairman of the UCC to act in their favor. These people work as share farmers and attempt to obtain appropriate land from landowners. Each group's peasants attempt to obtain the land around the deep tube well for shared farming. This is a situation where two groups of people who have lived in the same area for years are always at odds.

e) Deep owner and employee relation

Zeco Enterprise owns the sole commercial private deep tube well, which is located next to the BMDA deep tube well in the Niamatpur upazila of the Naogaon district. The Zeco deep tube well owner and his deep operator did not get along, and the operator complained about his wage being paid irregularly. The deep tube well owner ignored his complaints, which frequently turned into heated arguments. A power tiller that belonged to the deep tube well owner was stolen by the deep tube well operator one day.

f) Factionist centering private deep tube well

In the event of a dispute with the common peasants over the distribution of water charges and the provision of irrigation water, the

private deep tube well owners always keeps a group of people on their side. The deep owners prioritize the supporting group when it comes to irrigation water supply and other facilities. In order for the deep tube well owner to adopt various tactics against the competing peasants, this preferred group tries to incite factionalism among the peasants and tell them of their movements. Additionally, this preferred group continuously monitors the deep tube well owner's activities and apprises them of them. There is a clod relationship between the deep tube well owners and the deep tube well employees, and the deep employees dislike this preferred group.

g) Deep – operator versus rich land owner

Some wealthy landowners and peasants in the area constantly attempt to influence the deep tube well operators for unfair gain. In violation of the authorized serial list, they wish to obtain irrigation water. They occasionally pressure the deep tube well operators to provide more water than they require, depriving other peasants in the process. The wealthy, powerful cultivators form a cliquey group to act against the deep tube well operators and create harsh conditions for the deep tube well operator to quit if the deep tube well operator does not agree with their illegal demand. According to a deep operator, this exclusive group of wealthy peasants only ever acts in their own best interests. This group is claimed to be led by a member of the community. Every year during the irrigation season, this person attempts to cause

difficulty with the deep tube well operators on precarious ground. Everyone claims that his actions are bold and haughty. The deep tube well authority raises fish in their reserve pond, and the group leader doesn't think twice about removing some of his choire's fish when the deep tube well authority notices. The deep tube well authority secretly collects the fish prices from him by reducing his water usage during irrigation, which he doesn't comprehend, the deep tube well operator said.

h) Deep – owner and farm laborer

A large number of people living in the Naogaon district's Niamatpur upazila are either day laborers or share farmers. For irrigation water, the village's peasants are either directly or indirectly dependent on the Zeco firm, a private deep tube well owner. When the deep tube well owner needs farm labor, the receiving peasants work in the deep tube well owner's crop field. The peasants feel somewhat compelled to answer the deep tube well owner's summons to labor. The deep tube well owner's private crop field is in need. During the hectic days of agricultural work, farm laborers are occasionally unavailable. This possibility does not apply to the deep tube well owner.

i) Competition for coming close to the deep- owner

The owner of a private deep tube well in the Naogaon district's Niamatpur upazila is wealthy and well-liked by everyone. He holds the status of a member of the social elite. The peasants are sharply divided in their desire to build strong bonds with the deep-owner. There is a group of individuals known as the working group that receives irrigation water on an easy-term basis, in addition to this deep tube well owner and peasant group. Peasants in the Niamatpur upazila of the Naogaon district occasionally get into a heated and public argument over irrigation water when they discover that someone they like is receiving more water than those who are more in need. In the peasant community of Niamatpur upazila in the Naogaon district, this kind of excessive favoritism causes disorder.

j) Conflict on pond water

Every year, there is conflict between the locals and outsiders in a village of Niamatpur upazila in the Naogaon district. This community has a few Khas ponds (government-owned, untenanted ponds) that are kept full of water from the BMDA deep tube well in exchange for a water tariff. Every year, the villagers pay the water price by subscribing equally. In an emergency, they irrigate their grain fields using the water from this pond. However, occasionally a number of outsiders who own arable land close to these ponds attempt to

forcefully raise water to cultivate their property. A tense situation of open conflict between the opposing parties is created when the locals attempt to stop the outsiders from removing water from the Khas ponds.

k) No water for an unwanted neighbor

The community members typically don't like newcomers to their village because they fear that they will put too much strain on their water supply and cause the Khas land to decrease. Someone from somewhere else was able to purchase Khas land in the Niamatpur upazila in the Naogaon district, where he constructed his home. The neighbor took swift action against the newcomer and stopped him from using the village hand tube well or the Santal part of the village's hand tube well to obtain drinking water. At this point, the neighbors butchered hens and cocks and stole his cows. In an attempt to remove him from the hamlet, the neighbors migrated to different forums in the area, but they were unable to provide any justification.

Case Study – 2

A few years ago, 50-year-old Belal Uddin travelled abroad for business. But regrettably, his employer's business in Qatar was shut down, and he came home with nothing. To pay back the loan he took out while traveling overseas, he sold his landed property in

Durgapur village, which is located in Niamatpur upazila of Naogaon district. He looked up what a mason does. He was able to secure a price for Khas property in the Niamatpur upazila of the Naogaon district, where he constructed his homes and surprised his family by relocating there. The newcomer was disliked by his neighbors, who did all in their power to drive him out of the community. His lift turned into a horrible place because of his neighbors' harsh and insensitive actions. He nearly got imprisoned in his home after some of his neighbors slaughtered his chicks and cocks and stole his cows one day. His neighbors forbade him from gathering drinking water from the Santal enclave (Santal Para) in the Naogaon district's village Niamatpur upazila. The Santal people were urged by his neighbors to stop him from gathering drinking water from their tube well as well. As of right now, he has been getting drinking water from the private deep tube well in return for helping the deep tube well owner out with various tasks. Belal Uddin did reveal his enemies' names out of concern for retaliation. A poor, defenseless guy is attacked in this instance of vengeful village politics because he legally held a portion of Khas property. Given that the competitors are not equally strong, his agony will not end unless he gives up.

4.13 Change of outlook on water: Some adaptive features

In this region, water has become more precious than its price since it was commoditized. Water is now more scarce than it was in the past. In order to keep up with the times, individuals have begun to adopt new perspectives on water and implement various adaptation measures. Here is a summary of these adaptive changes:

a) Change of habit on using water

The ability to adjust to changing conditions is a special gift imparted upon humans. The conversation with the respondents revealed that the general public is altering their behavior about the everyday use of water and their perception of it. There was an abundance of water in prior years from ponds and draw-wells, among other sources. The aquifer has been fast depleting since BMDA installed numerous deep tube wells in the Barinda area and extracted a significant amount of water from the subterranean source. The research site is prone to drought. Most of the surface water sources have been abandoned, and they are drying up. People were forced to rely on deep tube wells' merchandized water for irrigation and drinking. The BMDA deep tube well provides piped water for household and drinking purposes. There are water taps in certain communities where people can gather water, but the pipe supply is inadequate, and everyone suffers from the lack of water. People are dealing with the issue and are starting to worry

about the resulting shortage. They used to watch the skies for rain, but now they use deep tube wells to supply irrigation water. They no longer abuse or lavishly consume water, and they are much more cautious about it now. Maintaining a minimal amount of water for household consumption has become a mandatory practice for every family. Every household has enough drinking water on hand to handle any situation that might arise from a disruption in the deep tube well's water supply brought on by an electrical outage or a mechanical failure. Nowadays, water is a marketed commodity, and water exchanges between nearby homes are a thing of the past. Offering cold drinking water to family members is no longer a social custom.

The current merchandized irrigation water system is also causing some noticeable modifications in the agricultural pattern. In order to reduce production costs, peasants are more interested in growing crops that require little or no irrigation. More arable land is being used for the cultivation of winter vegetables and rabi crops, which need less water for irrigation. Many peasants are protesting the government's introduction of drought-resistant paddy and wheat. According to the participants, the government ought to start a large-scale initiative right away to re-excavate both small and large waterways. In order to prevent the aquifer from depleting, ponds and other surface water bodies are used to retain rainfall for use in irrigation and to reduce the amount of water extracted from below ground. They think that this

kind of effort will make the current state of water governance more human-friendly and create an environment-friendly atmosphere.

b) Storage of water

Water was not a commodity of trade in the past. Everyone had unrestricted access to water from all sources. The idea of conserving and storing water for use during brief emergencies never occurred to anyone. Since all of the ancient water sources were abandoned and became outdated, people's reliance on marketed water increased. The cost and value of water increased for everyone. The deep-level authorities have increased drinking and irrigation water prices for a variety of reasons, forcing the public to pay more. Because of the situation, customers are now extremely careful about how much water they use. Their usage of drinking and household water has become austere. Every family has made it a practice to stockpile enough drinking water to last them for two or more days in case the deep supply is disrupted. Many households with corrugated iron sheets (also known as tin sheets) gather rainwater. There are different-sized containers on the ground where rainwater collects after flowing down. Some people gather rainwater in several big barrels for usage around the house, such as for cooking and as drinking water for animals. Every time it rains, the drums are refilled. Some astute respondents predicted that every house would soon have a concrete reservoir that is large enough to hold collected rainwater.

4.14 Influence of local power polities and social organizations on water related issues

Activities pertaining to water issues are governed by the local elite, which includes powerful local politicians, wealthy social leaders, landowners, peasant leaders, well-known social workers, educators, and religious leaders. Every day, a crowd of men and women swarms around a public water tap to collect drinking water. It frequently resulted in brief conflicts. To address this issue, the local government established an eight-member tap water committee. They also created a list of tap water recipients and encourage everyone to abide by it without causing any issues. The aggrieved individuals band together to voice their opposition to any prejudice or inconsistency in the serial list's creation. A cordial debate between the opposing groups leads to an amicable resolution of the issue. The tap committee oversees the deep-authority's regular supply of piped water and offers suggestions for installing new taps throughout the community. The creation of the serial list of peasants who would get irrigation water is also influenced by the local authorities. The tap water delivery system serves the village of Nachol upazila in the Chapainababganj district. The landless residents of the village of Niamatpur upazila in the Naogaon district are in charge of maintaining the Khas ponds only for their personal usage.

The villages' united resistance thwarts the attempts of numerous powerful non-locals to seize control of the Khas ponds for the purpose of raising fish. The worthy landless individuals are given the opportunity to reside on the Khas land surrounding these Khas ponds. As a result, those who are interested make an effort to stay in contact with both the local leadership and the union council.

Any disagreement over the delivery of irrigation water for the crop fields is settled by the peasants and the deep authorities sitting together. The local government also makes an effort to encourage a peaceful resolution to the water issues. Every week following Friday prayer, the concerned parties meet together to talk about the issues facing the community. The mosque's imam also tries to contribute in some way to the peaceful resolution of the persistent issues.

4.15 Social discrimination – access to water

Water management has become a permanent industry and a commodity of trade since the development of a merchandized system. Since then, the wealthy have gained actual control over water. Its control will stay in the hands of those who can afford to purchase the water technology and other components required for the extraction of subterranean water. It is clear that this water governance structure has led to societal discrimination between the haves and the have-nots.

a) No money – no water

Water availability depends on money. T hose who are able to buy water, the society views them as capable individuals. Those who are able to spend more money are able to regulate enough.

b) Money and advantage

Some wealthy people in Chapainababganj district's Nachol upazila have installed fresh tap connections in their homes. The entire cost of installing the personal taps has to be covered by them. However, ten or twelve families are forced to rely on a single shared tap.

c) Storage of water

Having a tap at home allows wealthy families to save adequate water for later use. However, poverty prevents the impoverished from taking advantage of such opportunities. They suffer as a result of the perpetual water shortage.

d) Sufferings of the poor for limited supply of water

To obtain water from a public tap, the impoverished endure having to wait in line. A power outage or a deep tube well's mechanical failure could cause the supply to be cut off or delayed. When collecting tap water, the impoverished suffer through terrible hardships. Because

they have built storage facilities for them, the wealthy are not affected by this challenging circumstance.

e) Mini – deep tube well of the rich

Numerous wealthy people in the Chapainababganj district's Nachol upazila have installed their own mini-deep tube wells on their property. The research team found that a village had up to five of these mini-deep tube wells. These wealthy families get the water they need every day, and some of them are even known to sell it. It is anticipated that the number of mini-deep tube wells will continue to increase.

f) Control of sources of water

The wealthy residents in this area possess the majority of the ponds and other surface water sources. They also possess the private mini deep tube wells and the private commercial deep tube wells. The wealthy girl also has direct or indirect control over all of the organizations that are involved in installing a water system in the new community of the landless poor in the Khas lands. When it comes to issues pertaining to water management, the BMDA authority needs to speak to the local elites despite being independent of any local group.

g) Water business of the rich

Zeco Enterprise, one of the biggest proprietors of deep tube wells, is a wealthy party. The current water commerce in this area is carried out

by such a company and numerous other proprietors of mini-deep tube wells. The wealthy are attempting to put their money into this water commerce. This water trade is expected to grow in the future if the government does not enforce tight water policies.

h) Disparity in water price

There are differences in the water charges for the BMDA deep tube wells that feed it. While a wealthy individual pays TK. 110/- (one hundred and ten) per month for his own tap, several households pay TK. 185/- (one hundred and eighty five) for a single communal faucet, but they are unable to gather enough water to suit their needs.

4.16 Gender discrimination and access to water

The serial list of receivers is closely adhered to throughout irrigation water supply, and men and women are not discriminated against on the same list. However, the clear division of labor between men and women in the local society is determined by water.

a) The social values – not deterrent

The majority of people is gradually shifting their viewpoint on some long-standing social standards. On certain occasions, people are growing flexible of gender discrimination. This is demonstrated when unrelated men and women form a line in front of a public water tap on

a daily basis. Men and women frequently engage in casual conversation at this time, which occasionally turns into a brief argument over who gets to collect the water first. Due to his perspective on male supremacy, men attempt to surpass women in the gathering of water, but encounter resistance. Mainly from a theological perspective, this practice of open communication between males and females is unacceptable in society. But there are no limits to necessity. People are gradually growing accustomed to the fact that men and women must fetch water from the same tap. The public's perception of conservative ideals that are ingrained in society is changing as a result of this inevitable requirement.

b) No gender-based discrimination in the ethnic societies

The Santal, Munda, and Oraon ethnic communities are unaware that their community discriminates against them based on their gender identity. According to the participants from ethnic communities, men and women collaborate for the family and see themselves as equals in every way. Men and women have an equal right to get water, and they assist one another in gathering it. A participant from an ethnic minority background mentioned that men and women fulfill their responsibilities and live in peace and harmony without engaging in any dishonest relationships because there is no gender-based discrimination.

c) Setup of tap – the role of women

The relevant authorities always consider the distance between the nearest households and the tap or hand tube well placement because women are the ones who utilize their water sources the most. The participants stated that in order to relieve women of their burdensome household responsibilities, new taps or tube wells are usually placed closest to homes.

d) Division of labor for water

Men and women have different responsibilities related to their own water management. The family's male members are responsible for making arrangements for the agriculture fields' irrigation water supply. The women are responsible for gathering drinking and household water for the family. Women must wait in a long line in front of a water tap while men must proceed to the deep tube well authorities.

e) Scarcity of water and work load of women

The ongoing water shortage has increased the workload for women in the household. It gets worse for them to get water from far-off sources in the area if the water supply is disrupted. They frequently have to stand in front of a tap until the electricity is restored during load shedding.

f) Priority of man for drinking water

In many families, male members are always given priority when it comes to drinking water. This preference is deeply rooted in societal attitudes, which justify it by claiming that men work hard to support the family. However, the significant domestic labor performed by women often goes unrecognized. Rural women also contribute greatly to agriculture, yet they are accustomed to silently enduring these kinds of social injustices.

4.17 Availability of irrigation water – change of life style

The introduction of technology-driven irrigation has opened new possibilities for expanding agriculture in multiple directions. Capital investments focused on increasing agricultural output are pushing the sector toward commercialization. This shift has created business opportunities in chemical fertilizers, agrochemicals such as fungicides and pesticides, and high-yielding seed varieties for crops like rice and seasonal (rabi and kharif) vegetables. Farmers are now able to grow three crops a year—typically two rice crops and one vegetable crop. Potatoes, tomatoes, mustard, and other suitable vegetables are also being cultivated on a commercial scale. Previously, farmers relied solely on rainfall and produced only one crop of Amon rice each year, just enough to sustain their families. However, technological advancements in water management have enabled them to cultivate

more crops at a commercial level. This has rapidly transformed the agricultural system, introducing diversification and intensifying farm activity. Farmers and private landowners now work around the clock, and new agricultural trade networks are forming, contributing to changes in the rural social structure. As agriculture becomes increasingly dependent on irrigation, traditional joint families are breaking into smaller nuclear units. Managing large agricultural areas under a joint family setup has become difficult, prompting this fragmentation. Additionally, large farms are being divided as water—once managed communally—is now under private control. This commodification of water is straining kinship bonds and disturbing family harmony, with noticeable social consequences. Conflicts and minor disputes over access to water taps are disrupting neighborhood relationships. In essence, many of these emerging social tensions are rooted in issues related to water.

4.18 Water supply system and peoples control

Many people believe that they have little to no control over how water is supplied. The current system of water management is closely tied to the market economy, where money determines who can access clean and safe water. Access to water now largely depends on an individual's financial capacity, making it inconsistent and unreliable

for those with limited means. As one respondent noted, the poor are hit the hardest by water scarcity. Under this system, people must spend significant amounts on tap water for drinking and irrigation for their crops. In the village of Niamatpur in Naogaon district, maintaining hand tube wells also demands substantial financial investment.

Although farmers generally receive the necessary amount of irrigation water, most express dissatisfaction with the system. There is widespread concern over the declining groundwater level, caused by excessive extraction beyond sustainable limits. In this semi-arid, drought-prone region where rainfall is scarce and unpredictable, crop failure is common. As a result, poor farmers are often forced to sell their land just to survive, leading to a steady rise in the number of landless people each year.

Local leaders and residents estimate that around 70% of the land in the area has been bought up by wealthy individuals from Chapi and Shibganj. Former landowners now work as sharecroppers on the very land they once owned.

The tap water system itself faces numerous issues—shortages, irregular supply, and frequent disruptions caused by mechanical failures and power outages. Despite these challenges, water connections are cut off if users fall behind on payments. In Nachol upazila of Chapainawabganj district, for example, a single 25,000-liter

water tank serves the entire village but runs dry within just 10 minutes due to the growing population. Consequently, the amount of water available per person continues to decline.

4.19 Present system of water management and ecosystem

A significant portion of the local population believes that the current water management system is damaging the natural ecosystem. They point to the drastic drop in groundwater levels caused by years of excessive extraction. Surface water sources are also drying up, and reduced rainfall is making the region increasingly arid and prone to drought. As the soil dries out, plants are unable to access water, since it has fallen below their root zone. Except for the irrigated farmlands, much of the surrounding area is losing its plant cover. Respondents suggested that these changes are contributing to shifts in rainfall patterns and are accelerating drought and desiccation across the region. They believe the current water management approach is driving harmful ecological changes.

However, another segment of the population supports the existing system. While acknowledging that some farmlands fall outside the reach of the irrigation network, they argue that agricultural activity has expanded and become more commercialized, leading to increased crop production. This diversification has encouraged the development of markets and services related to agriculture. Supporters of this view

emphasize that these developmental efforts should not be halted. Instead, they urge the government to implement a balanced water policy backed by legislation—one that promotes sustainable development in all sectors, especially agriculture—while also addressing and preventing ecological degradation.

4.20 Resistance from the deprived

Individuals who are not listed as eligible recipients do not receive water from the deep tube well authority, as access requires payment of water charges. Even those who are officially listed and have paid still face irregular and disrupted water supply, leading to ongoing hardship. Those excluded from the system are highly critical of the deep tube well authority, often engaging in heated arguments and using strong language. Their frustration has led to vocal protests against the water supply management.

At times, these disadvantaged individuals come together to seek intervention from local leaders in hopes of resolving the issue. Access to irrigation water from the BMDA deep tube wells is reserved for prepaid cardholders. Farmers who do not possess such cards are denied water access—even when their fields fall within the operational range of the tube wells. These farmers frequently appeal

to both local leaders and the water authorities for a solution. While temporary fixes are sometimes arranged, a lasting resolution remains elusive. This problem continues to persist, and so does the growing public resistance.

4.21 Deep tube well and the aquifer level

Since the widespread installation of deep tube wells in the region—initiated by the BMDA in 1982—the groundwater (aquifer) level has been steadily falling. These deep tube wells have been running continuously since their setup. Respondents reported that all draw wells and hand tube wells have already stopped functioning, and many of the BMDA-operated deep tube wells can no longer extract water as effectively as they once did. According to BMDA technical experts, the underground water table has dropped significantly, and current tube wells will need to be replaced with newer ones capable of reaching much deeper levels.

4.22 Merchandized water and break down of the joint families

The commodification of water has significantly altered family structures over the past 30 years, leading to the breakdown of joint families into smaller nuclear units. The primary factor behind this shift

is the need to purchase water. In the male-dominated society, the head of the family, along with other earning members, is responsible for paying the water bills. However, tensions often arise when a new bride joins the household, as the family must then decide how to manage the increased water expenses. Over time, such financial and domestic pressures create unrest within joint families, eventually resulting in their separation.

One participant from Nachol upazila in Chapainawabganj district shared that his brother, who has seven sons, once lived together in a joint family. To avoid disputes over water expenses, they decided to split into separate households on peaceful terms**.**

4.23 Water – the driving factor in clan struggle

Water has emerged as both a driving force and a dividing line in the ongoing conflict between wealthy individuals and the local poor community. Open tensions exist between the rich and the landless over control of water resources. The affluent seek to monopolize access to Khas ponds, keeping them within their territory for personal gain. However, these water sources are vital to the poor for irrigation and farming, and they view them as essential for their survival. As a result, a class-based conflict over water access appears inevitable.

Case Study – 3

A woman from the Oran ethnic community expressed her anger over a wealthy man who regularly wins the tender to a local pond for fish farming. She said, "They throw cow dung, human waste, and poultry droppings into the water, yet won't even let us touch it. We have nowhere else to go. That's why we're now united to keep control of the pond ourselves."

Currently, twelve ethnic families from Kanibrith Para in Niamatpur upazila of Naogaon district have come together to protect their access to the pond. When asked about their ability to pay the tender fees, they replied, "We have no money, but we have strong unity." They recalled losing their property and farmland during the 1971 conflict, and now, in Niamatpur, they believe their survival depends on solidarity: "United we stand, divided we fall."

4.24 Some essential services related with water management

Since the introduction of technology-driven and commercially managed water systems, several essential service roles have emerged in the community. These professional services play crucial roles in maintaining and operating the overall water management system.

Many local men are now employed in these water-related occupations, earning their livelihood through them. The key services include:

- ❖ Deep tube well driver for deep – operation
- ❖ Line man for supply and distribution of water
- ❖ Collectors for the collection of areas water changes
- ❖ Business of water technology related machineries
- ❖ Repairer group of professionals for the repair of water supply related components including mechanical tools, supply pipes, taps etc.
- ❖ Contractor group for the materialization of water related agreements.
- ❖ Inspector or supervisor group for the supervision of the entire water supply system.

Active operational services in the locality:

a) Deep tube well drivers:

The deep tube well operator is a skilled technician responsible for managing the operation of the deep tube well to extract groundwater. During working hours, they are tasked with overseeing the machinery, ensuring its proper maintenance, and making necessary decisions in case of any mechanical issues or malfunctions.

a.1) Remuneration of deep tube well driver

The BMDA deep tube well authorities distribute the wages of deep tube well operators in the month of May, based on the total number of water hours operated. The wage structure is as follows:

- For 1 to 1000 water hours: TK. 8 per hour
- For 1001 to 2000 water hours: TK. 10 per hour
- For over 2000 water hours: TK. 12 per hour

a.2) Social position of the deep tube well drivers

Deep tube well drivers hold a respected position in the local agrarian community, as they are central to the mechanized irrigation system. Farmers frequently rely on their support and cooperation in resolving water-related issues. However, at times, they face criticism from farmers for acting in an authoritarian manner during water distribution, which occasionally leads to verbal disputes. Currently, nine skilled deep tube well drivers are employed under the BMDA in Nachol upazila of Chapainawabganj district.

b) Lineman:

The lineman is responsible for overseeing water supply and managing irrigation water distribution in the crop fields. Farmers themselves are often capable of performing this role when needed.

c) Repairer:

Technically skilled individuals work as repairers under BMDA supervision. They fix mechanical failures or malfunctions in the deep tube well system and play an essential role during the installation of new wells.

d) Pipe Man:

Pipe men are tasked with installing and repairing water supply pipes. They earn around TK. 1,500 per assignment.

e) Tap Man:

Tap men are responsible for installing tap lines and handling minor repairs, typically earning between TK. 200–250 per task.

f) Contractor:

Contractors implement government projects such as installing deep tube wells, re-excavating creeks, and digging canals. Many local influential individuals are involved in this profession.

g) Tube Well Man:

These workers are responsible for sinking and installing hand tube wells, as well as repairing them. However, due to the falling groundwater level, many hand tube wells have become non-functional, causing a decline in this profession.

h) Pump Man:

Pump men install water pumps and also handle maintenance and repairs.

i) Deep Tube Well Manager:

A deep tube well manager, employed full-time by a Zeco enterprise tube well in Niamatpur upazila of Naogaon district, performs several key functions:

1. Acts as a liaison between the tube well owner and local farmers.
2. Encourages farmers to participate in implementing the owner's plans.
3. Maintains records of water sales.
4. Collects water fees from the farmers.

j) Tap Supervisor:

Typically, deep tube well drivers also function as tap supervisors. Their responsibilities include:

1. Supervising the tap line.
2. Ensuring the supply of piped drinking water.
3. Collecting local water fees.
4. Monitoring and preventing water misuse.
5. Enforcing the guidelines set by the tap committee.

4.25. Present water management system and work opportunities for day labourers

With the introduction of commercialized irrigation water, agriculture has gradually transformed into a more commercial system. In the past, farmers typically grew only one rice crop per year. However, the availability of water now allows them to harvest three crops annually. Previously unused fallow lands are now being cultivated. As a result, farmers must work extensively on their fields, both day and night. This shift has also created more employment opportunities for local day laborers. The following pages will present case studies and the agricultural calendar followed by the farming community.

Case Study – 4

Atiar is an agricultural laborer. He was unemployed during the month of Magh. He found work during the Boro rice cultivation in Falgun but had no employment for the following three months. In Ashar and Shrabon, he was engaged again when Aman rice sowing took place. He had plenty of work during the Aman rice harvest in Agrahyan. Atiar points out that agricultural work is seasonal, leaving laborers like him without jobs for much of the year. Many, including himself, travel to different parts of the country in search of work but often return disappointed. He once said, "Sir, give us work so we can survive." Most farm laborers remain jobless except during the cropping seasons. However, with the shift in agricultural practices and the introduction of deep tube well irrigation, job opportunities for farm workers have increased.

4.26 Present water management system and monthly based form labour.

The research team has observed significant changes in the agricultural labor system. In earlier years, farming relied solely on seasonal rainfall, which left farm laborers unemployed for most of the year. However, with the introduction of a new water management system, agriculture has entered a new stage of development. The availability of irrigation water has allowed farmers to shift from growing a single

crop to cultivating three crops annually. Additionally, they have begun producing Rabi and Kharif vegetables on a commercial scale. As a result, peasants now work throughout the year, often day and night. Farm laborers also benefit from year-round employment within areas covered by deep tube well irrigation. The entire agricultural system has become commercialized, and the labor structure has evolved into a more capitalist model. The current monthly-based farm labor system is outlined below.

(a) Bengali month – *Ashar* and *Shrabon*

This period falls within the rainy season, during which Aman rice is planted in the paddy fields. However, rainfall during this time is minimal and insufficient, forcing farmers to rely on irrigation from deep tube wells. On average, peasants spend around 7,000 Taka per bigha of paddy land, covering costs such as sowing, irrigation, and other related tasks. The deep tube well operators charge 150 Taka per hour for water supply, and around six laborers are required per bigha to transplant the rice seedlings.

a.1) *Ashar* month and purchase of water

Since rainfall is limited even during Ashar, farmers are forced to buy irrigation water at a rate of 150 Taka per hour. For two to three irrigation sessions, this results in a total cost of approximately 7,000 Taka per bigha of cultivated land.

a.2) Wages for labour

During the Aman sowing season, many day laborers are employed in the fields, earning 150 Taka per day along with three meals. However, those who choose not to take meals are paid 200 Taka per day instead.

a.3) Food for laborer

Cooked meals are delivered from the landowner's home to the worksite and are provided to the laborers each working day.

a.4) Morning – breakfast

In the morning, farm laborers are served soaked rice (panta), plain rice, or bread. Occasionally, they are given bread made from black gram (mash kalai) flour, which is especially favored by the workers. Additionally, each laborer receives two packets of biri (traditional hand-rolled cigarettes) daily.

a.5) Mid – day

The midday meal for farm workers typically includes rice, mixed vegetables, and pulses. They usually eat their meals right in the fields where they are working.

a.6) Meal at night

Farm workers receive rice, lentils, and mashed potatoes as part of their meals. Occasionally, rice with fish curry is also served in the evening.

a.7) Important works in *Ashar*

The farm laborers perform the following duties:

I. Cropping the field.
II. clean it.
III. Crop land boundary dikes are cleaned.
IV. The crop field is thought ready for sowing.
V. From mid – *Ashar* sowing of paddy seedling starts.
VI. Use of fertilizers and pesticide.
VII. Weeding.

b) Important duties in *Bhadra*

There may be some rainfall in their month but it is offer scanty and insufficient. The important works for the farm workers are:

I. Cleaning the grasses or other weeds from the paddy field.
II. Harvesting of paddy from the end of this month.

c) Ashwin

This month is almost without rainfall. Land preparation is made for potato cultivation. Harvesting of *Amon* paddy goes on will instant thrashing. The farm laborers engaged in harvesting and thrashing paddy are paid at the rate of 3 monds of paddy for 23 monds of total

thrashing is 3kg of paddy for 23kg of total thrashing. The main duty of the farm workers are:

I. Harvesting and thrashing *Amon* paddy.
II. Land preparation for potato cultivation.
III. Potato seed sowing.
IV. Harvesting *rabi* vegetable etc.

d) *Poush* month

The farm laborers remain engaged with the cultivation of various *rabi* crops with irrigation water. The main farm works are:

I. Sowing seeds of wheat, maiz, Mustard etc.
II. Preparation of seed bed of IRRI (Chautali IRRI) rice.

e) *Magh* month

Peasants and farm laborers remain busy with sowing of IRRI (*Chaitali*) and other varieties of paddy seedling in the field with the availability of deep – irrigation water. Land beyond the limit of deep irrigation supply is lift fallow. The main farm works are:

I. Sowing seedling of IRRI and other *Chaitali* paddy.
II. Weeding the crop land.
III. The empty land is ploughed thoroughly
IV. Fertilizer is applied on the crop field.
V. Some early rabi crops are harvested e.g. wheat, mustard, lentil, gram, potato etc.

f) *Falgoon* month

The main farm works are harvesting rabi crops and wedding the crop land with standing crops.

g) *Chaitra* month

The peasants and the farm workers remain busy during the entire month. The main farm works are:

I. Harvesting of IRRI paddy.
II. Thrashing of IRRI paddy.
III. Cleaning and preservation of the IRRI paddy.
IV. Preparation of seed bed of *Bhadui* paddy (*Boro*).

h) *Baishakh* month (Summer)

The main farm work during this this month are:

I. Ploughing the land to eliminate grasses and other weeds.
II. Organic fertilizer is applied in the land.
III. Preparation of seed bed for early amon rice.

i) Jaishtha

Peasants plough their land for the next crop.

4.27 Commodification of water and intrusion of NGO capital

With the commercialization of water and the development of commercial water management, agricultural practices have shifted

towards more commercial crop production. As a result, the workload for peasants has increased alongside agricultural expansion. Over time, peasants have had to spend more on purchasing irrigation water, leading to higher production costs. However, due to the relatively low prices of agricultural products, they do not receive the returns they expect. To sustain their farming activities, they rely heavily on loans, often borrowing from local moneylenders at high interest rates. In this context, NGO funding has become deeply involved in the local agricultural system, with many poor peasants becoming dependent clients of NGO capital.

Case Study – 5

When the research team visited Battola Para in Nachol Upazila, Chapainababganj district, a man, frustrated, took them to meet the loan installment collector and asked, "Sir, won't they even leave us alone on Fridays?" Various NGO loan collectors frequently visit the village to collect repayments from borrowers. Ayenuddin, a 60-year-old sharecropper from Battola Para, must buy irrigation water from deep tube wells. Despite the high production costs, the low market prices for crops cause him to face losses each year. This forces him to take out loans from several NGOs in the area, often borrowing from one to repay another. The installment collectors come weekly to collect payments.

Ayenuddin's wife, Rasheda, borrowed 12,000 Taka from BRAC and must pay 300 Taka weekly for 45 weeks. She also pays an annual interest of 50 Taka per thousand Taka borrowed, which amounts to a 15% yearly interest rate. Additionally, she borrowed from a local moneylender at a much higher interest rate of 150 Taka per thousand Taka each month. Ayenuddin himself took a loan of 15,000 Taka from ASHA NGO, with weekly installments of 400 Taka over 45 weeks, and pays 150 Taka interest per thousand Taka annually.

Their son, Forhad Ali, borrowed 15,000 Taka from PROSICA NGO, repaying 400 Taka weekly; 10,000 Taka from ASHROY with weekly payments of 285 Taka; 11,000 Taka from SEPORET (?) with 300 Taka weekly installments; and 10,000 Taka from CARP, for which he pays 80 Taka interest, with the installment payments deferred. Ayenuddin also took 10,000 Taka from CARP, while his daughter-in-law, Bulbuli, borrowed 20,000 Taka from Borrow Bangladesh and must pay 550 Taka weekly.

As repayment days approach, the borrowers grow anxious and overwhelmed. Sometimes they fail to collect enough money, even resorting to mortgaging property. Other borrowers often verbally abuse defaulters and urge NGO officials to deny them future loans. This family is trapped in a cycle of debt they cannot repay, despite

having sold their movable possessions. Given the situation, Ayenuddin is seriously considering selling one of his cows to manage the debt.

4.28 Common source of water – and development of mutual relationship

Since the introduction of the piped water supply system in a certain village in this area, participants have been gathering drinking water from communal taps placed at various spots throughout the village. Men and women often wait together in long lines at these taps to collect water. During this time, they have the chance to share their thoughts and discuss family and social matters, fostering a sense of community and strengthening local relationships. This can be seen as:

- Developing love and sympathy between families.
- Time for mutual discussion and exchange of views is lengthening.
- Mutual participation and help in collecting water from the common source is gradually growing.
- Mutual relation between some individuals is bing temporarily strained.

a) Tap and abstraction of women

Men and women gather at the communal tap to collect drinking water. Occasionally, some men attempt to cut the line to collect water more quickly, but they are strongly opposed by the women waiting, forcing them to respect the queue. When water supply is delayed, often due to power outages, the women have plenty of time to talk among themselves. They usually discuss their worries and express frustrations about the unkind behavior of their husbands, mothers-in-law, and other dominant family members. However, they often remain silent about these issues to avoid further trouble.

b) Some social problems

Men and women from the community gather at the common tap to collect drinking water. During this time, conversations sometimes occur between men and women who are not closely related. However, such interactions between unrelated men and women are frowned upon in the local society. Occasionally, this leads to distrust between husbands and wives, sometimes resulting in separation. Participants asserted that these conversations are often viewed as “extramarital affairs” and considered a social wrongdoing from a religious perspective. In most cases, however, it is the women who suffer the consequences in this male-dominated society.

Concluding remarks / Conclusion

The recent wave of neoliberal market reforms within capitalist consumer society is starkly reflected in the phenomenon of “glass water” in today's world. This represents a deeper conflict between production systems and their outputs, where the commodification of water's practical value began and rapidly expanded. In any society, the system of water governance plays a crucial and decisive role, influencing many of its other driving forces. As water becomes commercialized, it brings gradual but profound changes to the structure of society. With shifts in water governance come changes in social order, human relationships, and the roles of social institutions. People are gradually forced to adapt to these new realities.

As both the governance of water and societal thinking evolve, society itself becomes increasingly complex. In a commoditized system, even human beings begin to be viewed as tradable entities, with water acting as both buyer and seller in this marketplace. The transformation of water governance toward a market-driven model signals the emergence of a new neoliberal social structure. History shows that human civilizations have always flourished around water-rich areas, and many large settlements were abandoned when water became scarce. Thus, water governance and management will play a decisive role in shaping humanity’s future.

The Barind region, with its unique topography, semi-arid climate, and fragile ecology, is a key area of concern. Effective and balanced water governance is essential for the survival of this region. A revolutionary and well-considered change in water management is urgently needed to support the welfare of farmers and the expansion of agriculture here. The government must formulate a rational, sustainable, and environmentally friendly water policy specifically tailored to this region. Current water management systems—controlled by the government, private sector, and NGOs—pose risks of environmental degradation and threaten the ecological balance. The likely solution lies in a collective, community-driven approach: a non-commercial, sustainable, eco-friendly, and democratic model of water governance and management.

CHAPTER: FIVE

Conclusion: Listening to the Cries beneath the Surface – Toward Water Justice in the Barind Tracts

The journey taken through the social, political, cultural and social landscapes of water in the Barind Tracts shows a complicated and intertwined truth. Water in this region is more than just a physical or economic resource; it is a sacred as well as symbolic lifeline that has been integrated into the very fabric of communal identity, history, and sustainability. From ancestral stories to seasonal rituals, people's personal relationship with water has long been based on reciprocity, reverence, and collaborative stewardship.

However, the shift from communal reverence to capitalist rationalism has resulted in a new era of commodification, extraction, and exclusion. As evidenced by the political economy of water marketization, this transition has been neither organic nor neutral. It has been driven by institutional decisions, development paradigms, and market forces that prioritize profit over people, which are

frequently explained as agricultural modernization or economic efficiency. The rise of water as a commodity has reshaped access, power, and participation in ways that disproportionately harm the most disadvantaged.

This alteration has a wide-ranging impact on society. Unequal access to water has exacerbated existing hierarchies, changed gendered labor, strained inter-community connections, and pushed many people into precarious employment. Despite these challenges, resistance and resilience prevail. Community-driven solutions, indigenous practices, and burgeoning protest voices all point to a desire to recover water as a relational and cultural essence, not just as a human entitlement.

This book is more than just an anthropological and political history; it is an invitation to redefine water governance through its perspectives of justice, culture, and compassion. The neglected cries of the Barind Tracts call us to go beyond technocratic remedies and economic logics and toward frameworks that value local knowledge, restore equality, and maintain the sacredness of shared resources.

In an era of intensifying water issues caused by climate change, over-extraction, and institutional apathy, the Barind Tracts stories prompt us to ask: Who speaks for water? Who decides what it is worth? And

how do we ensure that the cultural, ecological, and social components of water are not lost in the swell of commodification?

Only by listening to the unheard and focusing on their lived experiences can we begin the journey toward a more equitable and sustainable water future.

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