RAAH FOUNDATION'S CENTRE FOR POLICY RESEARCH AND ACTION

A Feminist Political Ecology of Water Crisis in Palghar, Maharashtra

GRT RESEARCH FELLOWSHIP 2025

Authors

Ritika Patel

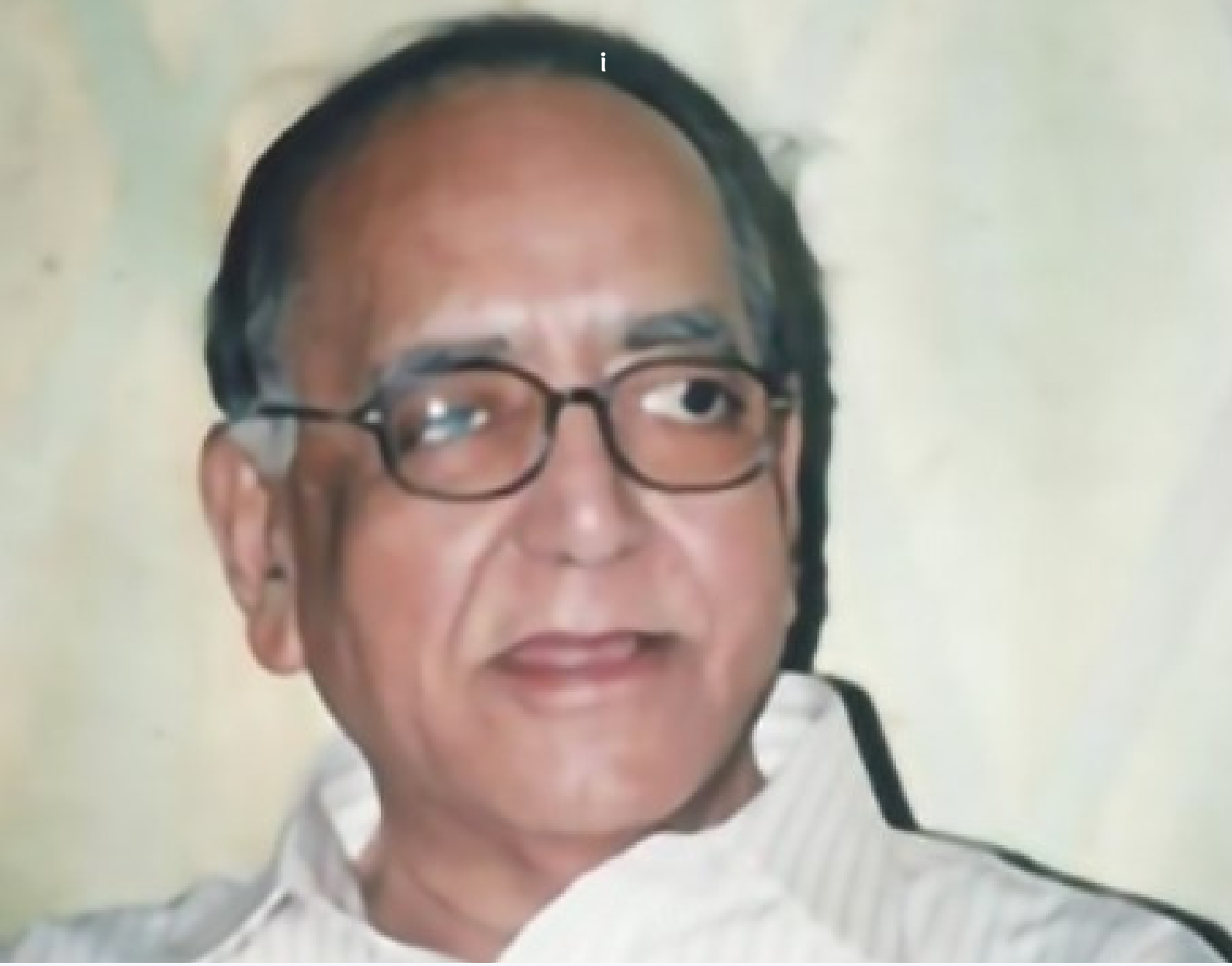
Snehal Bhilare

Fellowship Lead & Editor

Sunidhi Hegde

Suggested Citation

Bhilare, S. & Patel, R., 'A Feminist Political Ecology of Water Crisis in Palghar, Maharashtra' (2025) Centre for Policy Research and Action, Raah Foundation.



ACKNOWLEDGMENTS

We also wish to express our sincere gratitude to Mr. G.R. Thengdi, one of the founders of Raah Foundation, whose vision and dedication to empowering rural communities inspired this fellowship and made this research opportunity possible.

We would also like to acknowledge the communities in Palghar who generously shared their time, experiences, and perspectives, making this research both possible and meaningful. Their voices form the heart of this study.

We extend our sincere gratitude to the Raah Foundation for providing us with the prestigious GRT Research Fellowship opportunity. We are deeply indebted to Mr. Prakash Wagh, our field coordinator, whose expertise and local knowledge proved instrumental in facilitating the fieldwork. His tireless efforts in coordinating field activities, establishing community connections, and navigating the practical challenges of data collection were essential to the success of this study. His insights into the local context significantly enriched the quality of our research.

INDEX

EXECUTIVE SUMMARY

This research explores the gendered dimensions of water scarcity among tribal communities in Palghar district, Maharashtra, foregrounding the lived experiences and ecological expertise of tribal women. Climate change has intensified environmental degradation, imposing disproportionate burdens on women given their central role in water collection, household management, and resource conservation. The study hypothesizes that tribal women not only experience water scarcity more severely than men but also develop distinct strategies rooted in indigenous ecological knowledge. This knowledge encompasses detailed awareness of seasonal cycles, underground aquifers, and biodiversity-linked indicators, forming a critical yet under-recognized foundation for equitable water governance.

Women in Palghar predict water availability using bioindicators such as flowering patterns, insect behaviour, and soil properties, identifying seasonal changes months before conventional meteorological signs appear. These insights contrast with state-led interventions, which often fail in the district's laterite-dominated terrain and fragmented aquifer systems. Women's daily labour—ranging from locating and managing water sources to maintaining percolation pits and vegetation barriers—produces highly specific hydrogeological understanding. However, this expertise is excluded from formal governance because women's time is consumed by water-related work, and decision-making bodies rarely accommodate their perspectives.

Government schemes, including Har Ghar Jal, prioritise uniform infrastructure over adaptive, culturally grounded solutions. Tanker distribution is frequently misaligned with local needs, particularly during droughts, while women's adaptive strategies remain invisible to official assessments. This exclusion raises urgent questions about institutional design: how can governance frameworks integrate experiential, place-based knowledge with technical expertise, and what reforms are needed to ensure such knowledge informs climate-resilient water management in Palghar?

INTRODUCTION

With climate change exacerbating environmental degradation, women bear disproportionate burdens due to their roles in water collection and household management. This study hypothesizes that tribal women in Palghar not only experience water scarcity more acutely than men but also respond with distinct, gendered strategies rooted in indigenous ecological knowledge. Their understanding of seasonal cycles, underground aquifers, and biodiversity-linked water indicators constitutes an underrecognized yet critical knowledge system that can inform equitable water governance.

In Palghar district, tribal women appear to utilize complex bioindicators including specific flowering patterns, insect behavior, and soil conditions to predict water availability months before seasonal changes become apparent through conventional meteorological monitoring. This raises critical questions about the epistemic foundations of current water governance: Why are these knowledge systems, refined through generations of direct interaction with Palghar's undulating landscape and its seasonal springs, consistently marginalized in favor of technological solutions that have repeatedly failed in the region's laterite-dominated terrain?

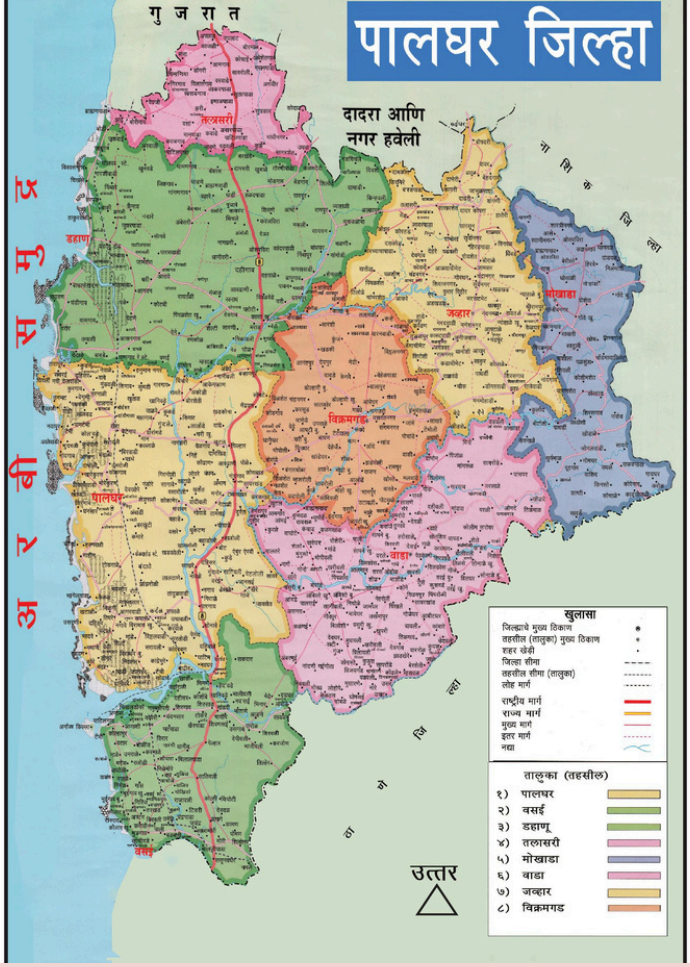
The hydrogeological reality of Palghar presents unique challenges that standardized state interventions have struggled to address. The district's fragmented aquifer system characterized by disconnected pockets of groundwater rather than continuous flows renders conventional boring techniques frequently ineffective. Yet women in these communities have developed location-specific knowledge of where and when seasonal water sources emerge, maintaining cognitive maps of hundreds of potential collection points that shift with rainfall patterns. This knowledge extends beyond mere location identification to include sophisticated understanding of recharge rates, water quality variations, and sustainability thresholds for each source.

The gendered division of water-related labor in Palghar's tribal communities creates a fundamental paradox: women accumulate extensive ecological knowledge through their daily water management responsibilities while simultaneously being excluded from formal governance processes due to these same responsibilities. Women in these communities spend an average of 4-6 hours daily engaged in water collection, treatment, storage, and conservation activities. This intensive labor produces sophisticated understanding of local hydrogeological conditions yet leaves minimal time for participation in formal decision-making forums. The embodied knowledge women develop through practices like maintaining percolation pits, protecting natural springs with specific vegetation barriers, and managing seasonal rotation between multiple water sources represents a comprehensive water governance system operating parallel to, but unrecognized by, official institutions.

The current water tanker distribution system, often driven by opaque state mechanisms, reinforces gender hierarchies by ignoring women's priorities, knowledge, and temporal routines of water use. It often transforms communal water-sharing norms into competitive, resource-scarce situations where women have less bargaining power. Furthermore, the state's interventions like the Har Ghar Jal scheme largely marginalize women's ecological perspectives by promoting infrastructure over cultural and environmental adaptation. The district water board, responsible for critical allocation decisions including tanker deployment, rarely consults directly with women who navigate water scarcity daily. When female representation exists on paper in Gram Panchayat water committees, participation remains constrained by meeting times that conflict with collection duties, technical jargon that excludes vernacular knowledge frameworks, and social norms that inhibit women's public speech.

The contradiction becomes particularly acute during drought periods when tankers deployed through technical assessment criteria frequently target incorrect locations or deliver at inappropriate times, creating new forms of water insecurity precisely when women's knowledge of alternative sources becomes most critical for community survival. The standardized response protocols developed at state levels with minimal local input cannot account for the microclimatic variations that characterize Palghar's topography. Meanwhile, women's adaptive strategies, including the maintenance of traditional water harvesting structures and protection of specific vegetation around seepage points, represent sophisticated responses to local conditions that remain invisible within formal assessment frameworks.

This disjuncture raises fundamental questions about how expertise is constituted and valued in environmental governance. What transformations in institutional design would be necessary to create genuine integration of women's ecological knowledge? Beyond token representation, how might governance structures be reconceptualized to value experiential, place-based understanding alongside technical measurement? These questions become increasingly urgent as climate models predict greater extremes in the Western Ghats' monsoon patterns, threatening both centralized water infrastructure and traditional collection sources simultaneously.



AREA PROFILE

Palghar is a district in the state of Maharashtra in Konkan Division. The headquarters of the district is the town of Palghar. Palghar District starts from Dahanu in the north and ends at Naigaon. It comprises the talukas of Palghar, Vada, Vikramgad, Jawhar, Mokhada, Dahanu, Talasari and Vasai. At the 2011 Census, the talukas now comprising the district had a population of 2,990,116. Palghar has an urban population of 1,435,210, that is 48% of total population is living in Urbanized Area. Palghar has all the three categories of lifestyles, Urban (*Nagari*), Coastal (*Sagari*) and Mountains-Hilly Region (*Dongari)*.

Palghar comprises the wide amphitheater like Ulhas basin on the south and hilly Vaitarna valley on the north together with plateaus and the slopes of Sahyadri. From the steep slopes of the Sahyadri in the east, the land falls through a succession of plateaus in the north and centre of the district to the Ulhas valley in the south.

Palghar can be separated into three geographical regions. The Eastern part of the Western Ghats, or Sahyadri mountains, is called *jangalapatt*i. This mainly encompasses the Jawhar, Mokhada, and Vikramgad talukas. The western part of the mountain district is called *Bandarpatti* which includes Vasai, Palghar, Dahanu. The third section is characterized by broad and flat land, including the Wada taluka. The district is bounded by Thane and Nashik districts in the east and northeast, and by the Valsad district of Gujarat state and the Dadra and Nagar Haveli district of the Dadra and Nagar Haveli and Daman and Diu union territory in the north. The Arabian Sea forms the western boundary, while the whole district falls under the fastest developing northern part of Mumbai Metropolitan Region.

Palghar is home to various tribal communities, with the *Warli* and *Katkari* tribes being prominent. Other tribes include *Mahadeo-koli, Kathodi, K-Thakur, M-Thakur, Dubla, Dhor-koli, Tokara-koli, Malhar Koli* and *Konkana*.

The main river flowing through the district is the Vaitarna. The river has many tributaries; the most important of them are Barvi and Bhatsa, Pinjal, Surya, Daherja and Tansa. Vaitarna, the largest of Konkan Rivers rises in the Trimbakeshwar hills in Nashik district, opposite to the source of Godavari. The river flows across Shahapur, Vada and Palghar talukas and enters the Arabian Sea through a wide estuary off Arnala. Vaitarna River is 154 km long and has a drainage area that practically covers the entire northern part of the district. The Palghar district gets some of the most rainfall in all of Maharashtra, an average 3000 mm (118 in) every year. Given its proximity to Mumbai, Palghar serves as a water catchment area to Mumbai. There are many dams, such as the Tansa Dam, which collect water and deliver to Mumbai through pipelines.

The Lower Vaitarna Dam, also called *Modaksagar* Dam, is also on west flowing Vaitarna river which supplies water to Palghar and Mumbai, but is located in Palghar & Nashik district in the state of Maharashtra in India. It was opened in 1957. The Middle Vaitarna Dam is a notable dam located in Kochale village in Thane, it is the third tallest dam in the state and is constructed using roller compacted concrete with a height of 84 metres (276 ft). The dam was built in 2012 on the Vaitarna river and serves the crucial purpose of impounding 455 million liters of water, which is essential to meet Mumbai's growing water demands. The Upper Vaitarna Dam, is also on Vaitarna river near Igatpuri, Nashik district. There are various debates on if this is damaging to Palghar. Some scholars believe this is necessary to meet the water demands of a large-scale city, but others argue that this is depriving Palghar residents of water, many of whom are farmers and have high water needs for agriculture. (Nikhil Anand Hydraulic city). In the mountainous regions of the Palghar district, such as in Jawhar and Mokhada, agriculture is the primary business. These areas mainly cultivate rice, millet, and black gram, as well as a variety of fruits and vegetables. Due to Palghar district's proximity to Mumbai, the region is the primary source of produce and grains to the Mumbai Metropolitan Area. This research focuses on several villages in the Mokhada and Jawhar talukas of Palghar, Maharashtra, are experiencing severe water scarcity, with some receiving water through tankers.

LITERATURE REVIEW

Feminist political ecology emerged in the 1990s as a critical response to both mainstream political ecology and development studies, which had largely overlooked the gendered dimensions of environmental change and resource management. The field developed from the recognition that environmental issues cannot be understood without examining how gender intersects with other social categories to shape differential access to, control over, and knowledge of natural resources.

The foundational contributions of female academics were instrumental in establishing and expanding this framework. Dianne Rocheleau, along with Barbara Thomas-Slayter and Esther Wangari, played a pivotal role in codifying feminist political ecology as a distinct analytical approach through their seminal edited volume "Feminist Political Ecology: Global Issues and Local Experiences" (1996). This work established three key principles that continue to guide the field: gendered knowledge and environmental experience, gendered environmental rights and responsibilities, and gendered environmental politics and grassroots activism.

Rocheleau's earlier work had already begun challenging the gender-blind assumptions of political ecology by demonstrating how environmental degradation and resource scarcity affected men and women differently. Her research revealed that women often possessed detailed ecological knowledge derived from their specific roles in resource management, yet this expertise was systematically excluded from environmental planning and policy-making processes. Barbara Thomas-Slayter's contributions focused particularly on participatory research methodologies that could capture women's environmental knowledge and experiences. Her work emphasized the importance of understanding local contexts and power relations in environmental change, moving beyond universal narratives to examine how gender intersects with class, ethnicity, and other social categories to create differentiated environmental experiences.

Esther Wangari's scholarship brought crucial attention to African women's environmental knowledge and practices, challenging development approaches that ignored indigenous expertise. Her work demonstrated how women's roles in agricultural production, water management, and forest conservation generated sophisticated ecological understanding that was often more sustainable than externally imposed technical solutions.

More recently, scholars like Kim TallBear have expanded feminist political ecology to incorporate Indigenous feminist perspectives and decolonial approaches. TallBear's work on Indigenous technoscience challenges Western knowledge hierarchies and demonstrates how Indigenous women's knowledge systems offer alternative ways of understanding human-environment relationships. Her scholarship emphasizes the importance of recognizing Indigenous knowledge as complete systems of understanding rather than fragmented practices to be validated by Western science. Contemporary feminist political ecology emphasizes the need to understand environmental issues through the lens of social justice, recognizing that environmental problems are always also social problems rooted in unequal power relations.

The gendered dimensions of water scarcity in tribal communities require examination through multiple disciplinary traditions that have evolved to understand the complex intersections of gender, environment, and governance. This literature review positions current research within broader scholarly conversations while identifying specific gaps that research in Palghar addresses. Bina Agarwal's critique of essentialist ecofeminism proves particularly relevant for understanding tribal water governance. In "The Gender and Environment Debate" (1992), Agarwal challenges assumptions about women's inherent connection to nature, arguing instead for "feminist environmentalism" - an analysis grounded in women's material reality rather than spiritual or biological determinism.

This materialist approach provides essential analytical tools for examining tribal communities in Palghar, where tribal women's water knowledge emerges not from essentialist connections to nature but from concrete daily practices of resource management. Agarwal's framework enables scholarly analysis that recognizes the sophistication and value of tribal women's environmental knowledge without romanticizing it.

Building on this foundation, Crow and Sultana's study in Bangladesh (2002) demonstrates how gender intersects with class to create differentiated water vulnerabilities. Their research across three villages revealed that poorer women faced compounding disadvantages due to both gender norms and economic marginalization. This intersectional lens proves crucial for understanding water access in Palghar, where tribal women experience marginalization based on gender, tribal status, and economic position.

Understanding contemporary water relations requires situating them within India's environmental history. Gadgil and Guha's "This Fissured Land" (1992) provides essential context by tracing how colonial governance transformed indigenous resource management systems. Their distinction between "ecosystem people" and "biosphere people" offers a powerful framework for understanding how tribal communities' relationship with water resources differs fundamentally from state-centric approaches.

Reeves' analysis of colonial water management (1995) reveals how British administrative control prioritized revenue generation over sustainable local practices, establishing.

historical roots of current tensions between tribal water knowledge and state governance

The colonial emphasis on centralized control and revenue extraction created institutional patterns that continue to marginalize indigenous knowledge systems in regions like Palghar.

Radkau's global environmental history (2008) reinforces this analysis by demonstrating how modern environmental bureaucracies consistently privilege standardized technical knowledge over localized understanding. This pattern explains why tribal women's water expertise remains systematically devalued despite demonstrated effectiveness.

Recent scholarship has increasingly recognized the sophistication of indigenous water management systems. Berkes' work on traditional ecological knowledge (2012) provides a crucial framework for understanding indigenous knowledge as dynamic, adaptive systems rather than static practices. Research demonstrates how ecological knowledge develops through generations of careful observation and interaction with specific ecosystems.

In the Indian context, Gadgil and colleagues' work through the People's Biodiversity Register initiative has documented the detailed ecological knowledge of adivasi communities. Their research "New Meanings for Old Knowledge" (2000) highlights how tribal communities possess sophisticated understanding of hydrological systems, including knowledge of groundwater movement that often proves more accurate than technical assessments in Maharashtra's complex geological formations.

The edited volume by Basu and Das Gupta (2022) on "Indigenous and Local Water Knowledge, Values and Practices" provides comprehensive documentation of how indigenous communities across India develop sophisticated water management systems. Their collection demonstrates that indigenous water knowledge operates as complete governance systems incorporating both practical techniques and cultural values that promote sustainable resource use. This work proves particularly valuable for understanding how tribal women's water expertise represents not isolated skills but components of comprehensive ecological knowledge systems.

The literature on gendered water practices reveals how women's water collection responsibilities generate distinct forms of environmental knowledge. Joshi and Fawcett's ethnographic research (2005) challenges the notion that water knowledge is gender-neutral, demonstrating how daily practices create gendered epistemologies. Women's responsibility for water collection produces specific expertise regarding seasonal availability, quality variations, and management practices.

In Maharashtra specifically, Kulkarni's research (2011, 2016) documents how women's water collection labor intensifies during scarcity periods, with women spending 4-7 hours daily on water-related tasks during droughts. This intensive interaction with water resources produces sophisticated knowledge of alternative sources precisely when formal systems fail. However, existing literature reveals a gap regarding how women's hydrogeological

knowledge develops in specific geological contexts. Most studies treat women's water knowledge generically rather than examining how it adapts to particular environmental conditions like the laterite-dominated terrain of Palghar.

Despite extensive documentation of women's water knowledge, research consistently reveals their systematic exclusion from governance structures. Zwarteveen's work (2008) identifies multiple barriers including meeting timing, location, language requirements, and gendered behavioral expectations that limit women's participation in water institutions across South Asia. In Maharashtra's tribal regions, these exclusions are particularly pronounced. Sainath's reporting (2014) documents how water governance bodies remain dominated by male landowners despite policy mandates for women's representation. Even when women are formally included, they often face tokenistic participation where they are physically present but socially constrained from meaningful contribution.

The broader pattern of governance failures in tribal regions reflects deeper structural issues. Shah's analysis (2013) of Maharashtra's water governance reveals how technocratic approaches consistently marginalize traditional knowledge despite proven effectiveness. Brara's ethnographic research (2007) demonstrates how standardized water schemes ignore microclimatic variations, implementing uniform approaches that fail in diverse local conditions. Phansalkar and Kher's assessment (2006) of water interventions in Maharashtra's tribal belt reveals systematic disconnection between government programs and community needs. Their research shows how the state's emphasis on borewells disregards indigenous knowledge of spring management despite evidence that revitalized spring systems provide more sustainable water access in laterite formations.

Climate change research increasingly recognizes how environmental shifts particularly affect communities dependent on fragmented water sources. Mosse's recent work (2020) demonstrates how climate destabilization creates new uncertainties in seasonal availability patterns for such communities. Lahiri-Dutt and Samanta's research (2013) reveals how women's environmental observations frequently provide early warning of changing water availability patterns. Their documentation of how women detect changes in soil moisture, plant flowering, and insect behavior months before these become apparent through conventional monitoring suggests sophisticated ecological knowledge systems.

The IPCC's Fifth Assessment Report specifically identifies tribal communities in semi-arid regions like northern Maharashtra as facing heightened climate vulnerability (Revi et al., 2014). The analysis emphasizes how climate adaptation requirements intensify existing resource pressures, particularly affecting women's water collection responsibilities.

Although there is substantial scholarship on women’s water knowledge in general, few studies focus on the specific hydrogeological expertise of tribal women living in laterite-dominated regions. Second, much of the existing literature tends to treat indigenous water knowledge as culturally or symbolically bounded, without adequately examining how it responds to particular geological and hydrological conditions. In contrast, research in

Palghar shows that tribal women develop highly localized and technical understandings of laterite formations, fragmented aquifer systems, and seasonal spring dynamics. These forms of knowledge differ significantly from both male-centered perspectives and formal technical assessments.

Finally, women's labor and expertise in this domain continue to be largely unrecognized and excluded from decision-making processes. By focusing on the specific content and context of tribal women's hydrogeological knowledge in Palghar, research contributes to understanding gendered water expertise while identifying practical possibilities for more equitable and effective water governance in climatically vulnerable tribal regions. This approach builds on existing scholarship while addressing crucial gaps in understanding how gendered indigenous knowledge operates within specific environmental contexts.

RESEARCH METHODOLOGY

To study the Feminist political ecology of water crisis in Palghar, Maharashtra, the research employs various ethnographic research methods, which ensures an in-depth understanding of their social, economical, cultural and economic landscape.

PARTICIPANT OBSERVATION

This research employs extensive participant observation as the primary methodological approach, involving direct accompaniment of tribal women during their daily water collection routines across selected villages in Palghar district. The researchers will spend sustained periods observing and participating in water-related activities during critical time periods, particularly early morning hours (5-7 AM) and evening sessions (4-6 PM) when water collection typically occurs. This immersive approach enables documentation of women's embodied knowledge regarding seasonal water availability, quality assessment techniques, and traditional management practices that emerge through their intensive daily interaction with local water sources. Participant observation extends beyond mere water collection to include household water storage, treatment processes, and conservation strategies, providing comprehensive understanding of gendered water management systems. The method allows for real-time documentation of women's sophisticated use of bioindicators such as specific plant flowering patterns, insect behavior, and soil moisture conditions to predict water availability and quality variations. Through sustained observation, the research captures the social dynamics surrounding water access, including negotiations over tanker water distribution, community discussions about water scarcity, and informal knowledge sharing among women during collection activities.

IN-DEPTH INTERVIEWS

In-depth interviews with tribal women employ semi-structured methodology to document their life experiences with water scarcity and development of their indigenous ecological knowledge over time (Kallio et al., 2016). This methodology enables the collection of detailed, targeted data while maintaining flexibility to explore emerging issues during the interview process. The study conducts life history interviews with tribal women to capture their lived experiences of water scarcity and document how their understanding of local hydrogeological conditions has evolved through daily water management responsibilities. These interviews employ open-ended questioning techniques to explore how women's knowledge regarding underground aquifer behavior, seasonal spring patterns, and traditional water conservation techniques has been refined through generational transmission. The life history approach enables participants to narrate their experiences chronologically, revealing how water access patterns have changed due to climate variability, infrastructure failures, and governance interventions (Jamshed, 2014). Additional key informant interviews with village leaders, water committee members, government officials, and NGO representatives provide institutional perspectives on water governance processes while revealing mechanisms through which women's knowledge and participation are systematically excluded from formal decision-making structures. These interviews are conducted in Marathi and local tribal dialects with support from trained interpreters who understand cultural nuances and can facilitate communication that respects indigenous knowledge frameworks.

FOCUS GROUP DISCUSSIONS

Focus group discussions with 5-6 women's groups utilize participatory techniques to enable collective knowledge sharing while overcoming individual interview limitations in documenting community-level water management practices. These sessions employ visual mapping exercises where women collaboratively document seasonal water sources, quality variations, and traditional management indicators using locally relevant symbols and terminology. The group setting facilitates discussion of shared experiences while allowing individual women to contribute specialized knowledge based on their specific roles and responsibilities within household water management systems. Focus groups incorporate the construction of daily activity charts that document time allocation for water-related tasks, revealing the intensive labor women invest in collection, treatment, storage, and conservation activities. These participatory exercises enable women to share knowledge using their own cultural frameworks rather than responding to researcher-imposed categories, ensuring that indigenous knowledge systems are documented authentically. The group discussions also explore collective experiences of exclusion from formal governance processes, examining how social norms, meeting structures, and technical language create barriers to women's meaningful participation in water-related decision-making forums.

INSTITUTIONAL ETHNOGRAPHY

The methodology incorporates systematic observation of formal governance structures

including village water committee meetings, tanker distribution processes, and interactions between community members and government officials. This institutional ethnography documents how formal water governance operates in practice, revealing the disconnect between official policies promoting women's participation and actual decision-making processes that marginalize their knowledge and priorities.

The research observes Gram Panchayat water committee meetings to analyze participation patterns, decision-making procedures, and the extent to which women's perspectives are incorporated into water management planning. Observation of tanker water distribution provides insight into how state interventions operate independently of women's knowledge regarding optimal timing, locations, and community needs. The institutional component includes interviews with government officials responsible for water allocation decisions, examining their assessment criteria and the extent to which they consider local ecological knowledge in planning processes. This method reveals the structural barriers that prevent

integration of women's sophisticated understanding of local water conditions into formal governance frameworks.

PARTICIPATORY MAPPING

The research employs community mapping exercises facilitated by women participants to document their comprehensive knowledge of local water resources, seasonal variations, and traditional management systems. These mapping sessions enable women to visually represent their cognitive maps of water collection points, quality variations, and sustainability thresholds for different sources throughout the seasonal cycle. Participatory mapping captures women's sophisticated understanding of how water sources interconnect across the landscape and their knowledge of recharge patterns that influence long-term availability. The exercises document traditional conservation structures maintained by women, including percolation pits, vegetation barriers around springs, and seasonal rotation systems that ensure sustainable use of multiple water sources. The mapping process reveals the spatial dimensions of women's water knowledge while demonstrating the complexity of their resource management systems that operate parallel to but remain unrecognized by official water governance institutions.

POSITIONALITY AND REFLEXIVITY

Our positionality in this study is influenced by a desire to comprehend tribal women's lived experiences and indigenous ecological knowledge from their perspectives, while acknowledging our status as outside observers. Reflexivity involves critically analyzing how our backgrounds, assumptions, and research procedures affect the interpretation of data, ensuring that conclusions are co-constructed with participants rather than imposed (Zahrádková, n.d.). This approach deliberately rejects the conventional notion of objectivity as neutrality and the absence of bias—a conception that envisions the ideal researcher as detached from the external reality under study, where personal identity and beliefs are deemed irrelevant to observation and discovery. Haraway (1988) argues that defining objectivity as neutral and separate from the subject of study is itself an expression of power, challenging the myth of the disembodied, objective observer.

CONSENT AND ETHICAL CONSIDERATIONS

To ensure the rights and welfare of the participants, this research upholds strict ethical principles. Before partaking, participants will be well informed about the research objectives, methodology and how their data will be used. They will have the option to draw back from the research at any time. Participants will receive written informed consent, to ensure that they understand use of their data and their right to privacy. To protect their privacy and confidentiality their identities will be kept private. Following procedures are intended to build trust, respect and fairness, resulting in a safe and ethical research environment.

QUESTIONNAIRE

SECTION A: BASIC DEMOGRAPHIC INFORMATION

1. Personal Details
   - Name (optional/pseudonym): _____
   - Age: _____
   - Village: _____
   - Marital Status: _____
   - Number of children: _____
   - Education level: _____
   - Primary occupation: _____

2. Household Composition
   - Total household members: _____
   - Number of women: _____ Men: _____
   - Who is the primary decision-maker for water-related matters?

SECTION B: DAILY WATER PRACTICES & GENDERED LABOR

3. Daily Water Collection
   - How many hours do you spend daily on water-related activities? _____
   - What time do you typically start water collection? _____
   - How many trips do you make for water collection per day? _____
   - What is the average distance to your primary water source? _____
   - Who else in your household participates in water collection?

4. Water Sources & Seasonal Variations
   - What are your primary water sources? (Rank in order of preference)
     - Well [ ] Borewell [ ] Spring [ ] Tanker [ ] Stream [ ] Other: _____
   - Which sources do you use during different seasons?
     - Monsoon: _____
     - Winter: _____
     - Summer: _____
   - How has water availability changed over the past 5 years?

5. Water Quality & Treatment
   - How do you assess water quality before collection?
   - What methods do you use to treat/purify water at home?
   - Have you noticed changes in water taste, color, or smell over time?

SECTION C: INDIGENOUS ECOLOGICAL KNOWLEDGE

6. Traditional Water Prediction Methods
   - Do you use any natural indicators to predict water availability?
     - Plant flowering patterns [ ] Insect behavior [ ] Soil conditions
     - Animal behavior [ ] Weather patterns [ ] Other: _____
   - Can you describe 2-3 specific examples of these indicators?

7. Knowledge Transmission
   - How did you learn about water management practices?
   - What knowledge do you share with your daughters about water?
   - Are there practices you follow that men in your community don't know about?

SECTION D: WATER SCARCITY EXPERIENCES

8. Scarcity Impact
   - During water scarcity, how do your daily activities change?
   - What activities do you have to reduce or stop due to water shortage?
   - How does water scarcity affect your health and that of your family?

9. Coping Strategies
   - What do you do when your usual water sources dry up?
   - How do you prioritize water use during shortages?
   - Do you have alternative water sources that others don't know about?

10. Tanker Water System
    - How frequently do tankers come to your village?
    - At what time do they usually arrive?
    - How is tanker water distributed in your community?7. Water Conservation Practices
    - What traditional water conservation methods do you practice?
    - Are there specific plants/trees you maintain around water sources? Why?
    - How do you manage water storage during scarcity periods?
    - What water-saving techniques have you learned from your mother/grandmother?

LIMITATIONS OF THE STUDY

This study acknowledges several key limitations that affect its scope and findings. The research doesn't fully represent all women's experiences within the communities, particularly missing perspectives from elderly women, adolescent girls, and women from varying socio-economic backgrounds. It also may not adequately capture experiences of women marginalized by age, disability, or marital status. Additionally, the study lacks the specialized knowledge needed for comprehensive technical assessments of water infrastructure, including detailed evaluations of borewell systems, solar mechanisms, pipelines, and water quality testing, which limits the analysis of existing water supply systems and proposed solutions.

The research also has limited insight into complex government processes, budget allocation, and inter-departmental coordination that affect water policy implementation, particularly regarding the Jal Jeevan Mission. Restricted access to administrative data constrains the evaluation of policy effectiveness and resource utilization patterns. Furthermore, the study focuses solely on tribal communities in Palghar district without comparative analysis across other regions, ethnic groups, or governance models. This limitation may restrict the identification of best practices or alternative approaches that have proven successful in comparable contexts.

KEY FINDINGS AND ANALYSIS

1. Paradox of knowledge and Exclusion

The research reveals that tribal women in Palghar district possess sophisticated ecological knowledge systems that remain systematically marginalized in formal water governance structures. Women utilize complex bioindicators including specific flowering patterns, insect behavior, and soil conditions to predict water availability. This knowledge extends beyond location identification to encompass sophisticated understanding of recharge rates, water quality variations, and sustainability thresholds for each source. Women maintain cognitive maps of hundreds of potential collection points that shift with rainfall patterns, demonstrating an adaptive knowledge system refined through generations of direct interaction with the region's laterite-dominated terrain. A fundamental paradox emerges wherein women accumulate extensive ecological knowledge through their daily water management responsibilities while simultaneously being excluded from formal governance processes due to these same responsibilities.

2. Structural Inequalities in Water Access

The research documents severe structural inequalities in water access across tribal communities. Women travel between 1.5 to 3 kilometers daily for water collection, with journeys beginning before dawn (5:30 AM) and extending late into the night during severe shortage periods. The physical and temporal demands of water procurement create cascading effects on women's health, with consistently low hemoglobin levels,

complications during childbirth, and inadequate menstrual hygiene management due to time constraints and work demands.

3. Institutional Failures and Governance Gaps

Despite policy frameworks like the Jal Jeevan Mission promising universal water access, significant implementation gaps persist. In villages like Brahmangaon, while all 180 households are theoretically covered under Har Ghar Jal, actual delivery occurs only on alternate days with frequent disruptions extending to four or five days without supply. The dependency on electricity for water pumping creates additional vulnerability, as power outages directly translate to water shortages.

5. Women's Collective Agency and Political Mobilization

The research identifies remarkable examples of women's collective agency in addressing water governance challenges. In Saturali village, two years of continuous petitioning secured water tanker services, while in Himmbatpada, women raised INR 60,000 through collective savings to replace a stolen water pump motor. Women-led water committees have emerged as significant institutional innovations, creating formal mechanisms for developing solutions while maintaining direct communication channels with panchayats.

6. Resource Appropriation and Development Politics

A striking paradox emerges where water-abundant regions experience chronic scarcity due to political and economic priorities. The proximity of Madhya Vaitarna dam (3 kilometers from Kiniste village) illustrates this cruel irony, as water resources are channeled toward urban centers like Mumbai for electricity generation and municipal supply, while local communities face acute shortages. This reflects broader patterns of development-induced displacement and resource appropriation affecting indigenous and tribal communities.

7. Health and Sanitation Implications

Chronic water scarcity creates severe health implications, particularly for women who bear primary responsibility for water-related activities. Regular health assessments reveal consistently low hemoglobin levels among women, contributing to complications during childbirth and general weakness. Water quality concerns are evident, with contaminated well water and absence of Total Coliform testing facilities resulting in widespread health issues including fever and gastrointestinal problems.

ORAL NARRATIVES

"The 2024 Gender Snapshot report highlights that climate change could force up to 158 million additional women and girls into poverty by 2050, which is 16 million more than men and boys. Even now, 47.8 million more women than men are affected by hunger and food insecurity."
- (UN Women, 2025)

When one searches for "water scarcity" on the internet, the search results consistently display images of women and children—a pattern that reflects the reality of who bears the greatest burden of the global water crisis. The global water crisis disproportionately affects women and marginalized communities, with women of different ages primarily responsible for the use and management of water resources, sanitation and health at the household level. This gendered impact is particularly pronounced in indigenous communities, where indigenous women play a significant and fundamental role in water resource protection and are considered the primary holders of water knowledge.

"Women are the ones to face and respond to the effects of climate change, but their role is not understood, much less made visible," says Miriam Jemio, an environmental journalist from Bolivia. In many regions, women bear a disproportionate responsibility for securing food, water and fuel for their families. When these resources become scarce due to the changing climate, women must work harder and travel farther. This also puts added pressure on girls, who sometimes have to leave school to help their mothers manage the increased burden.

Capitalist economy is not just about economics, it is structured around patriarchy. Maria Mies's phrase "women are the last colony" encapsulates her theory of capitalist patriarchy, which argues that women in both the Global North and South are exploited under a system where their labor and bodies are seen as resources to be exploited, much like the exploitation of colonized populations. The sexuality of women is intertwined with the developmental paradigm like Dams and the tanker system. 80%-90% of labour associated with agriculture and water collection in rural areas is done by women of the family. However their work is invisibilized, women's reproductive, agricultural and domestic work labour is seen as an intrinsic value. This is majorly a construct of patriarchal society which sees this as a fixated role. Intersecting structures of patriarchy, caste, and class make it very difficult for women to own resources like water, to successfully navigate markets or obtain state support. We cannot understand the problem of water scarcity with existing concepts. Doing justice to the experiences and struggles of these women requires critical rethinking of water scarcity as a socio-ecologically produced condition. Doing this hinges on the interrogation of a wider range of interconnected binaries that continue to inform both popular and theoretical ways of making sense of the relationship between nature-culture, emotion and rationality and control and care.

The feminist ecological perspective does this by revaluing everything that is seen to belong to the feminine side of the equation, which has often continued to be seen as less valuable in dominant theorization or continuously sitting outside of what needs to be explained. Feminist political ecology sets off projects and conversations that combine desire to expose and challenge the masculinist and patriarchal characteristics of the prevailing ways of organising and understanding society-nature relations with creative investments in the formulations and promotion of more just and ecologically sustainable alternatives.

The exploitation and subordination of women must be recognized as a distinct political issue, separate from but interconnected with the marginalization of other communities. This distinction is crucial for developing effective political positions that address women's specific experiences of oppression. Central to this analysis is the assertion of women's rights over entitlements and resources, particularly in relation to water, and commons, where women often attach unique meanings and have specialized knowledge systems.

There are theorizations around essentializing women or instrumentalism of why women should be carrying the burden of regenerating the environment. This requires asserting women's rights not as a justification for additional burdens, but as recognition of their agency, knowledge, and entitlement to equitable resource access and decision-making power in environmental governance. Our research in Mokhada and Jawhar talukas of Palghar District illustrates this through oral narratives from the tribal population in the region.

The population of Palghar district is predominantly engaged in agricultural activities during the monsoon period from June to October. However, the region experiences significant seasonal out-migration following the agricultural season due to acute water scarcity and inadequate irrigation facilities. This cyclical migration pattern compels rural

inhabitants to seek employment opportunities in nearby urban centers, where they participate in daily wage labor to sustain their livelihoods during the dry months. The severity of the water crisis is reflected in local perceptions, with residents noting that "पालघर जिल्हा पाणी पिकावण्यासाठी प्रसिद्ध आहे" (Palghar district ironically suffers water scarcity despite being a major water supplier to neighboring regions). Notably, the district lacks private water resources, with all water sources including borewells and village wells remaining under government ownership and subject to state requisition when required. This institutional framework of water resource management further constraints local autonomy over water access and contributes to the persistent challenges faced by agricultural communities in securing reliable water supplies for both domestic and irrigation purposes.

Villages in Mokhada taluka reveal the complex intersections of water scarcity, gender, and development politics in rural Maharashtra. Kiniste, one of twenty-six gram panchayats in the taluka with a predominantly Mahadev Koli population, exemplifies the multifaceted challenges surrounding water access in marginalized communities. The village's water crisis has been partially addressed through collective women's advocacy that secured tanker services three years ago, followed by pipeline installation under the Jal Jeevan Mission, yet these interventions remain insufficient for comprehensive water security.

The lived experiences of water scarcity reveal both immediate dangers and systemic inequalities. Personal accounts of near-drowning incidents during water collection and physical altercations in queues illustrate the bodily risks women face in their daily water procurement activities. The current pipeline system, while providing drinking water, necessitates continued long-distance travel for other essential activities such as washing clothes, demonstrating the inadequacy of partial solutions to address the full spectrum of water needs.

The Middle Vaitarna Dam, officially named after Shiv Sena founder Bal Thackeray, is an important water supply project for Mumbai. While the dam was built to address Mumbai's increasing water needs, its implementation and operation have resulted in significant harm to the local environment and communities, including the submergence of land and forests, inadequate rehabilitation of displaced families, and dangers posed by un-warned water releases.

The proximity of the Madhya Vaitarna dam, located merely three kilometers from the village, starkly illustrates what the 82-year-old Ajoba Koli describes as, "पाणी आमच्या उशाशी, कोरड आमच्या घशाशी" (Though water lies close to our pillows, our throats remain parched). This metaphor encapsulates the cruel irony of water abundance existing alongside acute scarcity due to political and economic priorities that channel resources toward urban centers like Mumbai for electricity generation and municipal supply. The unfulfilled promises made during dam construction, where villagers provided signatures based on assurances of water access, represent a broader pattern of development-induced displacement and resource appropriation affecting indigenous and tribal communities.

Environmental degradation accompanying dam construction has compounded local vulnerabilities through deforestation, biodiversity loss, soil erosion, and systematic landscape destruction. These ecological impacts intersect with social inequities to create layered disadvantages for already marginalized populations. Villagers' proposals for alternative solutions, such as pipeline connections to the Gargai River five kilometers away, suggest locally informed approaches that could address both domestic and agricultural water needs more comprehensively than existing government schemes.

Gender dimensions of water scarcity reveal particularly concerning patterns of embodied inequality. Women's lack of awareness regarding health impacts of water-related labor, combined with inadequate menstrual hygiene management due to time constraints and work demands, demonstrates how structural inequalities manifest in intimate bodily experiences. The requirement that menstruating women continue all household labor

except cooking while using the same cloth throughout their cycles due to work obligations illustrates how gender-based restrictions intersect with material deprivation to compound women's vulnerability.

The gendered division of labor surrounding water collection involves women and young girls as primary actors, with occasional assistance from younger male children but persistent exclusion of adult men from these responsibilities. This pattern begins early, with girls as young as five or six years accompanying mothers for water collection, suggesting the intergenerational reproduction of gendered water responsibilities. During acute shortages, households implement prioritization systems that maintain essential functions like cooking and drinking while sacrificing other water-dependent activities including bathing, laundry, and plant watering.

Sanitation challenges further amalgamate these difficulties, with women identifying improved water supply as fundamental to addressing hygiene and health concerns. The village water committee, despite formal gender parity with ten members, reflects broader patterns of women's political marginalization, as female members rarely participate actively in decision-making processes. This institutional dynamic exemplifies how formal inclusion may coexist with substantive exclusion, limiting women's ability to influence water governance despite bearing primary responsibility for water management at the household level.

The case of Kiniste demonstrates how contemporary water crises in rural India emerge from complex interactions between environmental degradation, development policies prioritizing urban and industrial interests, inadequate infrastructure provision, and deeply embedded gender inequalities. While community organizing has achieved incremental improvements, the persistence of water insecurity alongside nearby abundance reveals the fundamentally political nature of resource distribution and the need for more comprehensive approaches that address both material infrastructure and social equity concerns.

In the village of Khoch, comprising 150 households, women bear the disproportionate burden of water collection, traveling 2.5 kilometers daily to access this essential resource. The villagers articulate their predicament succinctly: "आमचा पूर्ण दिवस पाणी मधेच जातो" (our entire day is spent on water related activities), describing how water procurement becomes the primary activity that structures their daily existence. Women must wake before dawn, often departing at 5:30 AM to collect water from distant springs (वळती) before attending to other household responsibilities. This gendered division of labor is reflected in local sentiments: "आमच्या पुरुषांना फक्त पाणी खर्च करायला येतं, जर त्यांना रोज घागरीत पाणी आणावं लागलं तर त्यांना कळेल" (Our men only know how to use water carelessly; if they had to carry heavy pots of water every day, they would truly understand its value).

The village experiences distinct seasonal variations in water availability that create a cyclical pattern of scarcity and relative abundance. During the monsoon season, residents rely on traditional water harvesting methods, collecting water from 'Gandhi Pul' on the local river and utilizing indigenous pond systems that provide adequate supplies. However,

as winter approaches, the pre-shortage phase begins with springs gradually drying up, culminating in extreme water stress during the summer months of March and April. This seasonal variability forces communities to adopt increasingly desperate measures, including sleeping near wells overnight to secure even a single pot of water when spring flow becomes minimal.

Woman in Khoch village carries water pots and travels two kilometers daily to fetch water, embodying the silent labor that sustains her families' water requirements.

Despite government intervention through the Jal Jeevan Mission, which installed pipeline infrastructure throughout the village, the implementation remains largely ineffective. While every household has been equipped with taps, these serve primarily as decorative fixtures, as only one of the five installed pipelines functions properly. The existing well water is heavily contaminated with sediment, and the absence of Total Coliform (TCL) testing facilities means residents consume water of questionable quality without proper monitoring. This contamination has resulted in widespread health issues, particularly affecting women who are most exposed to water-related activities, with common ailments including fever and gastrointestinal problems.

The water crisis extends beyond immediate consumption needs, significantly impacting agricultural productivity and food security. Crop yields remain minimal and are primarily reserved for subsistence consumption rather than market sale, reflecting the broader economic constraints imposed by water scarcity. The region has experienced severe drought conditions that have led to crop failures and subsequent hunger issues, demonstrating the interconnected nature of water security and food sovereignty.

Community members have developed indigenous knowledge systems and adaptive strategies to cope with these challenges. They construct separate filtration ponds near rivers to harvest drinking water using cloth filters and traditional straining methods (channi) to improve water quality. Seasonal taste variations reflect the changing water quality, with summer water described as particularly unpalatable due to its concentrated nature, while monsoon water carries excessive sediment. The use of traditional water-finding techniques, such as coconut divination (This involves holding a coconut with the pointed tip upward and the broader bottom resting on the palm. Practitioners believe the coconut tip will turn or point toward directions where underground water is available. This follows the general principle of dowsing, which refers to using various devices like forked sticks, rods, pendulums, or similar objects to locate underground water, minerals, or other hidden substances) for locating underground water sources in agricultural fields, demonstrates the persistence of local ecological knowledge in addressing contemporary challenges.

The absence of institutional support is evident in women's lack of awareness regarding water management committees (samitis) designed to address these issues, indicating a disconnect between formal governance structures and community-level participation. Residents have articulated specific solutions to their water crisis, emphasizing the need for functional pipeline systems that would reduce the physical labor associated with water collection, accountable governance mechanisms, utilization of nearby dam resources, and implementation of integrated filtration systems to address health concerns. These demands reflect a sophisticated understanding of both immediate needs and systemic requirements for sustainable water security in their community.

The case of Saturali village in Mokhada presents a compelling example of how persistent community advocacy can catalyze transformative changes in water access and governance structures. After two years of continuous petitioning to the panchayat, the village successfully secured a water tanker, marking a significant turning point in addressing their water scarcity

challenges. This achievement demonstrates the power of sustained collective action in rural water management.

The water procurement system in Saturali reveals both the ongoing challenges and emerging solutions in rural water access. Currently, residents purchase 2000 liters of water for 250 rupees, indicating a monetized water economy that, while costly, provides more reliable access than previous arrangements. The improved water availability has generated substantial time savings for women, who traditionally bore the primary responsibility for water collection. This has created new opportunities for women to explore alternative employment prospects, suggesting that water security serves as a foundation for broader economic empowerment in the region.

Indigenous knowledge systems continue to play a vital role in water resource management within the community. Intergenerational knowledge transfer remains robust, with grandmothers passing down traditional water-finding techniques to their daughters. One particularly notable practice involves using auditory cues from insects to locate natural springs, demonstrating how local ecological knowledge complements formal water supply systems.

The establishment of the Pani Purvatha Samiti represents a significant institutional innovation in local water governance. This women-led water committee serves as a formal mechanism for developing solutions to water scarcity while maintaining direct communication channels with the panchayat. The committee's existence institutionalizes

women's voices in water management decisions, creating a platform for ongoing advocacy and problem-solving. Through their participation in self-help groups and the water committee, women have gained what they describe as a sense of independence, suggesting that water governance has become a pathway to broader social and political empowerment.

The transformative impact of *Saturali's* approach extends beyond the village boundaries, inspiring similar initiatives in neighboring communities. Other villages are beginning to recognize the effectiveness of women-centered water management, leading to demands for greater female participation in water governance structures. Women's critique of existing power structures raises important questions about the logic of water governance. Their argument that those who do not engage in water-related labor should not hold decision-making authority over water management reflects a broader challenge to traditional patriarchal structures in rural governance. This position suggests that expertise and responsibility should align with authority, proposing a more democratic and practical approach to resource management that recognizes the gendered nature of water-related work.

The *Saturali* experience illustrates how enhanced sanitation facilities, reduced time burdens, expanded economic opportunities, and strengthened collective action capabilities all emerge from the foundation of improved water security. This interconnectedness suggests that water interventions should be understood not merely as technical solutions but as catalysts for broader social and economic transformation in rural communities.

The women of *Himbatpada* village in the Mokhada cluster of Grampanchayat Chas exemplify remarkable collective agency in addressing rural water scarcity and governance challenges. Through the establishment of a borewell system powered by solar energy and equipped with filtration mechanisms, the village now has water availability from 7am to 10am daily, with a 5000-liter tanker capacity that, while adequate for most periods, still presents challenges during summer months.

The community's resilience became particularly evident when their water pump motor was stolen. Rather than waiting for external assistance, the women collectively mobilized resources, raising INR 60,000 through their monthly savings scheme called "*Nalpani*," where each member contributes INR 50 to a shared bank account. This initiative, supported by *Pragati Pratishthan*, demonstrates their commitment to self-reliance and community-driven development. The water management system operates under the leadership of women representatives, with *Manisha* serving as Chairman and *Vandana* as Secretary, overseeing a 24-member committee that ensures democratic participation in decision-making processes.

Beyond water management, these women have demonstrated exceptional political engagement and advocacy skills. When a promised village bridge remained unbuilt despite funds being allocated, the women took direct action by visiting the ministry

department to raise their concerns. Their intervention proved remarkably effective, with construction vehicles arriving the very next morning to begin bridge construction. This bold initiative has earned them recognition throughout the district, with local observers noting that while elected MLAs had not yet approached the ministry on such issues, these rural women had successfully navigated bureaucratic channels to secure essential infrastructure for their community.

However, despite their organizational successes, the village continues to grapple with structural economic challenges that perpetuate seasonal migration patterns. The community's agricultural calendar extends until Diwali, after which decreasing water availability necessitates migration for alternative livelihood opportunities. Water scarcity not only limits agricultural productivity but also threatens crop survival, particularly for traditional crops like *Nagali (Finger Millet)*, which may either fail due to insufficient irrigation or be destroyed by excessive rainfall. The economic vulnerability is further exacerbated by inadequate wages under the MGNREGA scheme, where workers receive only INR 200 per day, accumulating to merely INR 2400 over a 12-day work period. This insufficient income, combined with the seasonal nature of agricultural work and unpredictable crop yields, compels families to migrate despite their strong community bonds and successful local governance initiatives, highlighting the complex tension

Women collecting water at a community well in Brahamangaon village, Palghar district, Maharashtra.

between local agency and broader structural limitations that continue to shape rural livelihoods in contemporary India.

Brahmangaon village in Mokhada taluka comprises 180 households, all of which are theoretically covered under the Jal-Jivan mission's Har Ghar Jal initiative. However, the reality on the ground reveals significant gaps between policy objectives and actual water access. While the mission promises water to every household, the actual delivery occurs only on alternate days, with frequent disruptions extending to four or five days without supply. The dependency on electricity for water pumping creates an additional layer of vulnerability, as power outages directly translate to water shortages. This unreliable supply necessitates a daily ritual that has remained largely unchanged across generations. The women's daily routine begins before dawn, typically between 5:30 and 6:00 AM, with water collection taking priority over all other activities. This task involves a challenging 3-kilometer trek up a small mountain to reach the community well. When this primary source fails, women must extend their journey by an additional 2-3 kilometers to the nearest river for washing clothes and other water-intensive activities.

The intergenerational continuity of water-related hardships becomes evident through oral narratives shared by older community members. Previous generations recall walking 4-5 kilometers daily for drinking water, accompanied by bulls and oxen to transport larger quantities. The traditional practice of carrying three to four water pots on their heads while washing clothes in distant ponds required extensive physical labor. Despite decades of development initiatives, the fundamental challenge of water access remains largely unchanged, with only marginal improvements in distance and infrastructure.

Agricultural practices in the region follow a distinct seasonal pattern, with farming activities concentrated during the four-month period from June to October. The primary crops include *rice*, *vari*, and *nagali,* cultivated using traditional methods such as Bhujani, Perani, and Lavani. Modern inputs are limited, with urea being used exclusively for rice cultivation. However, agricultural productivity remains constrained by multiple factors, like the rocky subsoil composition, soil degradation from continuous cultivation, and erosion that makes it unsuitable for cultivation. Climate variability adds another dimension of uncertainty to agricultural outcomes. Irregular rainfall patterns, whether premature or delayed, create conditions conducive to crop diseases and failure. These environmental challenges, combined with poor soil quality, result in consistently low agricultural yields that fail to provide adequate economic security for farming families.

The post-harvest period presents significant employment challenges, as the four-month (June to September) agricultural cycle leaves families without primary income sources for the majority of the year. This economic gap necessitates seasonal labor migration, with women and members of larger families moving to urban centers for wage labor. Those women who remain in the village assume responsibility for household management, childcare, and livestock maintenance.

Water scarcity intensifies dramatically during the dry months following October, when

both rivers and wells begin to diminish. This period of acute shortage extends until the end of May, creating nearly eight months of water stress. The community has established a water management committee through Pragati Pratishthan, led by women, which conducts monthly meetings and has facilitated the construction of an additional well. However, this supplementary source also experiences seasonal depletion, limiting its effectiveness during critical shortage periods. The health implications of chronic water scarcity and the associated physical demands are evident in the community's health profile. Regular health assessments reveal consistently low hemoglobin levels among women, contributing to complications during childbirth, general weakness, and poor menstrual health (National Family Health Survey [NFHS-5], 2021). These health challenges are compounded by the extreme physical exertion required for water collection, which can extend late into the night or even past midnight during severe shortage periods.

During peak scarcity, water collection becomes an all-consuming activity that reorganizes entire daily schedules and family responsibilities. As community members explain, "सगळ्याचं गोष्टींना पाणी लागतं" (Everything needs water), encompassing drinking, cooking, washing, and livestock care. The intensity of this need overrides other considerations, including personal comfort and safety, as women prioritize water procurement regardless of heat or time constraints. Water storage strategies reflect the community's adaptive responses to irregular supply patterns. Households utilize various containers including traditional pipadas (blue plastic drums) and every available vessel within homes to maximize storage capacity during periods of availability. This comprehensive approach to water storage demonstrates both the severity of scarcity and the ingenuity of community-level adaptation strategies.

cThe daily struggle with water access creates an emotional and psychological burden that women encapsulate in the phrase "रोजचं दुखत: कोणाला सांगायचं?" (It hurts every day, but who is there to tell?). This expression reflects not only the physical hardships but also the sense of isolation and systemic neglect experienced by rural communities facing persistent infrastructure challenges. Community recommendations for addressing these challenges focus on both immediate improvements and longer-term structural changes. The primary request involves regularizing the existing daily water supply to ensure at least one hour of consistent delivery, eliminating the current unpredictability that creates chaos and places undue burden on households. Recognition of the village's size as a contributing factor to distribution challenges suggests the need for expanded infrastructure capacity.

The community has identified potential solutions including access to water from the Nashik Vaitarna upper dam system, which could provide a more reliable source for their expanding population. Additionally, they emphasize the need for agricultural support during non-monsoon periods, enabling cultivation of crops and vegetables throughout the year. This diversification could address both food security and income generation challenges while reducing the economic pressures that drive seasonal migration. The situation in *Brahmangaon* village shows that while policy frameworks like the Jal-Jivan mission represent important commitments to universal water access, the implementation gaps and infrastructure limitations continue to perpetuate intergenerational cycles of hardship and limitation for rural women and their communities.

Similarly, villages in Jawhar Taluka have been subject to the issue of water scarcity. *Palsin*, a village in Jawhar, is home to the Warli tribal community whose daily existence is fundamentally shaped by water accessibility and seasonal agricultural cycles. The daily routine of women in Palsin revolves around water collection, which constitutes the primary organizing principle of household activities. The day begins with fetching drinking water from nearby wells, followed by domestic chores. Subsequently, women proceed to check dams for washing clothes, return for lunch, and then collect water for utensil washing. Following these domestic responsibilities, women engage in agricultural work during the farming season (June to October) or participate in wage labor during non-agricultural months. The day concludes with another round of water collection for evening household activities, highlighting the cyclical and labor-intensive nature of water procurement.

The agricultural calendar in Palsin is structured around the Kharif cropping season from June to October, during which the community cultivates traditional crops including *udad* (black gram), *toor* (pigeon pea), *rice*, and *nachani* (finger millet). However, the region's agricultural productivity remains constrained by several factors: limited water availability prevents second cropping, insufficient technical knowledge restricts crop diversification, and low yields coupled with minimal market participation result in negligible profit margins. Raah Foundation, a Mumbai-based NGO with presence across the Western working at the nexus of people, planet and prosperity, has initiated interventions to introduce water-efficient crops such as ginger, turmeric, and chili to enable second

(cropping. Despite these efforts, the fundamental challenge of water scarcity continues to limit agricultural expansion and intensification. The seasonal nature of agriculture and water scarcity necessitates regular out-migration from Palsin. Post-harvest, community members migrate to urban centers including Mumbai, Dadra and Nagar Haveli, Nashik, and Silvasa (Gujarat) to work as daily wage laborers and agricultural workers in perennial crop cultivation. This migration pattern is so entrenched that among the village's 35 households, at least one family member from each household migrates annually for alternative employment, indicating the structural inadequacy of local livelihood opportunities.

The village's water infrastructure consists of a twice-daily supply system complemented by filtration facilities. The *Pragati Pratishthan* organization has installed solar-powered motors to address water accessibility issues. However, this system faces operational challenges during monsoon periods when solar panels cannot generate adequate energy due to cloud cover, and electricity supply irregularities further compromise the motor system's reliability.

Climate change has significantly disrupted traditional agricultural calendars and ecological indicators. Earlier farming activities commenced on *'Akshaya Tritiya'* in April, but changing weather patterns and untimely rainfall have destabilized this traditional rhythm. The community previously relied on peacock calls as natural indicators for

rainfall timing, but declining peacock populations have eroded this traditional forecasting system. Environmental degradation is evident in the premature drying of rivers and wells, with the village's Surya River experiencing reduced flow patterns. These changes underscore the vulnerability of rain-dependent agricultural systems to climate variability. Local residents of the community like elder Raju Dada (*55*), express skepticism about government assistance, characterizing it as "help on paper only." The community maintains a distinctive relationship with resource accumulation, with locals explaining their traditional disinclination toward long-term resource collection and saving. This approach reflects what they describe as a non-capitalistic mindset oriented toward living "in harmony with nature." This is reflective of the synergy between tribal communities and their environment.

In Juni Jawhar Sita Dhodi, aged 32, begins each day by fetching water. During December and the dry months that follow, when water levels drop to critically low points, she must travel 1.5 kilometers to reach the nearest well. Her seven-year-old daughter frequently accompanies her on these water collection trips, highlighting how water scarcity affects entire families and draws children into essential household labor. Following water collection, Dhodi engages in additional domestic responsibilities and agricultural labor. Her work patterns remain consistent despite menstruation and despite experiencing deteriorating health conditions over the preceding five-year period. She continues field work while managing physical ailments and bodily weakness, driven by what she articulates as the irreplaceable nature of her care work: "If I fall sick, who will manage the home? So I carry on, caring for others even when it means ignoring my own well-being". स्वतः मी जर आजारी पडली तर घरातल सगळ कोण बघेल ? त्यामुळे माझ्याकडे न लक्ष देता त्यांच्यवर लांगत). This statement illuminates the gendered expectation of self-sacrifice inherent in care work and the absence of alternative support systems.

During monsoon periods, the family uses water purification strategies including TCL tablets and boiling methods. While a water management committee (*samiti*) operates within the panchayat governance structure, women face systematic exclusion from participatory processes and decision-making forums related to water resource management. When water levels reached critically insufficient levels in the previous year, creating village-wide access deficits, women initiated autonomous collective action. They organized independently to arrange water tanker services for the community. However, this initiative generated significant hostility from male panchayat members, who interpreted the women's actions as a challenge to their institutional authority, characterizing it as "*chugli*" (interference or inappropriate involvement). Despite the successful outcome of securing water access through the tanker arrangement, the women encountered substantial community backlash for their advocacy efforts. The negative institutional response effectively deterred women's subsequent participation in formal governance mechanisms.

Following this incident, women have avoided approaching panchayat institutions even during periods of severe water shortage, demonstrating how punitive responses to women's political participation create lasting silencing effects. Male community leaders

perceived the women's initiative as diminishing their status and influence in village-level decision-making processes. This pattern of silencing women who articulate community needs has broader implications for local governance effectiveness. The misalignment between government interventions and actual community priorities became evident when officials distributed sarees as part of a development program. Women's responses reflected frustration with symbolic rather than substantive interventions, they explicitly articulated that their needs centered on water access rather than clothing distribution. This response demonstrates women's sophisticated understanding of priority needs and highlights the inadequacy of tokenistic gestures in addressing fundamental survival challenges and infrastructure deficits.

The geographic proximity of Juni Jawhar to the administrative center of Jawhar has resulted in systematic neglect by non-governmental organizations and other institutional bodies, which prioritize more remote villages in their service delivery frameworks. This spatial disadvantage is compounded by the community's peripheral location, which excludes it from the municipal water supply network originating from Jawhar. However, recent intervention by the Raah Foundation has marked a significant shift in developmental focus toward these previously underserved areas. The foundation's targeted initiatives in borewell recharge and water conservation have been met with considerable community approval, as residents express satisfaction with the organization's commitment to addressing long standing water security challenges in their locality.

Climate change has significantly disrupted traditional agricultural timing systems in the region, undermining generations of indigenous ecological knowledge. Historically,

local farming communities relied on the phenological cycle of the gulmohar tree (Delonix regia) as a reliable indicator for monsoon onset and agricultural planning. Traditional knowledge systems indicated that rainfall would commence within 5-7 days following the full flowering of gulmohar trees, typically occurring in June, marking the optimal time for cultivation activities. However, climate change has fundamentally altered these established patterns. Contemporary observations reveal that rainfall now occurs 15-30 days after gulmohar flowering, creating substantial temporal misalignment between traditional ecological indicators and actual monsoon onset. This disruption has rendered ancestral knowledge systems, carefully developed and transmitted across generations increasingly unreliable for agricultural decision-making.

The combination of delayed and unpredictable precipitation patterns, coupled with the loss of key indicator species, represents a significant threat to traditional agricultural systems that have historically demonstrated remarkable adaptation to local environmental conditions. This disruption necessitates the integration of traditional ecological knowledge with contemporary climate data and forecasting systems to support agricultural resilience in an era of climate uncertainty.

The discourse surrounding development in rural communities reveals a fundamental disconnect between official developmental paradigms and grassroots realities, as exemplified by the situation in Mokhada and Jawhar. Local residents articulate a critique that questions the very definition of development, challenging whether current developmental initiatives serve the common people or merely benefit intermediary actors who control resource distribution and project implementation. This tension reflects a broader debate about development's true beneficiaries and raises critical questions about whose interests are prioritized in developmental planning and execution.

The community's vision of authentic development centers on four fundamental pillars: quality education through well-equipped schools, sustainable employment opportunities, accessible healthcare services, and reliable water supply.These basic necessities represent the foundation upon which genuine human development can be built, contrasting sharply with top-down developmental models that often emphasize infrastructure or economic indicators while neglecting immediate human needs. The residents' articulation of these priorities demonstrates an understanding of development as a holistic process that must address the multiple dimensions of human welfare simultaneously.

The water crisis in Mokhada tells us how developmental resources can be misappropriated despite abundant natural endowments. The region serves as the origin point for seven rivers, creating an apparent paradox where a water-rich area experiences chronic water scarcity for its inhabitants. This contradiction exposes the complex web of interests that often characterize resource management in developing regions. While water is visibly abundant throughout the landscape, the extraction and distribution mechanisms have been captured by contractors and other intermediaries who control access to this vital resource.

The irregular supply of water tankers, meant to address the community’s water needs

exemplifies the inadequacy of stopgap measures that fail to address systemic issues of resource governance. The ongoing Tansa Dam project, now in its second year of implementation, represents another layer of this developmental dysfunction. Despite substantial budget allocations for water infrastructure, the tangible benefits have yet to materialize for the local population. This situation raises serious questions about budget utilization, project management, and the role of middlemen in siphoning resources intended for community development.

The community's frustration points to a broader phenomenon where developmental budgets and projects become vehicles for rent-seeking behavior rather than genuine improvement of living conditions. The gap between policy intentions and ground-level outcomes suggests that current developmental approaches may be structurally flawed, prioritizing process over results and creating multiple opportunities for resource diversion. This systemic dysfunction perpetuates a cycle where communities rich in natural resources remain impoverished in terms of basic services, while intermediaries profit from the very programs designed to alleviate such conditions. The call for redefining development emerges from this lived experience of developmental failure. The community understands that true development must be measured not by the scale of investments or the complexity of projects, but by tangible improvements that directly impact daily life.

CONCLUSION

This research demonstrates that water scarcity in Palghar district operates as a profoundly gendered phenomenon, wherein indigenous women experience differential impacts while simultaneously possessing critical indigenous knowledge systems. It conceptualizes domestic work (water collection) as work in the complete sense of the term, positioning it as an integral socio-economic activity rather than being an archaism within it.

The findings reveal three interconnected dimensions that collectively argue for reconceptualization of water governance approaches in tribal contexts. First, the study establishes that indigenous women's water-related knowledge constitutes a sophisticated ecological information system that encompasses predictive capabilities, resource mapping, and adaptive management strategies. Their deployment of bioindicators and understanding of local aquifer dynamics represents what can be characterized as indigenous hydro-ecological expertise. Significantly, these women through their everyday labour involved in water collection are defying the biologically deterministic claims that see men as custodians of laborious tasks and associate less intensive work with women. Their physical endurance, technical expertise, and sustained engagement with complex water systems challenge conventional assumptions about gendered labour divisions and demonstrate that strength, labour, and endurance manifest differently than patriarchal frameworks suggest.

Second, the research documents systematic exclusion of this knowledge from formal water governance structures, reflecting broader patterns identified by Pinho-Gomes and Woodward (2024) regarding barriers to women's environmental leadership. This exclusion manifests through what UNESCO recognizes as the systematic appropriation of indigenous water management knowledge, wherein traditional techniques developed by tribal communities are often rebranded as modern innovations by external development actors. This not only removes credit from the communities who developed these systems but also sidelines them from participating in decisions about resource management.

The findings illuminate a significant governance disjuncture wherein women, who disproportionately bear the burden of water scarcity and thus acquire nuanced expertise regarding its multifaceted challenges and remedial strategies, are nevertheless systematically excluded from participatory governance structures and policy formulation processes. This exclusion not only reinforces systemic inequities but also compromises governance efficacy, as enhanced female participation in decision-making processes would inherently strengthen water management outcomes through their experiential knowledge and vested interest in sustainable solutions.

Third, the intensification of climate-induced water stress is evident in natural hazards, environmental degradation, and adverse effects on agriculture, biodiversity, and human health. This deepens the gendered impacts of resource scarcity and underscores the critical importance of women's adaptive knowledge. Research from low- and middle-income countries consistently shows that women play an essential role in climate adaptation, with their local knowledge and community-based practices proving vital for environmental resilience. Despite facing the harsh realities of climate change, especially the growing water crisis, these women continue with remarkable grace, resilience, and unshakable connection to the land, challenging every assumption about strength, labour, and endurance while maintaining their communities' survival.

These findings contribute to theoretical understanding by demonstrating how gender intersects with indigeneity and environmental knowledge to create specific forms of marginalization that compromise both social equity and environmental sustainability. The research reveals how water governance failures extend beyond resource management to fundamentally redefine development paradigms. When women's water expertise is recognized and centered, it transforms approaches to sanitation, healthcare, and education—core development indicators that are intrinsically linked to water access and quality. This interconnection suggests that addressing water governance through women's leadership offers pathways to more holistic and sustainable development outcomes.

From a policy perspective, the research argues for institutional reforms that operationalize the UN Women framework of feminist climate justice through its four foundational principles: recognizing women's rights, labor, and knowledge; redistributing economic resources; representing women's voices and agency; and repairing inequalities and historical injustices. Specifically, this requires establishing community-driven water governance structures that center tribal women's ecological knowledge, developing

institutional frameworks that integrate traditional water management practices with formal governance systems, and creating accountability mechanisms that ensure equitable resource distribution while protecting indigenous knowledge from appropriation.

This research explicates that water governance is fundamentally about power relations, where analyzing power dynamics offers a way of tackling the deeply political and structural nature of the inequalities dominating ownership and use of natural resources. The Feminist political ecology framework reveals how environmental problems are simultaneously social, political, and ecological, with power relations and micro-politics undermining women's participation in water governance. This approach challenges the false separation between nature and society while centering intersectional analysis of gender, indigeneity, and environmental justice. The research contributes to recent developments in feminist political ecology that emphasize "embodied vulnerability" and the need to incorporate cultural practices and physical realities into environmental risk assessments. Thus, the study concludes that addressing water scarcity in Palghar thus necessitates governance transformation that recognizes tribal women as essential knowledge custodians and decision-makers, while protecting their intellectual contributions from appropriation and ensuring their meaningful participation in resource management decisions.

REFERENCES

- Agarwal, B. (1992). *T*he gender and environment debate: Lessons from India. *Feminist Studies,* 18(1), 119-158.
- Basu, M., & Das Gupta, R. (Eds.). (2022). *Indigenous and local water knowledge, values and practices*. Routledge.
- Berkes, F. (2012). S*acred ecology* (3rd ed.). Routledge.
- Brara, R. (2007). *Shifting landscapes: The making and remaking of village commons in India*. Oxford University Press.
- Crow, B., & Sultana, F. (2002). *Gender, class and access to water: Three cases in a poor and crowded delta*. Society and Natural Resources, 15(8), 709-724.
- Gadgil, M., & Guha, R. (1992). *This fissured land: An ecological history of India*. Oxford University Press.
- Gadgil, M., Seshagiri Rao, P.R., Utkarsh, G., Pramod, P., & Chhatre, A. (2000). *New meanings for old knowledge: The people's biodiversity registers program.* Ecological Applications, 10(5), 1307-1317.
- Haraway, D. (1988). Situated knowledge: The science question in feminism and the privilege of partial perspective. *Feminist Studies*, 14(3), 575-599.
- International Institute for Population Sciences & ICF. (2021). *National Family Health Survey (NFHS-5), India, 2019–21: Maharashtra (Publication No. FR374).* Mumbai, India: IIPS / The DHS Program.
- Jamshed, S. (2014). Qualitative research method-interviewing and observation. *Journal of Basic and Clinical Pharmacy*, 5(4), 87-88.
- Joshi, D., & Fawcett, B. (2005). The role of water in an unequal social order in India. In A. Coles & T. Wallace (Eds.), *Gender, water and development* (pp. 39-56). Berg Publishers.
- Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, 72(12), 2954-2965.
- Kulkarni, S. (2011). Women and decentralised water governance: Issues, challenges and the way forward. *Economic & Political Weekly*, 46(18), 64-72.
- Kulkarni, S. (2016). Gender and water in India: A review. In V. Narain, C. Goodrich, J. Chourey, & A. Prakash (Eds.), *Globalization of water governance in South Asia* (pp. 18-35). Routledge.
- Lahiri-Dutt, K., & Samanta, G. (2013). *Dancing with the river: People and life on the chars of South Asia*. Yale University Press.
- Mosse, D. (2020). The social life of water: Culture and ecology in South India. *Current Anthropology*, 61(S21), S217-S231.
- Phansalkar, S., & Kher, V. (2006). A decade of the Maharashtra groundwater legislation: Analysis of the implementation process. *Law, Environment and Development Journal*, 2(1), 67-83.

- Pinho-Gomes, A. C., & Woodward, M. (2024). The association between gender equality and climate adaptation across the globe. BMC Public Health, 24(1), 1394. https://doi.org/10.1186/s12889-024-18880-5
- Radkau, J. (2008). Nature and power: A global history of the environment. Cambridge University Press.
- Reeves, P. (1995). Inland waters and freshwater fisheries: Some issues of control, access and conservation in colonial India. In D. Arnold & R. Guha (Eds.), Nature, culture, imperialism: Essays on the environmental history of South Asia (pp. 260-292). Oxford University Press.
- Revi, A., Satterthwaite, D. E., Aragón-Durand, F., Corfee-Morlot, J., Kiunsi, R. B. R., Pelling, M., Roberts, D. C., & Solecki, W. (2014). Urban areas. In C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, M. Chatterjee, K. L. Ebi, Y. O. Estrada, R. C. Genova, B. Girma, E. S. Kissel, A. N. Levy, S. MacCracken, P. R. Mastrandrea, & L. L. White (Eds.), *Climate change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 535-612). Cambridge University Press.
- Rocheleau, D., Thomas-Slayter, B., & Wangari, E. (Eds.). (1996). *Feminist political ecology: Global issues and local experience*. Routledge.
- Sainath, P. (2014). *Everybody loves a good drought: Stories from India's poorest districts* (20th anniversary ed.). Penguin Books.
- Shah, E. (2013). Planning and the making of a resurgent Gujarat. *Economic & Political Weekly*, 48(2), 51-60.
- TallBear, K. (2013). *Native American DNA: Tribal belonging and the false promise of genetic science*. University of Minnesota Press.
- UN Women. (2023). *Feminist climate justice: A framework for action*. https://www.unwomen.org/en/digital-library/publications/2023/11/feminist-climate-justice-a-framework-for-action
- UN Women. (2025). *How gender inequality and climate change are interconnected. UN Women – Headquarters*. https://www.unwomen.org/en/articles/explainer/how-gender-inequality-and-climate-change-are-interconnected
- Zahrádková, L. (n.d.). *Ethnographer's bias: Cultivating reflexivity*. Karolinum Press.