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Women, Water and Climate: Navigating Local Adaptation in Ladakh and Jharkhand, India.

A Thesis submitted in partial satisfaction of the
requirements for the degree of Master of Arts
in Global Studies

by

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September 2024

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September 2024

DEDICATION

In memory of Mush, my beloved dog who crossed the rainbow bridge at the start of this master's journey, leaving behind a legacy of unconditional love.

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ABSTRACT

Women, Water and Climate: Navigating Local Adaptation in Ladakh and Jharkhand, India.

by

Ishleen Kaur

Climate change significantly impacts water resources globally, posing unique challenges in diverse regions such as Ladakh and Jharkhand, India. This thesis examines the effects of climate change on water availability and distribution, focusing on community resilience and gender dynamics in these areas. Through qualitative research methods, including interviews, focus groups, and participatory observations, the study reveals how local communities, especially women, adapt to and manage these changes. Findings indicate that despite differing social structures—matrilineal in Ladakh and patrilineal in Jharkhand—women face similar challenges in water governance. They employ innovative adaptation strategies yet remain underrepresented in decision-making processes.

This research underscores the need for inclusive policies that enhance women’s participation in water management to strengthen community resilience against climate change. A key point of exploration is the link between local knowledge and macro policies, highlighting that the local people understand their solutions as deeply as they understand their problems. Women are the key agents of this knowledge, and this thesis explores these nuances through their stories, told by them, lived by them. The study advocates for context-specific policies that incorporate indigenous knowledge, demonstrating that integrating local insights with broader

policy frameworks is crucial for effective climate resilience strategies adaptation strategies yet remain underrepresented in decision-making process

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LIST OF ABBREVIATIONS

FPE – Feminist Political Ecology

JIPCC - Intergovernmental Panel on Climate Change

JJM - Jal Jeevan Mission

LEDeG - Ladakh Ecological Development Group

LWWN - Ladakhi Women's Welfare Network

NGO - Non-Governmental Organization

PHE - Public Health and Engineering

PHED - Public Health and Engineering Department

SEWA – Self-Employed Women’s Association

SHG - Self-Help Group

UN - United Nations

WAD – Women and Development

WED – Women, Environment, and Development

WWF - World Wildlife Fund

WAL - Women Alliance of Ladakh

Chapter 1: Introduction

1. Climate Change Around the World

Driven by anthropogenic activities, climate change is causing significant disruptions in weather patterns, sea levels, and biodiversity. The Intergovernmental Panel on Climate Change (IPCC) has reported that global temperatures have already risen by approximately 1.1°C above pre-industrial levels, with severe consequences for natural and human systems (IPCC 2021). The Arctic is warming at twice the rate of the rest of the world, leading to accelerated ice melt and rising sea levels (Serreze and Barry 2011). In the tropics, an increased frequency and intensity of hurricanes, typhoons, and cyclones have been observed, posing substantial risks to coastal communities (Emanuel 2013).

In addition to extreme weather events, climate change exacerbates issues of water scarcity and food security. For instance, in sub-Saharan Africa, changing rainfall patterns threaten rain-fed agriculture, a primary livelihood source for millions (Niang et al. 2014). Similarly, in South Asia, the Himalayan glaciers are receding, impacting the rivers that sustain over a billion people downstream (Bolch et al. 2012).

2. Climate Change in India

India, with its diverse geography and climate, faces multifaceted impacts from climate change. The country experiences a range of climate phenomena, from the melting glaciers in the 7°C rise in average temperatures by about 0.7°C over the last century (Ministry of Earth Sciences 2020). One of the most significant impacts of climate change in India is on its water resources. The retreat of Himalayan glaciers, which feed major river systems like the Ganges,

Brahmaputra, and Indus, threatens water security for millions. Additionally, erratic monsoon patterns lead to alternating cycles of droughts and floods, severely affecting agriculture, which is the backbone of the Indian economy (Mall et al. 2006). This is particularly concerning as agriculture in India largely depends on monsoon rains, and any disruption in this pattern can have severe implications for food security and farmer livelihoods (Gadgil 2006).

Women, who are often the primary managers of household water resources, are disproportionately affected by these changes. In rural areas, they are typically responsible for fetching water, a task made increasingly difficult by depleting water sources and longer dry spells. This not only impacts their health and well-being but also limits their opportunities for education and economic activities (UN Women 2015). The increased burden on women due to water scarcity is exacerbate access to resources and decision-making processes (Agarwal 1992).

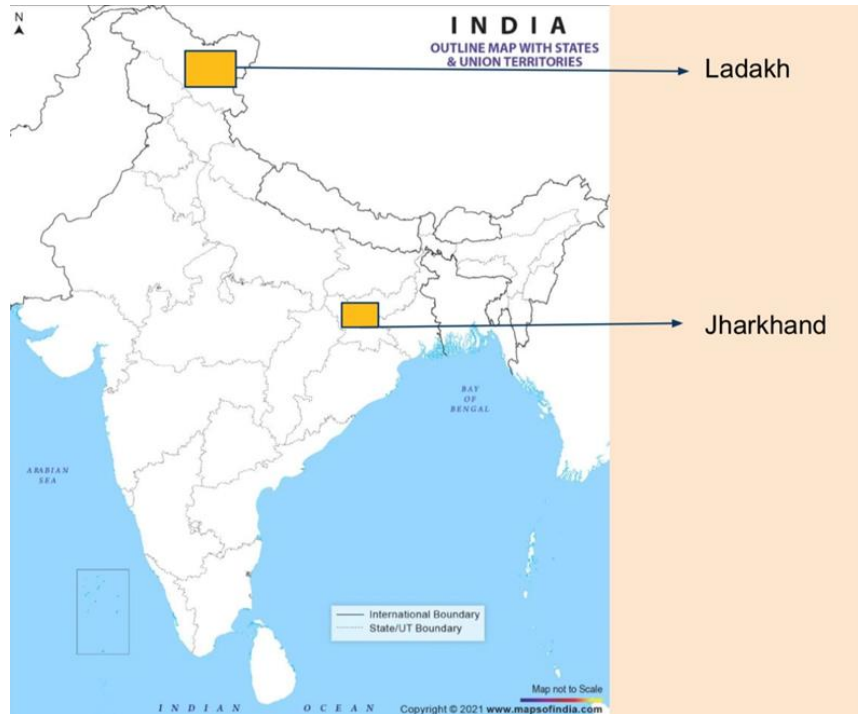


Figure 1 This research was based in Ladakh and Jharkhand, India.

3.1 Climate Change in Ladakh

3a. Background

Ladakh, a high-altitude desert region in northern India, is renowned for its stunning landscapes and unique cultural heritage. However, it is also one of the region's most vulnerable to climate change. The primary impacts of climate change in Ladakh include:

- i. Glacial retreat,
- ii. Changes in precipitation patterns, and
- iii. Temperature fluctuations.,

These impacts have significant implications for water resources, agriculture, and the livelihoods of local communities.

i. Glacial Retreat

Glaciers in Ladakh are critical for the region's water supply, especially during the dry season. They are natural reservoirs, slowly releasing water that sustains agriculture and provides drinking water. However, rising temperatures have led to accelerated glacial melting, resulting in reduced water availability during the summer months. Kulkarni et al. (2007) found that glaciers in the Indian Himalayas, including those in Ladakh, have been retreating at an alarming rate, with some losing up to 20% of their volume over the past few decades (Kulkarni et al. 2007).

This glacial retreat poses a severe threat to Ladakh's traditional irrigation systems, known as "*ghuls*." *Ghuls*, which have been used for centuries to direct meltwater to agricultural fields, are now running dry earlier in the growing season. The reduced availability of water forces farmers to either alter their cropping patterns or abandon agriculture altogether, leading to economic instability (Vince 2009).

ii. Changes in Precipitation patterns

Climate change is also altering precipitation patterns in Ladakh. Historically, the region has experienced minimal rainfall, relying primarily on glacial meltwater. However, recent years have seen an increase in sporadic and intense rainfall events, which can cause flash floods and landslides. These extreme weather events not only damage infrastructure but also wash away topsoil, further degrading arable land (Borgaonkar et al. 2011).

The 2010 flash floods in Ladakh served as a stark reminder of the potential devastation caused by changing precipitation patterns. The floods, triggered by unprecedented rainfall, resulted in

significant loss of life and property (Kaul 2010). Such events highlighted the urgent need for improved disaster preparedness and adaptive measures to protect vulnerable communities.

iii. Temperature fluctuations

In addition to glacial retreat and altered precipitation patterns, Ladakh is experiencing significant

temperature fluctuations. Winters are becoming shorter and less severe, while summers are hotter and drier. These changes have direct implications for agriculture, as traditional crops may no longer be under the new climatic conditions (Vince 2009).

To adapt to the changing climate, farmers in Ladakh are increasingly turning to less water-intensive crops, such as barley and buckwheat. However, these crops often yield lower economic returns, impacting income and food security of farming households (Gupta et al., 2015). Moreover, the shorter growing limits the diversity of crops that can be cultivated, further reducing agricultural resilience (Negi et al. 2012).

3b. Impact on Women

Women in Ladakh play a crucial role in managing household water resources and agricultural activities. Traditionally, women are responsible for fetching water, a task that is becoming increasingly arduous as water sources dry up. The longer distances required to collect water not only increase the physical burden on women but also limit their time for other activities, such as education and income generation (UN Women 2015).

Furthermore, as agriculture becomes more challenging due to climate change, women bear

disproportionate share of the burden. According to the United Nations, women and girls disproportionately feel the effects of climate change. They are often the first to manage environmental resources and respond to climate-related impacts, such as increased distances for water collection and more frequent and severe weather events disrupting agricultural activities (UN News 2020). Women are often involved in labor-intensive tasks such as planting, weeding, and harvesting, all of which are impacted by water scarcity and changing climatic conditions. The reduced agricultural yields force families to seek alternative livelihoods, often in urban areas, leading to social and economic disruptions (Agarwal 2010; Nelson et al. 2002).

Simultaneously, women in Ladakh are at the forefront of community adaptation efforts. Their traditional knowledge and experience in managing natural resources are invaluable in developing sustainable adaptation strategies. Initiatives such as community-based water management and the promotion of water-efficient agricultural practices highlight the critical role of women in building climate resilience (Kelkar & Bhadwal 2007).

3c. Adaptation and Resilience

Despite the challenges, communities in Ladakh, including women-led groups such as the Ladakhi Women's Welfare Network (LWWN), are actively engaged in adaptation and resilience-building efforts. Traditional practices, such as the construction of artificial glaciers, or "ice stupas," have been revived and adapted to modern needs. These structures store winter meltwater and release it gradually during the summer, providing a reliable source of irrigation water (Chellaney 2011; WWF 2009).

Women's groups and local NGOs also play a pivotal role in promoting sustainable water management practices. Training programs on rainwater harvesting, soil conservation, and climate-resilient agriculture empower women to take leadership roles in their communities. For example, the Ladakh Ecological Development Group (LEDeG) conducts workshops that teach women techniques for conserving water and improving soil health. By leveraging their traditional knowledge and adapting to new challenges, women in Ladakh are becoming key agents of change in the face of climate change (Wangchuk 2014; Jain 2020).

Women's involvement in these initiatives not only leverages their expertise but also empowers them to take leadership roles in their communities, fostering a more inclusive approach to climate change adaptation. (Dankelman 2010)

4. Climate change in Jharkhand

4a. Background

Jharkhand, located in eastern India, is characterized by its diverse landscapes, including forests, hills, and plateaus. The region has a significant tribal population that relies heavily on natural resources for their livelihoods.

The profound impact of climate change in Jharkhand on agriculture, water resources, and the socioeconomic well-being of local communities is manifested through:

- I. Increased rainfall variability,
- II. prolonged droughts, and
- III. extreme weather events

i. ___ Increased rainfall variability

Climate change has led to increased variability in the timing, intensity, and distribution of monsoon rains- the main source of the region's annual rainfall- in Jharkhand as a whole (Singh et al. 2013; Mall et al. 2006). According to Mishra et al. (2019), the Jharkhand region has experienced both severe droughts and intense rainfall events in recent years, disrupting agricultural cycles and reducing crop yields.

Erratic rainfall patterns make it difficult for farmers to plan and manage their crops effectively. Traditional rain-fed agriculture, which is predominant in Jharkhand, is particularly vulnerable to these changes (Naidu et al. 2013). Crops such as paddy, maize, and millets, which rely on timely and adequate rainfall, are often affected by delayed monsoons or excessive rainfall, leading to crop failures and economic losses (Mall et al. 2006; Singh et al. 2013). This variability in rainfall has significant implications for food security and the livelihoods of rural communities in Jharkhand.

ii ___ Prolonged droughts

In addition to increased rainfall variability, Jharkhand is experiencing more frequent and prolonged droughts. These dry spells have a direct impact on the availability of water for both irrigation and household use. The lack of water affects crop production and the health and well-being of communities that depend on natural water sources (Gupta, Banerjee, and Sangwan 2020).

Periods of drought exacerbate the already challenging water scarcity in Jharkhand. Many rural areas lack access to reliable water infrastructure, forcing communities to rely on traditional wells and ponds that are quickly depleted during dry periods (Kumar and Gautam,

2021). The scarcity of water also increases the burden on women, who are primarily responsible for fetching water for their households (Mishra et al. 2019). This additional burden not only impacts their physical health but also limits their time for other essential activities such as education and income generation.

iii ___ Extreme Weather Events

Extreme weather events, such as heatwaves and unseasonal storms, are also becoming more common in Jharkhand. These events cause immediate and severe damage to crops, homes, and infrastructure. For instance, unseasonal storms can destroy standing crops just before harvest, leading to significant economic losses for farmers (Patel et al., 2021). This destruction not only reduces the agricultural yield but can also affect the financial stability of the numerous farming households that rely on a single cropping season for their income.

The increasing frequency of heatwaves poses additional challenges. High temperatures not only stress crops but also affect livestock and human health (Mukherjee and Chakraborty 2020). Farmers must contend with reduced productivity and increased costs associated with heat stress mitigation measures, such as irrigation and shade provision (Mishra et al. 2019). These measures are often expensive and labor-intensive, further straining the resources of already vulnerable communities. Additionally, heatwaves can exacerbate health issues, leading to increased incidences of heatstroke and other heat-related illnesses among the rural population.

4b. Impact on Women

Women in Jharkhand are disproportionately affected by the impacts of climate change due to their roles in agriculture and water management (Rao et al. 2019). As primary caregivers

and managers of household resources, women bear the brunt of water scarcity and agricultural disruptions. The increased workload associated with fetching water and managing drought-affected crops limits their opportunities for education and economic activities (Singh et al. 2018).

In many tribal communities in Jharkhand, women are integral to agricultural production, participating in activities such as sowing, weeding, and harvesting (Mishra and Pandey 2020). Climate-induced changes in agricultural productivity directly impact their livelihoods and food security. During times of agricultural distress, in order to supplement household income, women have to find alternative sources of income, such as wage labor to repair roofs and other construction work (Kumar et al. 2017).

Additionally, women's health is at risk due to the physical strain of increased labor and the lack of access to clean water and sanitation during droughts and extreme weather events (Das and Mishra 2020). The increased incidence of waterborne diseases and malnutrition during such periods further exacerbates the vulnerability of women and children (Pandey and Jha 2019).

4c. Adaptation and Resilience

Despite the challenges posed by climate change, women in Jharkhand are actively involved in adaptation and resilience-building efforts (Shukla et al. 2018). Community-based organizations and NGOs are working to empower women with the knowledge and skills needed to manage climate risks effectively. For instance, training programs by NGOs like Motive8 focus on sustainable agricultural practices, water conservation, and climate-resilient

livelihoods, enabling women to take on leadership roles in their communities (Patel and Singh 2019).

One notable example is the Self-Help Group (SHG) movement in Jharkhand, which has empowered women to collectively address issues related to water scarcity and agricultural challenges (Srivastava and Biswas 2021). They meet every Friday to discuss local issues, which also serves as a time to connect with other women in the community (Gupta and Sharma 2016). SHGs provide a platform for women to share knowledge, access financial resources, and implement community-based solutions to climate change impacts.

The experiences of Ladakh and Jharkhand exemplify the diverse and profound impacts of climate change across different geographical and cultural contexts in India.

In Ladakh, the retreat of glaciers, changing precipitation patterns, and temperature fluctuations threaten traditional water management systems and agricultural practices and directly impact local livelihoods (Kulkarni et al. 2007; Shukla et al. 2018). Conversely, Jharkhand contends with increased rainfall variability, more frequent droughts, and extreme weather events, which disrupt agricultural cycles and exacerbate water scarcity (Mishra et al. 2019; Chakraborty et al. 2020). Despite these distinct challenges, a common thread runs through both regions: the pivotal role of women in managing and adapting to these environmental changes.

Women in Ladakh and Jharkhand have leveraged their traditional knowledge and community roles to develop innovative adaptation strategies, from constructing ice stupas to implementing rainwater harvesting systems (Patel and Singh 2019). These efforts highlight the critical importance of empowering women and integrating gender-sensitive approaches into climate resilience initiatives.

Chapter 2 - Theories of Gender and Environment & Related Key Issues

2A. Research Issues

1. **Assessing Climate Change Impacts:** The research explores and assesses the impacts of climate change on water resources in Ladakh and Jharkhand, including changes in glacier dynamics, precipitation patterns, and hydrological regimes. By analyzing existing data and engaging with local communities, the thesis demonstrates how these environmental changes affect water availability, quality, and distribution and identifies potential adaptation strategies.
2. **Community Resilience:** The study investigates how communities in Ladakh, and Jharkhand demonstrate resilience in the face of environmental and socio-economic challenges. Through qualitative research methods such as interviews, focus group discussions, and participatory observations, this thesis documents the adaptive strategies, traditional knowledge systems, and community-based initiatives that contribute to resilience-building efforts.
3. **Gender and Water Management:** A key focus of the research is to examine the gendered dimensions of water access, management, and governance in Ladakh and Jharkhand. By adopting a gender-sensitive approach, the thesis aims to understand how gender norms, power dynamics, and institutional structures shape women's roles, responsibilities, and decision-making authority in water-related activities. Through gender analysis and participatory research methods, the thesis identifies opportunities for enhancing women's empowerment, promoting gender equality, and strengthening community resilience to climate change.

2B. Theories of Gender and Environment

Feminist theories provide powerful tools for critical environmental analysis. Attention to gender is crucial for understanding environmental issues due to the longstanding association between the concepts of gender and nature, the gendered interaction of human labor with the environment, and the gendered impacts of environmental degradation (MacGregor, 2017).

Gendered marginalization has been identified as a key element that is to be explored within all research. As bell hooks notes, social systems and institutions have historically been structured in a way that privileges the interests of men over women and other marginalized groups (hooks 2000, 56). This concept refers to how social systems and institutions disadvantage women and other marginalized groups in terms of access to resources, opportunities, and decision-making power. In the context of environmental issues, gendered marginalization manifests in several ways:

___*Access to Resources:* Women often have less access to natural resources such as land, water, and forests. Patriarchal inheritance laws and social norms can restrict women's rights to own and manage land, limiting their ability to engage in sustainable agriculture or benefit from environmental programs. (Agarwal 2010)

___*Increased Burden of Labor:* Environmental degradation often increases the labor burden on women. For instance, water scarcity forces women to travel longer distances to fetch

water, taking time away from other productive activities like education or income generation. This additional labor can also have adverse health effects on women. (Nightingale 2017)

—*Participation in Decision-Making:* Women are frequently underrepresented in environmental decision-making processes at all levels, from local community groups to national policy-making bodies. This exclusion means that women's knowledge, needs, and priorities are often ignored in environmental policies and projects (Terry, 2009).

—*Impact of Climate Change:* Climate change disproportionately affects women, particularly in developing countries. Women's reliance on natural resources for their livelihoods makes them more vulnerable to climate impacts like droughts, floods, and changing weather patterns. Additionally, social norms and inequalities can limit women's capacity to respond to climate-related challenges (Tschakert 2010).

The intersection of gender and environment and gender and marginalization encompasses a broad range of theories that examine how environmental issues and gender inequalities are intertwined. These theories explore how environmental changes affect men and women differently and how gender roles and power dynamics shape environmental policies and practices (Shiva and Mies 2014). Ecofeminism, Feminist Environmentalism, and Feminist Political Ecology are the main theories here, and I discuss each of them below.

a. Ecofeminism

Ecofeminism is a prominent theory that interrogates how patriarchal structures rely on the exploitation of women and nature. Ecofeminists argue that the domination of women and the degradation of the environment share common roots in a patriarchal system that values control and dominance over cooperation and sustainability (Merchant 1996). This perspective suggests that addressing environmental issues requires dismantling patriarchal systems and promoting gender equality. While both women and nature are subjected to the same forces of exploitation and oppression, any effective solution must address these intertwined issues in order to tease out their entanglements.

Key ecofeminist thinkers like Vandana Shiva and Maria Mies emphasize the crucial role of women in sustainable agriculture and biodiversity conservation. They argue that women, particularly in rural and indigenous communities, have a closer relationship with nature due to their roles in food production and resource management, making them key actors in environmental conservation (Shiva 2016; Mies and Shiva 2014). Shiva (2016) highlights that women's traditional knowledge of seed preservation, crop diversity, and sustainable farming practices is essential for maintaining ecological balance and ensuring food security.

Mies and Shiva (2014) also discuss how women's engagement in biodiversity-rich, small-scale farming practices contrasts sharply with industrial agriculture's monocultures and its negative environmental impacts. They assert that women's practices are inherently more sustainable and beneficial for long-term ecological health and demonstrate how the connection between women and nature is not only a matter of livelihood but is also one of cultural identity and resilience in the wake of environmental degradation.

Ecofeminism, therefore, advocates for the recognition and integration of women's environmental knowledge into broader conservation and sustainability efforts, arguing that this is vital for both gender justice and ecological sustainability.

b. Feminist Environmentalism

Feminist environmentalism extends ecofeminist ideas by focusing on the material realities and everyday experiences of women (Agarwal, 2019). This theory examines how women's interactions with the environment are shaped by their social and economic roles. It highlights that women, especially in developing countries, are usually responsible for collecting water, fuel, and food, making them more vulnerable to environmental degradation and climate change (Dankelman 2010). The daily tasks of women in these regions, activities such as gathering firewood or fetching water are directly impacted by the state of the environment. As resources become scarcer due to environmental degradation, these responsibilities become more burdensome, thus exacerbating the hardships faced by women.

Feminist environmentalism emphasizes that environmental policies and practices frequently overlook women's needs and knowledge. Most environmental governance structures tend to be male-dominated and often fail to consider the specific ways in which environmental changes affect women. This oversight not only marginalizes women's contributions, but such also as how women leverage their unique knowledge and expertise in sustainable practices. but also leads to less effective environmental strategies. By incorporating women's experiences and voices, feminist environmentalism advocates for more inclusive and effective environmental governance. It argues that policies must be designed with a gender

perspective as central in order to address the specific challenges women face and to leverage their unique knowledge and expertise in sustainable practices.

Incorporating women's insights and experiences into environmental policy leads to more sustainable and equitable outcomes. For instance, when women are involved in managing community water resources, they often prioritize sustainability and equitable distribution, drawing on their intimate knowledge of local water sources and their roles as primary water collectors (Agarwal 1992). Similarly, women's involvement in agricultural decision-making can enhance food security and biodiversity, as they tend to favor diverse cropping systems that are more resilient to climate variability (Shiva 2016).

c. Feminist Political Ecology

Feminist Political Ecology (FPE) is a theoretical framework that merges insights from political ecology and feminist theory, providing a nuanced analysis of how gender and other social categories, such as class, race, and ethnicity, influence environmental interactions and resource control (Rocheleau, Thomas-Slayter, and Wangari 1996; MacGregor 2017). This approach focuses on the power relations governing environmental access, use, and management.

This perspective examines how gendered power relations shape environmental policies and practices and how these, in turn, affect different genders. FPE theorists assert that environmental issues are deeply embedded in social structures and power dynamics and are deeply gendered (Buechler and Hanson 2015). For instance, women often have less access to natural resources such as land and water due to patriarchal inheritance laws and social norms

that restrict their rights (Agarwal 2010). This limited access hinders their ability to engage in sustainable agriculture or benefit from environmental programs.

Moreover, environmental degradation often increases the labor burden on women. For example, water scarcity forces women to travel longer distances to fetch water, detracting time from other productive activities like education or income generation and adversely affecting their health (Nightingale 2017). Additionally, women are frequently underrepresented in environmental decision-making processes, meaning their knowledge, needs, and priorities are often ignored in environmental policies and projects (Terry 2009).

FPE provides a critical framework for understanding and addressing these issues, emphasizing the importance of considering gendered power relations in environmental studies and practices. By integrating a gender-sensitive approach, FPE advocates for policies and interventions that promote gender equality and empower marginalized groups (Rocheleau, Thomas-Slayter, and Wangari 1996). FPE builds on the insights of ecofeminism and feminist environmentalism by placing a stronger emphasis on power relations and social justice. FPE examines how intersecting identities and power structures influence environmental dynamics, and argues for a transformative approach to environmental governance, advocates for more equitable and sustainable practices, and challenges existing power imbalances (Arora-Jonsson 2013).

By focusing on gendered marginalization, FPE offers a comprehensive understanding of environmental issues, recognizing that solutions must address both ecological sustainability and social justice. This perspective is crucial for developing strategies that empower women and other marginalized groups, ensuring that their voices are heard, and their needs are met as

they combat climate change and environmental degradation (Sultana 2014; Mollett and Faria 2013).

Recognizing the specific needs and contributions of women can inform more effective and equitable environmental policies and interventions, supporting their roles in water governance and enhancing their resilience to climate change (Schroeder 1993).

For an extended period, efforts to address climate change have been predominantly shaped by policymakers at higher levels (Chhetri et al. 2020; Nightingale et al. 2020), resulting in policies and programs that are formulated at national and international levels. While these policies are significant, their implementation at the local level has faced challenges, and some researchers suggest that such policies are often disconnected from the specific local contexts in which they operate (Klein et al. 2017; Funder and Mweemba 2019).

In contrast, FPE proposes that the 'lived experiences of women' are crucial for understanding the nuanced and diverse ways women interact with their environments. Unlike earlier feminist perspectives that often-viewed women's connection to nature through an ideological or essentialist lens, FPE emphasizes the material realities of women's daily lives.

'Lived experiences of women' refers to the specific day-to-day interactions, struggles, and practices that women engage in within their particular environmental contexts. This grounded perspective offers empirical evidence that analyzes how environmental changes and policies affect women differently from how they affect men (Gezon 2002). Highlighting women's lived experiences ensures that women's voices and concerns are represented in environmental decision-making processes, challenging the often male-dominated narratives and structures that overlook or marginalize women's contributions (Rocheleau et al. 1996).

Furthermore, FPE incorporates an intersectional approach, recognizing that women's experiences are shaped by multiple factors, including class, race, ethnicity, and age, which interact with gender to produce unique environmental interactions and outcomes (Nightingale 2006). This approach acknowledges the diverse and specific ways in which different groups of women experience and respond to environmental challenges.

The strength of FPE lies in the following:

1. *Grounded Perspective*: It provides a grounded, empirical basis for analyzing how environmental changes and policies affect women differently from men. It moves beyond abstract or ideological notions to concrete realities (Gezon 2002).
2. *Visibility and Representation*: Highlighting women's lived experiences ensures that their voices and concerns are represented in environmental decision-making processes. It challenges the often male-dominated narratives and structures that overlook or marginalize women's contributions (Rocheleau et al. 1996)
3. *Intersectionality*: It incorporates an intersectional approach, recognizing that women's experiences are shaped by multiple factors, including class, race, ethnicity, and age, which interact with gender to produce unique environmental interactions and outcomes (Nightingale 2006).

FPE also notes that the adaptive strategies that women develop in response to environmental challenge are often rooted in traditional knowledge and community-based practices, which are critical for successful and sustainable water management (Gezon 2002). Recognizing the specific needs and contributions of women can inform more

effective and equitable environmental policies and interventions, supporting their roles in water governance and enhancing their resilience to climate change (Schroeder 1993).

My study, in drawing on FPE, focuses on women's everyday activities, challenges, opportunities, and local specificity and draws on that empirical evidence to understand how climate change impacts are directly experienced by women and men. The impacts include changes in water availability, quality, and accessibility, and thus become a direct consequence for those who are the primary managers of household water, women (Rocheleau et al. 1996).

Role of Lived Experiences in the Research

In the context of studying the impacts of climate change on water resources in Ladakh and Jharkhand, and the role of women in water governance and resilience, lived experiences become pivotal for several reasons:

1. *Empirical Evidence:* Collecting data on women's daily interactions with water resources provides empirical evidence on how climate change impacts are felt on the ground. This includes changes in water availability, quality, and accessibility, and the direct consequences for women who are often the primary managers of household water (Rocheleau et al. 1996).
2. *Adaptive Strategies:* Understanding lived experiences reveals the adaptive strategies women develop in response to environmental challenges. These strategies are often rooted in traditional knowledge and community-based practices that are critical for sustainable water management (Gezon 2002).
3. *Policy Implications:* Insights from women's lived experiences can inform more effective and equitable environmental policies and interventions. By recognizing the specific needs and

contributions of women, policies can be designed to support their roles in water governance and enhance their resilience to climate change (Schroeder 1993).

The emphasis on lived experiences also addresses critiques within FPE. Earlier versions of FPE were sometimes criticized for equating gender with biological sex, thereby oversimplifying complex gender dynamics (Nightingale 2006). By drawing on poststructuralist feminist writings, contemporary FPE scholars advocate for a more nuanced understanding of gender that goes beyond binary categorizations. This approach recognizes that gender identities and relations are socially constructed and vary across different contexts (Rocheleau et al. 1996).

There are a number of reasons why Feminist Political Ecology (FPE) is the optimal theoretical framework for addressing the issues of water access, climate change, and community resilience in Ladakh and Jharkhand:

1. *Intersectionality*: FPE recognizes that environmental issues are intertwined with social inequalities, including those related to gender, class, ethnicity, and caste. In Ladakh and Jharkhand, marginalized communities, particularly women and tribal populations, bear the brunt of environmental degradation and climate change impacts due to their socio-economic vulnerabilities. FPE's intersectional approach allows for a nuanced analysis of how multiple forms of oppression intersect and shape people's experiences of environmental change and resilience strategies.

2. *Power Dynamics*: FPE demonstrates the necessity to examine power relations within environmental governance processes, highlighting how dominant social groups control access

to resources, decision-making processes, and knowledge production. In Ladakh, for example, patriarchal norms may marginalize women's voices and limit their participation in water management decisions, despite their central role in water-related activities. Similarly, in Jharkhand, tribal communities may face dispossession and marginalization due to land acquisition for mining and industrial projects. FPE provides a lens through which to analyze these power dynamics and advocate for more inclusive and equitable environmental governance arrangements.

3. Emphasis on Agency and Resistance: FPE recognizes the agency of marginalized groups in contesting dominant narratives and asserting their rights to access and control natural resources. In both Ladakh and Jharkhand, local communities employ various forms of resistance and resilience to cope with environmental challenges and assert their sovereignty over their lands and waters. By centering the voices and experiences of women, indigenous peoples, and other marginalized groups, FPE amplifies their agency and empowers them to participate in decision-making processes that affect their lives and livelihoods.

4. Context-Sensitivity: FPE emphasizes the importance of context-specific analyses that consider local socio-cultural, political, and ecological dynamics. In Ladakh and Jharkhand, where cultural practices, governance systems, and environmental challenges vary widely, a context-sensitive approach is essential for designing effective interventions and policies. FPE's flexibility allows researchers to adapt their analyses to the specificities of each case study area, ensuring that recommendations are grounded in local realities and responsive to community needs.

2C. Women and Climate: The Global Significance

Women represent a disproportionate amount of the world's poor, making them unequally vulnerable to environmental changes and natural disasters (Arora-Jonsson, 2011; O'Brien et al., 2004). Arguments centered around women's vulnerability to climate change have emerged in the fields of gender and climate change, women and development (WAD), and women, environment, and development (WED). Arora-Jonsson (2011) and Gonda (2019) urge scholars working under these frameworks to move away from north-south binaries, in which women in the Global North are viewed as engaging in the environment through virtuous behavior, while women in the Global South passively engage in the environment through their status as victims of climate change.

For example, women in the Global North are often regarded as more likely to support policy changes related to climate change (Brody et al., 2009, p.15), to engage in climate-sensitive behavior, or to be at the frontlines of environmental activism (Miller, 1996). On the other hand, women in the Global South are framed as victims to climate change, such as being more likely to die in natural disasters (Brody et al., 2008, p.6; McMichael et al., 2003), more likely to experience food insecurity to provide for their children, or by having to travel farther distances for water and firewood (Goldsworthy, 2010; Rocheleau et al., 1996; Schroeder, 1993). These findings oversimplify the situation for women, ignoring contextual factors that differentiate individual vulnerabilities and agencies about climate change.

Through frameworks such as feminist political ecology, attention is redirected to power dynamics within the larger political economy that exacerbates and causes gender vulnerability (Arora-Jonsson, 2009; O'Brien et al., 2004; Schroeder, 1993). Focus is pointed to four

interconnected aspects that affect women's vulnerability to climate change: 1) the gendered division of labor; 2) gendered access to resources (financial, environmental, educational, and land rights); 3) gendered decision-making power; and 4) the gendered environmental knowledge that arises from women's roles as food producers. To contextualize how these four factors are applied to women's experience with climate change in a global context, several case studies in Kenya, Tanzania, Canada, and Central Mexico will be examined here. These case studies provide a global context for understanding how women are uniquely impacted by climate change. This is often situated within their gendered roles as farmers, herders, and caregivers that place them closer to the environment in material ways, and thus produce a gendered environmental knowledge. Women's lack of access to both the resources required to navigate their gendered roles, and adaptive resources to mitigate the effects of climate change, exacerbate how they experience environmental stress, which is coupled with a lack of decision-making power on the local, regional, and international level.

In rural Kenya, Rao (2019) focuses on the re-negotiation of women's decision-making power in relation to accessing adaptive technology in times of drought and water scarcity. Rao finds that while women experienced disadvantages from living within the limitations of a patriarchal household, there also exist opportunities for resistance and agency to overcome vulnerabilities, specifically during times when men are absent from the village. This exemplifies women's agency that may arise from situations of abandonment that are commonly presented as sources of vulnerability (Bhandari, 2017; Mccarl, 2013). It is also evident that a woman's ability to gain access to certain resources and hold positions of authority is found to be dependent on their class, socioeconomic status, ethnicity, and marital status. For example, young, separated women are in more vulnerable positions on climate change than older married women.

Bee (2014) explores the impacts of drought on food security in central Mexico, using a feminist political ecology perspective to analyze women's important role in providing for families. Their research demonstrates that women's gendered roles as farmers shape their knowledge regarding climate change, yet they are left out of decision-making spaces, such as state policies and programs, due to farming land being leased under the male head of household. This renders women's knowledge of the material realities of climate change invisible in the construction of agriculture-based climate change policies. Bee surmises that these many unique adaptive strategies are a result of women's gendered roles that produce embodied knowledge of the environment, which ultimately allows them to persevere through the impacts of climate change in gendered ways. For example, women adapt to drought in their ways, such as gathering wild plants to sustain food security within their households (p. 614).

Perez et al. (2015) examine the gendered impacts of climate change on farming households in nine East and West African countries. While women are responsible for the collection of firewood and tending to household fields, they simultaneously have less access to the very fields they work on due to patriarchal land and inheritance rights. Moreover, women's restricted access to improved agricultural technology and equipment limits their ability to adapt to climate change. Perez et al. attribute this limited access to women's inability to obtain education, government-led agricultural services, and available free time (p.105).

Nelson and Stathers (2009) use participatory methods in two villages in the Dodoma region of Tanzania to explore how women are unequally impacted by climate change-induced agrarian stress. Women experience overbearing workloads because of droughts and unpredictable rainfall. Specifically, women must replant crops more frequently to counteract the seeds wasted from unpredictable rainfall. Moreover, male-out migration, the trend of men migrating

out of rural villages to urban areas, has increased in recent years as a response to agrarian stress, which has ultimately increased women's farm-based responsibilities. The authors pay particular attention to how gender vulnerability in the context of rural Tanzania intersects with other factors, such as age and health, in determining a woman's ability to adapt to climate change.

For example, during drought, women with multiple children are unable to keep up with their workloads and secure food, leading them to eat less to provide for their children, ultimately jeopardizing their health (p.86). This study also illustrates the ways in which decision-making power and access to resources are negotiated across various spaces and conditions. For example, crops such as wheat are typically sold by men, meaning that women have limited access to the income that materializes. However, unpredictable rainfall has grown the need for groundnut cultivation, which are typically sold by women. This has increased women's workload but has also provided them with more control over their income. Therefore, gender vulnerability needs to be recognized as dependent on multiple factors not only within the subjectivities of an individual, but also of external influences, such as market demands, and gender and cultural norms.

Anishinaabe scholar Deborah McGregor (2012) provides an indigenous perspective from Ontario, Canada, in which Anishinaabe women play a crucial role in protecting water. These women are viewed as intrinsically connected to water through their reproductive roles and thus hold responsibilities in performing water ceremonies aimed at protection, passing down water-based knowledge, and participating in water protection activism. McGregor emphasizes how Anishinaabe women embody knowledge regarding the care for water that arises from their gendered roles that place them closer to bodies of water. Contrary to other literature on women

and the environment that separates women's lived experience with the environment from larger decision-making spaces, McGregor finds that women-based activism among Anishinaabe communities has begun to successfully infiltrate itself into regional and provincial decision-making processes (p.13).

These case studies move past homogenizing ideas of women in the Global South by exploring various factors that diverge across local, regional, and international spheres to affect how women are simultaneously victims of and active agents in adapting to climate change. This phenomenon is not limited to women in the Global South but is translated to Western countries in contextually specific ways. Therefore, it is important to understand external local and global forces that create locally specific challenges for women in both the global north and south.

Chapter 3 - Methodology

For this research, I conducted a comprehensive study over the course of five months (July to November 2023), focusing on two distinct locations in India: Ladakh and Jharkhand. These regions were chosen due to their unique environmental and socio-economic challenges, providing a rich context for examining the lived experiences of women in relation to environmental changes. My methodological approach combined semi-structured interviews, focus groups, participant observation, and ethnographic immersion to capture a holistic understanding of the participants' lives and their interactions with their environment.

1. Semi-structured Interviews: Semi-structured interviews are a key component in this research. This method allows for in-depth conversations guided by a set of predetermined questions while also providing the flexibility to explore new topics as they arise during the discussions (Burgess, 1984). I conducted interviews with a diverse group of women from different age groups, socio-economic backgrounds, and occupations in both Ladakh and Jharkhand. These interviews explored the women's perspectives on environmental changes, their coping mechanisms due to the demands of climate change, as well as their roles in developing community adaptation efforts.

2. Focus Groups: Focus groups were organized to facilitate group discussions among women from similar backgrounds. This method was particularly useful in exploring communal experiences and the collective strategies they developed for dealing with environmental challenges. In Ladakh, focus groups included discussions on water management and agricultural practices, while in Jharkhand, the focus was on the impacts of erratic rainfall and droughts on daily life.

3. Participant Observation: Participant observation involved living within the communities and participating in their daily activities. This immersive approach provided firsthand insights into women's routines, challenges, and adaptive strategies. It also helped to build trust and rapport with the participants, making them more comfortable sharing their experiences openly.

Living Among the Villagers:

A few of the villagers invited me to stay with them at their homes. I decided to accept the invitations. This decision was driven by the belief that living among them would provide an authentic glimpse into their daily struggles and triumphs. It wasn't just about collecting data; it was about building connections and understanding their stories on a profound level. For days, I became a part of their homes, sharing meals, chores, and conversations. This homestay experience established trust and rapport between myself and my hosts, the women farmers and their families, and I enjoyed it!

Many women spoke Ladakhi and were not fluent in Hindi, necessitating the use of local translators. After asking around, Dolma, a local schoolteacher, asked her daughter, to help during the interviews with the translation from Ladakhi into Hindi. In Jharkhand, I was also invited to stay with families in rural villages, and I participated in both household chores and agricultural work. Hindi is the language spoken by the interviewees, and I am fluent in Hindi.

These immersive experiences allowed me to observe the intricate dance of cultural norms and witness firsthand the impact of climate change on their water sources and agriculture.

A typical day during my field immersion began at

4:00 AM: with waking up and preparing fires for cooking and warmth, gathering wood or dung cakes, and starting the fire in the kitchen hearth.

5:00 AM: The women were getting ready for morning prayers, reading of religious scriptures and the day's labor, and gathering necessary tools and containers.

5:30 AM: We set out to fetch water from nearby streams or communal taps, with the walk taking anywhere from 30 minutes to an hour each way.

7:30 AM: Returning home, the women shared brief conversations with other family members.

By 8:00 AM, they were preparing breakfast, cooking on the fires, and using the water fetched earlier.

9:00 AM: After breakfast, the women headed to the fields for agricultural work, which included sowing seeds, weeding, watering crops, and tending to livestock.

At 12 noon, they returned home to prepare lunch using fresh ingredients from their fields or local markets, maintaining a balanced diet.

1:00 PM Lunch was served around, allowing the family to rest before resuming tasks. Post-lunch, the women continued with agricultural work or other labor-intensive activities like collecting firewood or fetching more water until

4:00 PM, when they shifted focus to household chores such as cleaning, washing clothes, and preparing for the evening meal.

Early evening, around 5:00 PM, was reserved for community activities and meetings, including attending village gatherings, participating in self-help group discussions, or engaging in communal tasks.

Preparation for dinner began at 6:00 PM, involving cooking a substantial meal that often included leftovers from lunch and additional dishes.

Dinner was served at 7:00 PM, providing an opportunity for families to gather, share their day's experiences, and discuss plans for the next day.

After dinner, around 8:00 PM, the women prepared for bed by cleaning up, ensuring the fires were safely extinguished or maintained, and preparing the home for the night.

By 9:00 PM, the day had wound down, and the women went to bed, resting for the early start the next morning.

This immersive 17-to-18-hour day provided a comprehensive understanding of the women's daily lives, their resilience in facing environmental challenges, and the critical roles they play in their communities, essential for building trust and gathering in-depth insights for the research.

Participant Observation and 'Hanging Out'

I used participant observation and 'hanging out' as methods. While semi-structured interviews provided substantial insights into the lives of the interviewees, it was through observing and participating in their everyday activities that I could truly comprehend their experiences and challenges. By engaging in daily activities such as farming, cooking, cleaning, and fetching water, I was able to gain a deeper understanding of the women's lived experiences. This method

provided valuable context for the interviews and helped me understand the practical aspects of their lives.

An immersive approach allowed me to witness numerous relationships and interactions. I took detailed field notes, including close observations and comments on what I was seeing, feeling, thinking, and how I fit into the lives of my hosts. I listened to conversations, noted down silences, and elaborated on the banal and trivial aspects of their daily lives. Through these observations, I mapped patterns and paid attention to power dynamics, gender roles, and the impact of environmental changes on their routines and livelihoods.

While participant observation enriched my understanding of the women's lives, it also raised questions. I remained mindful of my role as both an observer and participant, striving to maintain a balance between involvement and detachment. This dual role allowed me to embrace the idea that my presence did not disrupt the natural flow of their activities.



Fig 2 A kitchen scene at the homestay while spending time with family.

Timeline (See Table 1)

July to September 2023: Fieldwork in Ladakh

- Conducted semi-structured interviews with women from various villages.
- Organized focus groups to discuss water management practices and agricultural challenges.
- Engaged in participant observation by living with local families and participating in daily activities.
- Attended community meetings and local events to gain cultural insights.

September to November 2023: Fieldwork in Jharkhand

- Conducted semi-structured interviews with women affected by erratic rainfall and droughts.
- Organized focus groups to explore communal strategies for managing water scarcity and agricultural disruptions.
- Participated in daily activities and community events to understand the socio-economic impacts of environmental changes.
- Engaged in ethnographic immersion to contextualize the women's experiences within their cultural and social frameworks.

December: Analysis and Synthesis

- Transcribed interview and focus group data.
- Analyzed field notes.
- Identified key themes and patterns related to the research questions.
- Synthesized findings to develop a comprehensive understanding of the women's lived experiences and adaptive strategies.

Table 1: Fieldwork Timeline

Month 2023	Activities
July	I arrived in Ladakh, established contacts, and began preliminary observations.
August	Conducted semi-structured interviews and focus groups in Ladakh.
September	Continued interviews, focus groups, and participant observation in Ladakh till mid-September and started preparing for the next site.
October	Transitioned to Jharkhand, established contacts, and began preliminary observations.
November	Conducted semi-structured interviews and focus groups in Jharkhand.
December	Return to Santa Barbara. Transcribed interview and focus group data and analyzed field notes.

Overcoming Challenges

Conducting research in such remote areas came with numerous challenges. Securing appointments with government officials often proved difficult due to their busy schedules and the bureaucratic processes involved. Language barriers were another significant hurdle, particularly in Ladakh, where many women only spoke Ladakhi. Finding reliable transportation to reach remote villages was also a constant struggle, particularly in Ladakh,

where the terrain and temperatures compounded transportation possibilities. Flexibility was crucial; I adapted my plans based on the availability of resources and the changing needs of the participants. At times, I encountered much difficulty in obtaining interviews with members of NGO's simply because many people did not have time to sit down for an interview. I also spoke casually with many more people than I could interview formally.

Data collection and analysis

Data was collected through a combination of handwritten notes, NGO reports audio recordings, and photographs. After each interview or focus group, I reflected on the session, noting any significant observations or insights. The recorded interviews, which lasted from one to three hours, were transcribed and translated with the help of local translators to ensure accuracy. I used thematic analysis to identify recurring patterns and themes within the data. This approach allowed me to draw connections between the experiences of women in different regions and understand the broader implications of their stories\

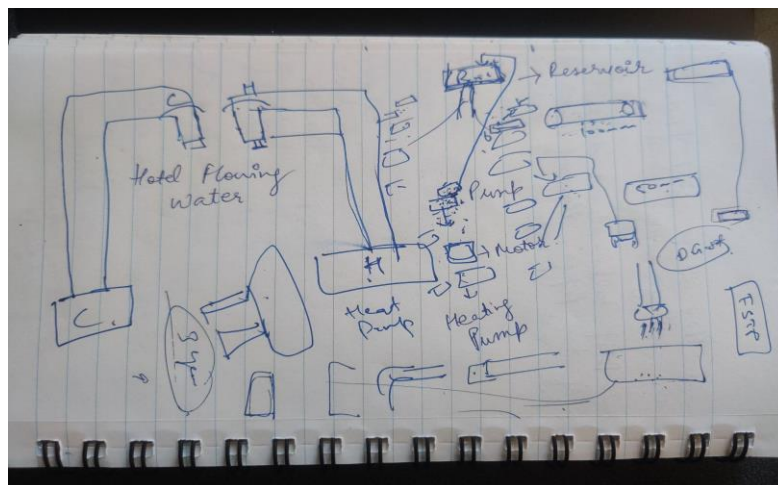


Figure 3 A picture from fieldnotes shows a diagram made by an interviewee.

Table 2: Data of Semi structured interviews

S.No	Name	Age	Occupation	Gender	Place
1	Dolma Lamo	67	Farmer	Female	Ladakh
2	Kunzang Angmo	45	Farmer	Female	Ladakh
3	Tsering Chondol	60	President of Women's Alliance of Ladakh	Female	Ladakh
4	Lobsang	29	Environment Conservationist	Male	Ladakh
5	Nishant Tiku	33	Geologist	Male	Ladakh
6	Rigzin Angmo	40	Farmer	Female	Ladakh
7	Sara	27	NGO worker with LedeG	Female	Ladakh
8	Stanzin	30	Farmer	Female	Ladakh
9	Tundup	62	Government Official	Male	Ladakh

10	Rekha	40	Farmer	Female	Jharkhand
11	Phoolan Devi	41	Farmer	Female	Jharkhand
12	Manju	36	Daily laborer	Female	Jharkhand
13	Janki	35	Farmer	Female	Jharkhand
14	Ramsakhi	48	Farmer	Female	Jharkhand
15	Sheela	35	NGO worker	Female	Jharkhand

Table 3: Data of focus group interviews

S.no	Participants	Place	Occupation	Age bracket
1	Sheela, Ramsakhi, Janki, Manju, Sita,	Jharkhand	Farmers and daily wage workers	35-45
2	Rigzin, Angmo, Sonam, Dawa, Iqra ¹	Ladakh	Farmers and SEWA workers	35-50

¹ Sita, Dawa, and Iqra are not mentioned in the biographies as the interviewees did not give permission to share their information.

Biographies of interviewees

Ladakh Participants

Dolma Lamo

Dolma Lamo, a resilient 67-year-old farmer from Ladakh, has spent her entire life nurturing the land and embracing its challenges. Born and raised amidst the rugged terrain of Ladakh, Dolma inherited her passion for farming from her ancestors. Despite the harsh climate and scarcity of resources, she has managed to cultivate a thriving farm, specializing in traditional crops adapted to the high-altitude environment. Dolma's deep connection to the land and her unwavering dedication to sustainable farming practices make her a respected figure in her community. She is not only a farmer but also a custodian of Ladakh's agricultural heritage.

Kunzang Angmo

Kunzang Angmo, a 45-year-old farmer hailing from the serene landscapes of Phyan, Ladakh, embodies the spirit of resilience and determination. With her weather-beaten hands and a heart full of hope, Kunzang tends to her fields with unwavering dedication, defying the harsh realities of farming in the Himalayan region. Some members of her family have moved to bigger towns but despite the formidable challenges posed by unpredictable weather patterns and limited resources, Kunzang remains steadfast in her commitment to provide for her family and contribute to the sustenance of her community.

Tsering Chondol

Tsering Chondol, a 60-year-old visionary leader, serves as the President of the *Women Alliance of Ladakh* (WAL), spearheading initiatives aimed at empowering women and fostering community development. With her compassionate heart and indomitable spirit, Tsering has dedicated her life to advocating for gender equality and social justice in Ladakh. Through her tireless efforts, she has mobilized women from diverse backgrounds, empowering them to assert their rights and actively participate in decision-making processes. WAL has over 5000 members who work collaboratively on a range of issues, including climate change, plastic management, and the revival of traditional culture.

Lobsang

Lobsang, a 29-year-old conservationist, is deeply passionate about preserving Ladakh's pristine natural beauty and rich biodiversity. He is the co-founder of *Navikarnikia*, an organization that uses solar pumps to draw water from streams in villages facing acute water shortages in the Zaskar valley. Inspired by the awe-inspiring landscapes of his homeland, Lobsang has devoted his life to environmental conservation, advocating for sustainable practices that harmonize with the delicate ecosystem of the region. Through his work, he strives to raise awareness about the importance of preserving Ladakh's glaciers.

Nishant Tiku

Nishant Tiku, a 33-year-old geologist, possesses a deep-rooted fascination for the geological wonders of Ladakh's ancient terrain. With a keen eye for detail and a thirst for knowledge, Nishant explores the rugged landscapes of Ladakh, unraveling the mysteries hidden beneath its rocky surface. Through his research, he seeks to understand the geological forces that have shaped Ladakh's unique topography over millions of years. Nishant's passion for geology

serves as a driving force in his quest to unravel the secrets of Ladakh's geological past and contribute to the scientific understanding of the region.

Rigzin Angmo

Rigzin Angmo, a 40-year-old farmer from Ladakh, is known within the community for her innovative agricultural practices. With an acute understanding of the unique challenges posed by Ladakh's high-altitude climate, Rigzin has implemented various sustainable farming techniques to enhance productivity and crop resilience. Her dedication to improving agricultural methods has made her a local pioneer in organic farming, and she often conducts workshops to share her knowledge with fellow farmers. Rigzin's contributions have significantly bolstered the agricultural sustainability of her community, making her an invaluable asset to Ladakh's farming community.

Sara

Sara, 27-year-old social worker has been an integral part of LeDeg for the past three years, contributing s to the organization's fieldwork and research initiatives. She has been instrumental in carrying out fieldwork in specific villages, collecting data for NGO reports. She offered valuable insights and connected me with the technical head for further support.

Sonam

Sonam, a 25-year-old schoolteacher from Ladakh, is passionate about education and its transformative power. Despite the remote and challenging environment, Sonam is dedicated to providing quality education for the children of her village. She emphasizes the importance of cultural heritage and environmental conservation in her teaching, aiming to instill a sense of

pride and responsibility in her students. Sonam's efforts go beyond the classroom, as she actively engages with parents and community members to foster a supportive educational environment. Her commitment to nurturing young minds is a beacon of hope for the future of Ladakh.

Stanzin

Stanzin, a 30-year-old farmer, has been a stalwart of the agricultural community in Ladakh. Known for her perseverance and hard work, Stanzin has successfully managed her farm despite the region's harsh climatic conditions. She is deeply involved in local cooperative movements, advocating for better resources and support for farmers. Stanzin's leadership and dedication have earned her respect among her peers, and she continues to inspire other women in her village to pursue farming with confidence and resilience.

Tundup

Tundup, a 62-year-old government official in the Public Health and Engineering (PHED) Department, has spent his career navigating the complexities of Ladakh's administrative landscape. With decades of experience, he has played a crucial role in implementing policies and programs aimed at improving the livelihoods of local communities, including *Swatch Bharat Mission* and *Jal Jeevan Mission*. Tundup's intimate knowledge of the region's socio-economic challenges has enabled him to advocate effectively for infrastructural development and resource allocation.

Jharkhand Participants

Rekha

Rekha, a farmer from Jharkhand, brings a wealth of traditional agricultural knowledge to her community. Her expertise in organic farming and sustainable practices has made her a vital resource for other farmers in her village. Rekha's dedication to preserving indigenous farming techniques while adapting to modern challenges has helped her community achieve greater food security and environmental sustainability. Her leadership in local farming initiatives has empowered many women to take active roles in agriculture.

Phoolan Devi

Phoolan Devi, another farmer from Jharkhand, is celebrated for her resilience and innovation in agriculture. She has also served as the former sarpanch (head) of the village. She actively participates in community farming groups and advocates for women's rights in agriculture. Phoolan's story is one of perseverance and determination, serving as an inspiration to many in her village and beyond.

Manju

Manju, a daily laborer from Jharkhand, embodies the spirit of hard work and determination. She juggles multiple roles to support her family, working tirelessly in the fields and as a laborer on various local projects.

Janki

Janki, a farmer from Jharkhand, is a dedicated farmer from a small village in Jharkhand. Each day, she rises before dawn to tend to her fields, working tirelessly under the sun. Her mornings are spent watering crops and checking on the plants, ensuring they are healthy and thriving.

Despite the challenges posed by erratic rainfall and depleting groundwater, Janki remains resilient.

Ramsakhi

Ramsakhi, another dedicated farmer from Jharkhand, has a profound understanding of the local ecosystem and sustainable farming practices. A mother of two, she spends most of her day in the field.

Sheela

Sheela, an NGO worker from Jharkhand, is passionate about community development and social justice. Her work focuses on empowering marginalized communities, particularly women, by providing them with education, resources, and support. Sheela's efforts have led to significant improvements in health, education, and economic opportunities for many in her region. Her dedication to social work and her ability to connect with people on a personal level make her an invaluable asset to her organization and the communities she serves.

Chapter 4 - Results

In this section, I present the empirical evidence gathered from extensive fieldwork, offering insights into how these communities are responding to the complex interplay of factors such as environmental, socio-economic, and gender. I discuss the results in line with the three research issues discussed on pages 18.

1. Climate change impacts water resources.
2. Exploring Community Resilience in Ladakh and Jharkhand; and
3. Analyzing Gender and Water Management in Ladakh and Jharkhand²

1. Assessing Climate Change Impacts on Water Resources in Ladakh and Jharkhand

Ladakh:

The Impacts of climate change on Ladakh and its water resources are stark and multifaceted. Glaciers which are critical sources of water for the region, are retreating at an alarming rate. This phenomenon has been corroborated by local observations and scientific studies. Tsering Chondol, President of the Women’s Alliance of Ladakh, remarked:

“The glaciers are melting faster than before, and we can see the impact on our water sources. This melting is leading to reduced water flow in streams and rivers, which traditionally relied on glacial meltwater.”

² This dissertation also compares matrilineality and patrilineality and their outcomes, in a dedicated sub-section (page 67). By examining how these differing social structures influence water governance and community resilience, the research illuminates the unique challenges and strategies employed by women in Ladakh and Jharkhand. This comparison will offer a more refined understanding of the role of gender dynamics in climate change adaptation and policy development.

Rigzin Angmo, a 40-year-old farmer, narrated her observations about the shrinking glaciers.

“When I was a child, the glaciers were immense, visible even from our village. Now, they have receded so much that sometimes I wonder if my grandchildren will ever see them.” Those white giants were a constant part of our landscape, like silent guardians watching over us. You see in Buddhism: we believe everything has a soul. Back in the day, we used to play near the edges of the glaciers, feeling the chill and listening to the sounds of the ice cracking. It was like playing a game. Now, I see my children, and I feel a pang of loss. They play too, but not near ice.”

It is these intimate details that bring to life the drastic environmental changes that formal data alone cannot fully convey. Rigzin’s story is not unique. Many Ladakhi farmers depend on glacial meltwater for irrigation and are now witnessing diminished water availability, particularly during the crucial pre-monsoon period.

In Ladakh, the reduction in glacial meltwater has led to the drying up of traditional irrigation channels (locally known as *ghuls*), which were once reliable sources of water. In Jharkhand, field visits revealed that many traditional water bodies, such as ponds and wells, are either drying up or facing contamination due to irregular rainfall.

Dolma Lamo, a 67-year-old farmer, reminisced,

“I remember when the fields were so green that it looked like a sea of grass. Now, it is a sea of brown.”



Figure 2 Dolma Lamo gets water from a pipeline connected to the spring.

The erratic precipitation patterns further exacerbate the situation. "With less snowfall in recent years, the streams are drying up earlier in the season," noted a local farmer, reflecting on the critical water shortages faced during the growing season. This shift has not only affected water availability but also quality, as diminished flow leads to higher concentrations of contaminants in the water supply.

Dolma Lamo shared her concerns: "Unreliable rainfall and a shrinking river have made it challenging to sustain our traditional farming practices" and explained how the lack of water often forced her to fetch water from distant sources, making farming increasingly difficult.

A geologist from the Himalayan Institute of Alternatives, Nishant Tikku, emphasized the urgency:

"The rate at which glaciers are melting is fast, and there is no infrastructural development on the ground to deal with it. In the next 10-15 years, major chaos will unfold if no concrete solutions are brought into place."

Mr. Tundup, a Technical Officer in the Public Health and Engineering (PHE) Department, Leh Administration notes that

“The biggest challenges are geography and climate. Because no matter who comes here, it’s very difficult to work here. In freezing temperatures, we cannot work, so the working season is only for 4-5 months. The administration is trying. Different departments are working in different capacities. Under the ‘Catch the Rain³’ campaign, we are trying to preserve snow and glaciers. We have also provided tap water connections under JJM⁴. We have also tried making ice stupas. But personally, I don't think it is able to conserve a lot of water. Every effort has been put forth by my administration to tackle water shortage issues.”

In many villages, traditional water management practices heavily rely on the ancient *Churpon system*⁵, where water allocation is managed by a designated individual. This traditional system is still prevalent but is now being supplemented with newer practices under government initiatives like the Jal Jeevan Mission (JJM). However, implementation gaps exist. The insights from Ms. Sara, an NGO worker and fieldworker of the Ladakh Ecological Development Group (LEDeG), further highlight the challenges:

“In many places, pipes are not put properly in the ground. There are leakages. Some infrastructure is broken. The pipe should be 4-5 meters below the ground, but in some places, it was only 2 meters below the ground. We did a study called Decentralized Water Management System and studied how we could apply a decentralized approach. We believe that if there is a centralized system and if any problem occurs, then the whole system has to be shut down. But a decentralized system is more efficient at solving problems.”

³ The Jal Shakti Abhiyan launched this campaign to promote rainwater harvesting.

⁴ JJM, which stands for Jal Jeevan Mission, is a scheme initiated by the Ministry of Jal Shakti of the Government of India under the Jal Jeevan Mission in 2019 to provide 55 liters of tap water to every rural household per capita per day regularly on a long-term basis by 2024.

⁵ The ancient, traditional water management system of Ladakh which allows local people to elect a water chief who manages water distribution in the village.

This reflects the ongoing struggle between traditional methods and new, yet sometimes flawed, implementations. Women farmers, who primarily manage water for agricultural purposes, are directly affected by these discrepancies. They often face water shortages and must adapt to both old and new water management. When I visited Phyang village, I had an enlightening conversation with the Goba, the village water chief. It was intriguing to learn about the traditional roles and the evolving dynamics in water management. The Goba shared an interesting point that highlighted gender-specific responsibilities in their community. "It was not easy," he admitted.

“Men have been responsible for irrigation decisions for as long as I can remember, but times are changing. Women are now actively involved in managing water, even though we've only ever had men as Gobas.”

He continued,

“All the women of the village gather in the sun, talking about our lives, cooking, cleaning, and sending children to school. They know how much water the household needs. Winter is harsh here, so we break ice and boil it. But if only I work, then nothing will happen.”

This statement underscores the collective effort required to adapt to changing environmental and social conditions. It also emphasizes the crucial, yet often overlooked, role women play in the day-to-day management of water, reflecting their resilience and adaptability in the face of tradition and modern challenges.

Jharkhand

In Jharkhand, the impacts of climate change manifest differently and are equally severe. The monsoon, which is vital for the state's agriculture, has become increasingly unpredictable.

These changes in precipitation patterns have led to erratic rainfall, affecting both water availability and agricultural productivity. Rekha, a farmer in her early fifties, explained,

“Earlier, we could predict the rain. Now, either we have floods or droughts. Last year, we lost half our crop because the rains came too late. This change in seasons means we cannot get water when we need it. It’s hard to decide what crops to plant and when, and this means that our community isn’t sure when we will get money to buy food and clothes for our children. It is hard.”

Field observations support these narratives, showing that both regions are experiencing significant climatic changes.

“The monsoon has become more irregular, making it challenging to plan agricultural activities. Earlier, we knew when it would rain, but now we can't tell; one day is sunny and the other is rainy,” shared Sheela, a local farmer.

This unpredictability disrupts traditional farming cycles, leading to crop failures and food insecurity.

Sheela continues,

“There used to be a jungle here, but it's all gone now. All the trees. The ground doesn't take in the rain like before, so when the dry days come, we don't get much water. It feels like the gods are annoyed with us.”

These environmental changes caused due to climate change led to reduced groundwater recharge, making water scarcity a persistent problem, especially during the dry season. Another farmer said, “The ground has almost no water, especially during the summer dry season,” highlighting the urgent need for sustainable water management practices.

In another interview, Janki explained how floods have also become a significant concern:

“Big water⁶ comes more now, ruins our fields, and breaks our houses. Each time, it is tougher to fix everything and stand up again. These big waters coming often are a big worry for all of us living here. My kids get scared

⁶ Big water here implies lots of water at once.

when it rains hard. We try to keep them calm, but it's not easy. Even if we have done all the work, the landlord does not give us money easily; we must ask him again and again. I must feed my children; if something happens to me, who will look after them? I pray to Lord Indra every time it rains a lot; I know he will listen to me someday...”

2. Exploring Community Resilience in Ladakh and Jharkhand

Ladakh:

Ladakh's communities have developed innovative strategies to cope with the changing climate, with traditional knowledge playing a significant role in these adaptive measures.

“Almost every Ladakhi woman knows farming; almost every house has a vegetable garden; we farm side by side; I learned it from my parents. We grow barley, wheat, radish, carrots, cabbages, mint, turnips, cauliflowers, potatoes, and tomatoes, shared Dolma.

It is evident that self-sufficiency in food production is a key resilience strategy.

The Women's Alliance of Ladakh (WAL) is at the forefront of resilience efforts. The organization has over 5,000 members and consists entirely of women. WAL works to increase women's status and self-confidence by having meetings in the villages and arranging education in various crafts to give women an opportunity for their own income. The organization also disseminates information about how important it is to grow organically and to manage the water supply in the harsh landscape. They persuade farmers to practice organic farming and traditional water-harvesting techniques.

“We need to be prepared for water-related challenges ahead,” emphasized Tsering Chondol, President of WAL. By reviving ancient practices such as building *zings*⁷, the community is creating sustainable water sources that mitigate the impacts of glacial retreat.”

Collective action also plays a critical role. Chondol described the efforts to maintain the cleanliness of water sources:

‘We organize community clean-up drives to ensure our streams and lakes are not polluted. It’s a collective effort to protect our water.’”

“Through working together as farmers, women support each other during difficult times and share resources” noted one community member during the focus group interview. Initiatives such as these strengthen social bonds and community resilience while ensuring food security.

In the village of Pishu⁸ the community has implemented solar water pumps to mitigate water scarcity. These pumps are put under the river or lake and are drawn in using the Sun’s energy. The use of solar energy not only ensures a sustainable water supply but also reduces dependence on external resources and fuels. These pumps are especially beneficial in remote areas with unreliable traditional water sources. This practice exemplifies how local innovation and renewable energy sources can address water challenges in high-altitude regions. Previously, women farmers in Pishu had to travel long distances and lift heavy buckets of

⁷ Zings are water harvesting structures found in Ladakh. They are small tanks, in which collect melted glacier water.

⁸ Pishu is a small village located in the Zaskar valley of Ladakh.

water, with the use of a pump. The solar pump has made life easier, and they have now asked the village council to install more water via tanks so that their effort is further reduced.

During an interview, Lobsang, a conservationist from the region, emphasized the need for locally driven solutions to environmental challenges. He argued

“The solution is to regulate the number of tourists and vehicles entering the area, understanding the impact of black carbon on glaciers and greenhouse gas emissions at high altitudes. The real issue isn't the global scale of climate change, but what we do within this ecosystem. Poor policies, disconnected from local realities, exacerbate these challenges. What's needed is a collaborative effort that bridges communities, politics, and international relations, backed by reliable data. At the end of the day, it's the community that must take a stand for the region.”

Lobsang's reflections resonate with the discourse on adaptation in Pishu Village, particularly the need for context-specific, regionally tailored solutions that integrate local knowledge and community participation. While external interventions like infrastructure development and technology transfer are essential, they must be aligned with the lived experiences and insights of local communities. This perspective aligns with Singh's assertion that “decentralization in governance must transcend mere administrative devolution and engage with local knowledge systems. Without the active participation of local communities, particularly marginalized groups such as women, these interventions risk being misaligned with the ground realities” (Singh, 2018). Singh's conclusion further underscores the importance of capacity-building mechanisms and ‘inter-local organizational synergies at the community level’ as critical components for future policy design (p. 228). These considerations, drawn from an ethnographic examination of policy failures at the grassroots level, situate his study within the broader discourse on capacity and justice in state policy design.

In Ladakh's frigid winters, where temperatures can plummet to -30 degrees Celsius, preventing water pipes from freezing is crucial. Yak wool, sourced from the hardy yaks that thrive in high-altitude pastures, is an integral part of Ladakhi life and is a material known for its excellent insulating properties. The women shear the wool, clean it, and then spin it into yarn using traditional spinning wheels. This yarn is then woven into thick, durable covers. The women skillfully wrap water pipes with yak wool covers. Wrapping the pipes with yak wool ensures a continuous water supply during winter and prevents the pipes from bursting due to ice expansion. The process is labor-intensive, requiring patience and skill, but the result is a highly effective insulation material that is both sustainable and readily available. This use of yak wool is a testament to the women's resourcefulness and their ability to utilize traditional knowledge in modern applications. This practice showcases women's deep understanding of local resources and climate adaptation techniques, reflecting a blend of resilience and innovation.

Taking this forward, the local adaptations by women exemplify call for integrating local knowledge and community involvement into adaptation strategies. Beyond insulating water pipes, the women of Ladakh engage in various daily activities that demonstrate how they ensure an adequate water supply, their resilience, and their deep-rooted connection to their environment. For instance, they use traditional techniques to harvest and store water in ice stupas—artificial glaciers that melt slowly during the summer, providing a reliable source of water for irrigation. These ice stupas are a community effort, often led by women, who coordinate the collection of water during the winter and its strategic storage in towering ice structures. This method not only mitigates water scarcity but also illustrates the community's adaptive strategies for climate change.

The women are also adept at crafting winter clothing from yak wool and other local materials. To survive the harsh winters, women knit and weave warm garments, such as hats, gloves, and sweaters, with intricate patterns and designs that reflect the region's artistic traditions. This is not only practical but also ensures the continuity of the cultural heritage of Ladakh, with intricate patterns and designs that reflect the region's artistic traditions.

Inside their homes, Ladakhi women take care of the family by making sure the house is warm. They do this by using traditional wood stoves, which are often enhanced with insulating materials such as mud and dung to retain heat. These stoves are central to the household, providing warmth and a means to cook food in the severe cold. Women also make use of locally sourced herbs and plants for medicinal purposes, maintaining a wealth of traditional knowledge about natural remedies that is passed down through generations. This knowledge is crucial in a region where access to modern healthcare can be limited.

Through these practices, the women of Ladakh exemplify resilience and sustainability, effectively blending traditional knowledge with innovative solutions to address the challenges posed by their environment. Their daily lives are a testament to their strength, adaptability, and the vital role they play in maintaining their communities' well-being amidst changing climatic conditions.

Jharkhand:

In Jharkhand, resilience is demonstrated through community solidarity and innovative practices. Women have formed self-help groups that play a crucial role in addressing water scarcity. “Sometimes we have to walk long distances for water, but we make the journey

together,” said Janki, a local farmer. These groups provide a platform for sharing knowledge and resources, ensuring that no one is left behind.

Rainwater harvesting is another critical strategy. “We're exploring new ways to collect rainwater and store it for when we need it most,” explained a village woman. Collecting rainwater systematically is crucial in a region where traditional water sources are becoming increasingly unreliable.

A Khunti woman said:

“Our community used to help each other in the sowing and reaping seasons. But now it is difficult to find help because many people are not able to make money farming, and some have gone to the city.”

The level of awareness about climate impacts and adaptation strategies is growing. Community members also connected the decrease in soil productivity and nutritional value of food with the excessive use of pesticides. They also know the need to preserve traditional, nutritious food items like *madua* (finger millet) and *kulthi daal* (horse gram), which are becoming extinct due to the shift towards more lucrative but less nutritious hybrid crops.

Leadership within the community also matters. “There are women like Leela Didi in Morchu who understand women's issues better,” said a local activist. These leaders advocate for better infrastructure and support, ensuring that women's voices are heard in decision-making processes.

In the rural regions of Jharkhand, the concept of *Rani Mistri*⁹, or female masonry workers, has emerged as a powerful symbol of resilience and empowerment. Traditionally, masonry work was considered a male-dominated field, but economic pressures and social changes have driven women to break these gender norms and take on roles as skilled laborers. The term “Rani Mistri” embodies the pride and respect these women have earned through their hard work and determination.

These female masons are not only contributing to the construction industry but also earning an additional income, which is crucial for their households. Many of these women were previously engaged in unskilled labor or domestic work, earning minimal wages. By training as masons, they have significantly increased their earning potential, enabling them to support their families better and invest in their children's education and health. The additional income also provides a safety net against the economic shocks caused by erratic rainfall and agricultural challenges.

The training programs that have enabled women to become Rani Mistris are often supported by local NGOs and government initiatives aimed at promoting gender equality and economic development. These programs provide women with the necessary skills in bricklaying, plastering, and other masonry techniques. Additionally, they are taught to read construction plans and manage work sites, further enhancing their capabilities and confidence. This vocational training empowers them to compete equally with their male counterparts and secure jobs in the construction sector.

⁹ Rani Mistri is the unique movement which started from the Rural Development Department, Jharkhand, where these women Mistris used to construct toilets and houses in rural areas.

The impact of these women's work extends beyond individual households to the broader community. As Rani Mistris, for example, they contribute to building essential infrastructure, such as schools, community centers, and sanitation facilities, which are vital for the community's development. Their involvement in construction projects also challenges societal perceptions about gender roles, gradually fostering greater acceptance of women in non-traditional occupations.

Furthermore, the resilience of these women is evident in how they manage both domestic responsibilities and their work as masons. A typical day for a Rani Mistri often begins early in the morning with household chores, followed by a full day of physically demanding masonry work. Despite the challenges, they persist, driven by the goal of securing a better future for their families. Their ability to balance these dual roles underscores their strength and determination.

In addition to financial independence, becoming a Rani Mistri has also brought about a sense of personal empowerment and self-worth for many women. They gain respect within their communities and from their families, altering traditional power dynamics and paving the way for future generations of girls to pursue similar opportunities. The success of the Rani Mistris serves as an inspiring example of how women in rural India can overcome societal barriers and contribute meaningfully to their households and communities through resilience and hard work.

Ladakh and Jharkhand compared:

Ladakh's communities have developed innovative strategies to cope with the changing climate. Traditional knowledge plays a significant role in these adaptive measures.

Dolma:

“Almost every Ladakhi woman knows farming; almost every house has a vegetable garden. We grow barley, wheat, radish, carrots, cabbages, cauliflowers, potatoes, and tomatoes.”

The Women’s Alliance of Ladakh (WAL) is at the forefront of resilience efforts, persuading farmers to practice organic farming and traditional water-harvesting techniques, and the community is reviving ancient practices such as building 'zings' (artificial glaciers) to create sustainable water sources.

Tsering Chondol emphasized: “We need to be prepared for water-related challenges ahead women groups like ours can lead this movement”

3. Analyzing gender and water management in Ladakh and Jharkhand

Ladakh

In Ladakh, traditional gender roles often place women in charge of water collection and management, yet women are underrepresented in formal decision-making bodies. A local woman lamented:

“Men make decisions, but we work in the field all day; from sowing to harvesting, he decides what price to sell vegetables for in the market.”

She adds

“Every day, I wake up before the sun. The first thing I do is get the fire going, so we have hot water for tea.

Then, I get ready to go fetch water. It’s a long walk to the well, and sometimes, the queue is so long, I end up spending hours just waiting.

By the time I get back, the children are awake, and I must get them ready for school.

We have breakfast together, just simple rice and vegetables, whatever we have.

After they leave, it's time for real work. I go to the fields, tending to our crops. We grow everything ourselves – rice, wheat, some vegetables.

It's hard work, especially when the weather doesn't cooperate. Like last year, we had such a dry spell, the crops almost failed. But we found ways to save them, using less water, and working longer hours. We women don't give up easily.

By noon, I head back to the house to prepare lunch. After lunch, there's more work – cleaning, washing clothes, taking care of the animals. The day never ends.

But through all this, we talk, laugh, and support each other. The other women (she points towards them) and I, we share our worries and our hopes. We sit together, sometimes under the big neem tree, and just talk. It's our way of finding strength, of knowing we are not alone in this struggle.

...I remember when they were building the new water tank. I had some idea, but my husband asked me to stay quiet. After all, I fetch the water every day. But no one asked us. You tell me, Madam ji, what should I do?"

Efforts are being made to change this dynamic. The Women's Alliance of Ladakh advocates for more women in local water management committees. "We need more women's representation in local water management committees to ensure inclusivity," argued Tsering Chondol. By improving women's education and leadership opportunities, the community aims to empower women to take on more significant roles in water governance.

Sonam expressed her desire for better educational opportunities for her daughters:

"Improving women's education will be a big thing. I want to send my daughter to a school in the city so she can have a better future."

Jharkhand

In Jharkhand, similar gender disparities exist. Women are often responsible for water collection, which involves long and arduous journeys. Janki noted:

“Women are responsible for traveling long distances to fetch water. They put all the effort, even daughters miss school at times to fetch water, but women rarely participate in formal decision-making processes. They want to participate, but they are overlooked. Even the husband does not listen.”

Education and training are seen as possible pathways to change. An NGO participant, Rakhi said: “Teaching women more about water can help them get involved in making decisions about it.”

By further equipping women with knowledge and skills, about leadership, the community could undermine the barriers that prevent women from participating fully in water governance.

Economic migration further complicates the situation. “Men leave for cities, but women have to stay back with the crops,” said Rekha. These dynamic places additional burdens on women, making it even more critical to address gender inequalities in water governance.

“When women migrate for work and leave their children in the care of the father or grandparents, caregiving gets disrupted” explained Rekha. Women migrants also discussed, but perhaps not openly, that men can misuse the remittances, for example by gambling and/or purchasing alcohol, thus exacerbating the children's vulnerability.”

When women are employed, as paid workers—for example, in factories near their hometowns—they also face significant challenges. A woman from Sakhi NGO¹⁰

“Women working in factories near their hometowns have often complained of poor working conditions and health hazards...”

The long hours, low wages, and exposure to harmful conditions add to the stress and health risks faced by the women.

Having offered an overview of the main thinking by interviewees in relation to the three central research questions, I now discuss the results in line with four issues: water management,

¹⁰ The NGO works on rural development.

climate change impact on water resources, community resilience, and the linkages between gender and water management.

In terms of women in water management in Ladakh, women constitute only 10% of members in local water management committees, despite making up 60% of the agricultural workforce. In contrast, Jharkhand shows a more progressive trend, with women leading 30% of the newly formed water management groups, indicating a shift towards gender inclusivity (NGO reports by LeDeg, 2021).

i. Assessing Climate Change Impacts on Water Resources in Ladakh and Jharkhand.

Ladakh: The impacts of climate change on Ladakh and its water resources are stark and multifaceted. Glaciers, critical sources of water for the region, are retreating at an alarming rate, as corroborated by local observations and scientific studies.

Tsering Chondol, President of the Women’s Alliance of Ladakh:

“The glaciers are melting faster than before, and we can see the impact on our water sources. This melting is leading to reduced water flow in streams and rivers, which traditionally relied on glacial meltwater.”

Rigzin Angmo, a 40-year-old farmer, shared her observations about the shrinking glaciers: “When I was a child, the glaciers were immense, visible even from our village. Now, they have receded so much that sometimes I wonder if my grandchildren will ever see them.”

Rigzin’s story is not unique. Many Ladakhi farmers depend on glacial meltwater for irrigation and are now witnessing diminished water availability, particularly during the crucial pre-monsoon period.

Jharkhand: In Jharkhand, traditional water bodies, such as ponds and wells, are drying up or facing contamination due to irregular rainfall. This situation mirrors the drying up of traditional irrigation channels (locally known as *ghuls*) in Ladakh.

Rekha, a farmer in her early fifties, explained: “Earlier, we could predict the rain. Now, either we have floods or droughts. Last year, we lost half our crop because the rains came too late.”

This unpredictability disrupts traditional farming cycles, leading to crop failures and food insecurity.

While both regions face significant water-related challenges due to climate change, the specifics differ. In Ladakh, melting glaciers are the primary concern, whereas, in Jharkhand, erratic rainfall patterns and resulting water scarcity are the main issues.

Jharkhand: In Jharkhand, resilience is demonstrated through community solidarity and innovative practices. Women have formed self-help groups that play a crucial role in addressing water scarcity.

Janki noted: “Sometimes we have to walk long distances for water, but we make the journey together.”

Rainwater harvesting is another critical strategy. Collecting rainwater systematically is crucial in a region where traditional water sources are becoming increasingly unreliable.

A woman from Khunti explained:

“Our community used to help each other in the sowing and reaping seasons. But now it is difficult to find help because many people are not able to make money farming, and some have gone to the city.”

Comparative Insights:

Both regions demonstrate strong community resilience, but the methods differ. Ladakh relies heavily on traditional knowledge and practices, while Jharkhand emphasizes community solidarity and modern techniques like rainwater harvesting.

ii. Analyzing Gender and Water Management in Ladakh and Jharkhand.

In Ladakh, traditional gender roles place women in charge of water collection and management, yet they are underrepresented in formal decision-making bodies.

A local woman lamented: “Men make decisions, but we work in the field all day; from sowing to harvesting, he decides what price to sell vegetables for in the market.”

Efforts are being made to change this dynamic. The Women’s Alliance of Ladakh advocates for more women on local water management committees. Tsering Chondol argued: “We need more women’s representation in local water management committees to ensure inclusivity.”

Jharkhand: similar gender disparities exist. Women are often responsible for water collection, which involves long and arduous journeys. Janki noted: “Women are responsible for traveling long distances to fetch water.”

Education and training are seen as possible pathways to change. An NGO participant, Rakhi, said:

“Teaching women more about water can help them get involved in making decisions about it.”

In terms of comparative insights, both regions face significant gender disparities in water management. However, the initiatives in Ladakh focus more on increasing women’s

representation in decision-making, while Jharkhand emphasizes education and training to empower women.

A Comparison of Ladakhi Matrilineality¹¹ and Jharkhand Patrilineality¹²

Below, I discuss property and inheritance, family structures, and social and cultural norms for both sites.

Matrilineal Society in Ladakh

Property and Inheritance: In Ladakh's matrilineal system, property and land are passed down through the female line. Women may inherit land, which theoretically gives them control over family assets. Despite inheritance rights, male family members often manage the property and make key decisions, limiting women's practical power over these assets.

Family Structure: Women may hold the role of family head in a matrilineal society. However, major decisions often require the consent or input of male relatives, such as uncles or brothers. Male elders and community leaders typically hold significant sway in decision-making processes, both within families and in broader community matters.

Social and Cultural Norms: Societal norms and traditions can restrict women's autonomy, dictating their roles within the household and community despite their formal property rights. Leadership positions within the community are often dominated by men, limiting women's influence in public affairs.

¹¹ Matrilineality refers to familial relationships that can be traced through a female

¹² Patrilineality refers to familial relationships that can be traced through a male

Patrilineal Society in Jharkhand.

Property and Inheritance: In Jharkhand's patrilineal system, property and inheritance are passed down through the male line, reinforcing male dominance in economic matters. Women typically have limited rights to inherit property, and their economic security is often tied to their relationships with male relatives.

Family Structure: The family head is usually a male, such as the father or eldest son, who wields significant control over household decisions and resources. Women's roles are primarily domestic, with expectations to manage the household and care for children, further entrenching male authority.

Social and Cultural Norms: Cultural norms emphasize traditional gender roles, with men as providers and decision-makers, and women as caretakers and homemakers. Men dominate political and community leadership positions, limiting women's participation and influence in public life.

Commonalities in Power Dynamics.

Despite the differing inheritance systems, men hold significant power in both societies through their roles in decision-making and community leadership.

For example, cultural reproduction and cultural norms in both Ladakh and Jharkhand reinforce male dominance, limiting women's practical autonomy and influence. In relation to economic control: Men often control economic resources and opportunities, further entrenching gender power imbalances regardless of the inheritance system.

These points highlight how traditional gender roles and cultural norms sustain male dominance in both matrilineal and patrilineal societies, despite differences in property inheritance and family structure.

The dynamics of matrilineal societies and the role of gender in decision-making, particularly in regions like Ladakh, present a complex interplay between cultural norms and environmental challenges. Despite the matrilineal structure, where lineage and inheritance are traced through women, especially in critical areas like water and agriculture, decision-making often remains in the hands of men. This paradox highlights the intricate relationship between social ties and authority, which can be further complicated by the impact of climate change.

Similarly, in patrilineal Jharkhand, despite women's extensive involvement in agriculture and their intimate knowledge of water resources, their input is also frequently overlooked in formal governance and community planning. It is evident that in both sites it is patriarchal norms that dictate men to be the primary decision-makers, which leads to the marginalization of women's voices in critical discussions on environmental management and adaptation strategies.

This gender disparity in decision-making is especially problematic in the context of climate change, where effective adaptation requires the insights and cooperation of all community members. Women, who are often the most directly affected by water scarcity (due to their responsibilities for food preparation) and climate-related disruptions (due to their agricultural work) bring valuable perspectives through their lived experiences on resource management that would be crucial for developing sustainable solutions.

By drawing on parallels between the two regions, I argue that regardless of the underlying societal structure—be it matrilineal or patriarchal—the inclusion of women in decision-making

processes is essential for effective climate change adaptation and sustainable water governance. This not only aligns with principles of gender equality but also strengthens community resilience by leveraging the full spectrum of knowledge and experience – women’s and men’s - within society.

Chapter 5 - Conclusion.

1. Linking theory to practice: FPE and my study

From my earlier discussion, it is evident that many have demonstrated that Feminist Political Ecology (FPE) examines how intersecting identities and power structures influence environmental dynamics, advocating for a transformative approach to environmental governance. FPE promotes more equitable and sustainable practices and challenges existing power imbalances. Building on, and developing my study also focuses on how the dynamics and relationships among people manifest in practice. Through fieldwork, I sought to understand “how it happens” on the ground, offering a concrete perspective on FPE's theoretical concepts.

Feminist Political Ecology suggests that women, generally, have limited access to sustainable agriculture. In contrast, my research presents a different perspective within the specific contexts of Ladakh and Jharkhand. Contrary to the broader assumption, the women in this case are not only actively involved in water management but are also leading the way in sustainable agricultural practices.

Feminist Political Ecology (FPE) has also been instrumental in highlighting the frequent underrepresentation of women in environmental decision-making processes. However, my research in Ladakh and Jharkhand reveals that women's knowledge, needs, and priorities are not ignored, mostly due to the women's active involvement in, for example, The Women's Alliance of Ladakh, a grassroots organization. This deep community commitment illustrates the profound impact of their involvement. the WAL has become a beacon of empowerment, ensuring that women's voices are heard in environmental decision-making processes.

During my fieldwork, I encountered a local woman, Sita, in Morchu, Jharkhand, whose insight painted a vivid picture of community engagement. As we stood by the newly installed tap outside her house, I asked, “Do you know who set up this?”

With a smile, she replied, “Yes, some men came and installed it here. The government will provide water.” I looked across and saw a young girl washing dishes at the tap provided by the government. I asked her, “Is this the tap? Did each house get one?” She said, “No, there is only one tap for four houses.” (See Figure 4)



Figure 4: A young girl washing dishes with Jal Jeevan Mission written in the background.

In the results section, I discussed my interview with Sita, and her impressive awareness of the Jal Jeevan Mission, reflecting the widespread awareness among women in the village.

This active participation highlights a crucial aspect of Feminist Political Ecology—while women may often be underrepresented in formal decision-making, their grassroots involvement ensures their needs and priorities are not always overlooked. In Morchu, women like Sita are leading the way in sustainable agriculture and water management, showcasing that true empowerment comes from the ground up.

Feminist Political Ecology (FPE) provides a valuable framework for research, but it does not encompass all the complexities of unequal power relations. While FPE often highlights the barriers women face in accessing resources, it is important to recognize that these barriers do not always hinder women's involvement. In many cases, women are not only participants but are, simultaneously, leaders in their communities. As observed during the interviews and informal discussions, it appeared although women may be underrepresented in formal environmental decision-making processes, they actively advocate for their needs and priorities at the village level, demonstrating significant influence and leadership in local environmental initiatives.

Policies are significant, yet their implementation at the local level has faced challenges. Some researchers suggest that such policies are often disconnected from the specific local contexts in which they operate (Klein et al. 2017; Funder and Mweemba 2019). Echoing these concerns, my study has addressed this gap by engaging directly with women at the local level, providing insights through conversations that highlight the practical realities and challenges of policy implementation.

Feminist Political Ecology (FPE) advocates for policies and interventions that promote gender equality and empower marginalized groups. This study illustrates that empowerment often

comes from the actions of women themselves, not solely from policy interventions. While FPE implies this, it does not explicitly prioritize the centrality of women's direct actions. As this research demonstrates there is, therefore, a need for more field studies to better understand and document the proactive roles women play in promoting their own empowerment and advocating for gender equality within their communities.

The example of the Rani Mistris in Jharkhand is especially illuminating in demonstrating how environmental changes and policies affect women differently from men (Gezon 2002). This policy had a profound impact on women, providing them with not only the technical skills needed, but also created more financial independence and greater social recognition for women. Unlike their male counterparts, women face unique challenges such as balancing household responsibilities with their training and work. However, they also experience significant benefits that men do not, such as increased autonomy and a stronger voice in community decisions. The Rani Mistri¹³ initiative demonstrates the gender-differentiated effects of environmental policies and underscores the importance of considering women's specific needs and contributions in policy design and implementation.

2. Lived Experiences Realities and the Research

The comparison between Ladakh and Jharkhand reveals distinct challenges and adaptive strategies related to climate change, community resilience, and gender roles in water management.

¹³ The Rani Mistri initiative was discussed on page 52. It empowers rural women by training them as skilled masons to construct toilets.

Climate Change Impact on Water Resources

Both regions experience significant water-related challenges due to climate change, but the specifics differ, highlighting the need for region-specific solutions. In Ladakh, the rapid melting of glaciers poses a severe threat to water availability, whereas Jharkhand struggles with erratic rainfall and water contamination.

Community Resilience

Ladakh's reliance on traditional knowledge and innovative practices like artificial glaciers contrasts with Jharkhand's emphasis on community solidarity and modern techniques like rainwater harvesting. Both approaches showcase the adaptability and resilience of these communities, and also underline the importance of integrating traditional and modern methods to address environmental challenges effectively.

Gender and Water Management.

Gender disparities in water management are evident in both regions. In Ladakh, traditional gender roles limit women's participation in decision-making, despite their crucial role in water collection and management. In contrast, Jharkhand's focus on education and training for women aims to empower them to take on leadership roles in water governance. Both regions highlight the need for greater gender inclusivity and the empowerment of women in water management.

By examining the unique experiences and responses of Ladakh and Jharkhand, this study has underscored the importance of context-specific strategies in order to address climate change impacts, enhance community resilience, and promote gender equality in water management.

The findings from these two regions offer valuable insights for developing effective policies and interventions that can support sustainable water management and resilient communities in diverse socio-environmental contexts.

In conclusion, while policy recommendations are often discussed in academic and policy-making circles, this thesis aims to foreground the voices of those directly affected by climate change. However, what is often forgotten is that the very same people who can articulately discuss their problems also make valuable suggestions for eliminating problems that can form the basis for policy development. This study has shown that the women appear to know what the problems are, they form solutions and utilize local resources to address the challenges, proving their self-sufficiency to a significant extent. This is particularly evident among local women who are acting to mitigate climate change. They also demonstrate their deep understanding of their contexts to improve their circumstances. The women also have specific expectations from the government and policy frameworks. In sum, the study has underscored the importance of incorporating local knowledge and community-driven solutions into broader policy initiatives to create effective and sustainable climate resilience strategies.

Through their dedication and collective action, the women of Ladakh and Jharkhand are redefining sustainable practices, confirming that their contributions are indispensable to the environmental resilience of their communities.

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