



Climate Change, Gender, and Adaptive Capacity in Nepal's Rural Communities

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Abstract

This paper examines the relationship between climate change, gender, and adaptive capacity in Nepal's rural communities. Using a qualitative thematic review of empirical studies, policy documents, and case-based evidence, the study explores how climate change affects rural livelihoods and how social inequalities shape communities' ability to adapt. The findings show that climate-related hazards, including erratic rainfall, floods, droughts, and landslides, threaten agriculture, food security, and health, with greater impacts on women, Indigenous groups, and marginalized communities. These vulnerabilities are linked to unequal access to resources, information, decision-making power, and institutional support. Although rural communities use local knowledge and traditional adaptation practices, these efforts require stronger policy recognition and institutional support, guided by principles of climate justice and equity. The study highlights that adaptive capacity is shaped not only by environmental conditions but also by gender relations, socio-economic status, and governance systems. It argues that effective climate adaptation in Nepal requires gender-responsive, socially inclusive, and locally grounded approaches that strengthen community resilience and address structural inequalities.

Keywords: Climate change, gender vulnerability, rural livelihoods, social inclusion, climate adaptation policy

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Introduction

Climate change has emerged as one of the most pressing global challenges, with extensive scientific evidence demonstrating the increasing influence of human activities on the climate system. Successive assessment reports of the Intergovernmental Panel on Climate Change (IPCC) confirm that global temperatures, greenhouse gas concentrations, and extreme weather events have risen significantly over time (IPCC, 2021, 2022, 2023). These changes have resulted in intensified climate variability, including heatwaves, heavy precipitation, and rising sea levels, with profound implications for ecosystems and human societies.

Nepal is among the countries most vulnerable to climate change due to its fragile mountain ecosystems, diverse climatic zones, and heavy dependence on climate-sensitive sectors such as agriculture (National Planning Commission, 2024). Evidence shows that Nepal has experienced a higher warming trend than the global average, particularly in high-altitude regions, along with increasing variability in rainfall patterns and a rise in climate-induced hazards such as floods, droughts, and landslides. These changes have severely affected water resources, agricultural productivity, and food security, posing significant threats to rural livelihoods (National Planning Commission, 2024; Pasa et al., 2026).

The impacts of climate change in Nepal are not uniform and are deeply shaped by socio-economic and cultural inequalities (Magar, 2026). Rural communities, especially women, Indigenous peoples, and marginalized groups, are disproportionately affected due to limited access to resources, restricted mobility, and exclusion from decision-making processes. Intersectional factors such as caste, ethnicity, and age further exacerbate vulnerability and constrain adaptive capacity (Goodrich et al., 2017). Despite growing recognition of community-based adaptation and Indigenous knowledge systems, these approaches remain inadequately integrated into formal climate policies and programs (Ministry of Science, Technology and Environment, 2015). Moreover, existing policy frameworks need a gender-responsive perspective, to enhance their effectiveness in addressing the needs of vulnerable populations (World Bank, 2025).

Against this backdrop, this paper aims to examine the gendered dimensions of climate change impacts in rural Nepal by synthesizing existing literature on vulnerability, adaptive capacity, and policy responses. It seeks to provide a comprehensive understanding of how environmental, social, and institutional factors interact to shape climate vulnerability, and to identify pathways for developing inclusive and context-specific adaptation strategies.

Literature Review

Climate change is one of the major threats to rural livelihoods in Nepal (Pasa et al., 2024). The country depends heavily on subsistence agriculture, and rural communities, particularly in agriculture-dependent regions like Surkhet District, are increasingly vulnerable to uncertain monsoons, rising temperatures, and other extreme climatic events (Gautam, 2025). Agricultural households are adopting several adaptation strategies, including crop diversification, water-efficient irrigation, and community-based natural resource management. Using the Sustainable Livelihood Framework (SLF) and Community-Based Adaptation (CBA) approaches, Gautam (2025) shows that financial capital allows households to invest in improved agricultural technologies, while social capital strengthens community resilience through collective action. However, limited financial support and weak institutional backing continue to restrict adaptation, especially for marginalized communities. The study looks at households as general units and does not explore how adaptation opportunities and challenges differ between men and women.

Recent research shows that climate vulnerability in Nepal and the wider Hindu Kush Himalaya (HKH) region is strongly shaped by gender inequality. The International Centre for Integrated Mountain Development (ICIMOD, 2022) assessment, which covers South Asian and HKH countries, shows that women and girls often face greater climate risks and have lower adaptive capacity because of poor access to and control over productive resources, along with limited mobility and voice in decision making. In mountain communities across HKH countries, including Nepal, China, India, and Pakistan, male migration for work has increased women's responsibilities in agriculture, adding to what is called the feminisation of agricultural labor. However, most national climate policies in the region are still only gender accommodative. This means they recognize gender issues but do not take strong action to change existing conditions (ICIMOD, 2022). Similarly, Upadhyay and Bastola (2024) found that Nepal's agriculture and climate policies address food security and climate vulnerability but say little about gender specific impacts, and women remain underrepresented in budget formulation and program design. They call for gender inclusive policymaking, budget allocations that account for gendered climate impacts, and support for women-led cooperatives and climate-smart, women-friendly technologies.

Beyond vulnerability, some studies look at whether women's empowerment can improve climate adaptation. Khadka and Schuett (2024) surveyed 190 households in the Chepang community of Chitwan and found that women's empowerment, measured across six attributes, has a significant positive effect on household adaptive capacity. Their findings suggest gender equality is not only a social issue but also an important factor in building climate resilience. However, since the study covers only one ethnic community in one area, it is hard to generalize the findings across Nepal.

In general, Pasa and Thapa (2025) reveal that gender construction differs across cultural belief systems that is motivating women to assume socio-economic roles in their families and communities, leading to socio-economic and political empowerment in Nepal. In particular, other research looks at gender inclusion in Nepal's climate governance more broadly. Rai et al. (2021) argue that policies which treat women mainly as victims of climate change, rather than as active participants in adaptation and decision making, weaken their role in shaping responses. They point to ongoing barriers such as limited access to information, weak representation in decision making, and slow bureaucratic processes, and call for gender transformative policies rather than ones that simply acknowledge the problem. Similar concerns were raised earlier by Mainlay and Tan (2012), who identified institutional and capacity gaps affecting women's participation in Nepal's climate planning.

Evidence on gender differences in adaptation behaviour is not always consistent, though. Kumar et al. (2024), using survey data from 1,158 livestock farming households across five districts of Gandaki Province, found no statistically significant difference between men and women in adopting adaptation strategies overall, although the odds of adoption were still somewhat higher among men. Instead, access to credit and non-agricultural employment were stronger predictors of adaptation. This suggests that economic opportunity may shape adaptive capacity as much as gender, or even more, though household level surveys may still miss differences in decision making power and resource control within the household. A broader review by Dev and Manalo (2023), covering 59 studies from developing countries published between 2010 and 2020, found that discussions of gender and adaptive capacity mostly center on agriculture. Power, social norms, control over assets, and decision making processes all shape women's capacity to adapt. The specific issues involved, such as income, organization, community, water, food, farming, security, and land, varied across African and Asian countries. The authors argue that adaptation research needs to consider local social, cultural, and geographic context instead of relying on universal assumptions.

Despite these contributions, important research gaps remain. Many studies are either broad policy assessments or focused narrowly on specific communities and sectors, and few examine gender and adaptive capacity across diverse rural communities of Nepal using one consistent framework. Findings on gender differences in adaptation are themselves mixed. While several studies find significant gender inequalities, Kumar et al. (2024) suggest that economic factors such as credit access and employment may sometimes matter more, which indicates that the relationship between gender and adaptive capacity may depend on the social and economic context. Limited research also connects household adaptation practices directly with gender related factors such as empowerment, control over resources, and participation in decision making. Finally, although policy discussions increasingly call for gender transformative climate action, there is still limited empirical evidence on how such approaches are actually implemented at the local level.

Overall, the existing literature points to three main patterns. First, rural communities in Nepal are adapting to climate change through strategies shaped by financial and social resources (Gautam, 2025). Second, women generally face greater climate vulnerability because of unequal access to resources, information, and decision-making power (ICIMOD, 2022; Rai et al., 2021; Upadhyay & Bastola, 2024). Third, available evidence suggests that women's empowerment can strengthen household adaptive capacity (Khadka & Schuett, 2024), although findings on gender differences in adaptation behaviour itself remain mixed (Kumar et al., 2024).

These gaps provide the rationale for the present study on Climate Change, Gender, and Adaptive Capacity in Nepal's Rural Communities. The study aims to generate gender disaggregated evidence on climate adaptation strategies and to examine how gender interacts with financial, social, and institutional factors in shaping household and community resilience to climate change.

Objectives and Methodology

The general objective of the study was to examine the relationship between climate change, gender, and adaptive capacity in Nepal's rural communities. The specific objectives were to examine climate change impacts on rural livelihoods in Nepal, to analyze gendered vulnerability and social inequalities, to assess health impacts and equity dimensions of climate change, to evaluate adaptive capacity, local knowledge, and policy responses and to explore policy gaps and pathways toward climate justice. In doing so, the study used a literature review approach (Snyder, 2019) to examine the interconnections between climate change, gender, and adaptive capacity in rural Nepal. The qualitative thematic analysis is based on 45 academic and policy sources, including peer-reviewed journal articles, book chapters, national and international policy documents, and grey literature produced by government agencies, international organizations, and research institutions. The review primarily focuses on literature published between 2012 and 2026, with particular emphasis on recent empirical studies from the last decade to capture current trends in climate change impacts and adaptation practices. In addition to Nepal-specific studies, selected regional and global literature, including reports from the IPCC, are incorporated to contextualize Nepal's experience within broader climate change discourses.

A thematic analysis framework (Almeida, 2026) was employed to systematically organize and synthesize the literature. Following an initial screening, the selected studies were categorized into key thematic areas: (i) gendered vulnerabilities to climate change, (ii) intersectionality and social exclusion, (iii) livelihood and adaptive capacity, (iv) health and well-being, (v) climate policy and governance, and (vi) women's agency in adaptation. This approach enabled the identification of recurring patterns, relationships, and gaps across different dimensions of climate change impacts.

The study emphasizes critical interpretation, comparison, and synthesis of existing findings to generate a comprehensive understanding of the multidimensional nature of climate vulnerability in rural Nepal. This methodological approach allows for the integration of diverse perspectives and provides a coherent analytical framework for examining how environmental, social, and institutional factors interact to shape adaptive capacity.

Results and Discussion

This section presents the findings from the literature analysis and discusses the major dimensions shaping climate change vulnerability and adaptation in rural Nepal. The discussion is organized in five interconnected themes: climate change vulnerability and rural livelihoods; gendered vulnerability and social inequalities; health impacts and equity dimensions; adaptive capacity, knowledge systems, and policy responses; and policy gaps, climate justice, and transformative pathways. The findings demonstrate that climate change in Nepal is not only an environmental challenge but also a social, economic, and governance issue shaped by unequal access to resources, institutional support, and decision-making power.

Climate Change Vulnerability and Rural Livelihoods

The analysis demonstrates that climate change has become a major driver of vulnerability among rural communities in Nepal, particularly among households dependent on subsistence agriculture and natural resource-based livelihoods. Nepal's rural economy remains strongly connected to agriculture, livestock, forests, and water resources, making communities highly sensitive to changing climatic conditions. Rising temperatures, irregular monsoon patterns, prolonged droughts, floods, landslides, and glacier-related hazards have increasingly disrupted traditional livelihood systems and reduced agricultural productivity (Adhikari et al., 2024; Sapkota, 2025). These environmental changes have affected crop yields, soil quality, water availability, and livestock productivity, creating increasing uncertainty for rural households that rely on climate-sensitive economic activities.

Recent studies indicate that climate change impacts are particularly severe in Nepal's mountainous and remote regions, where ecological fragility interacts with limited infrastructure and weak livelihood diversification opportunities. Research from Upper Dolpa and Mustang shows that changing climatic conditions have shortened agricultural growing seasons, reduced crop productivity, and increased water scarcity, threatening traditional farming practices and local food systems (Hamal et al., 2022; Poudel et al., 2025). Such evidence highlights that climate change does not simply alter environmental conditions; it transforms social and economic relationships by reducing livelihood choices and increasing dependency on increasingly uncertain natural resources.

Gautam (2025) further illustrates how rural households respond to these challenges through a combination of traditional and emerging adaptation strategies. Using the Sustainable Livelihood Framework (SLF) and Community-Based Adaptation (CBA) approaches, the study identifies crop diversification, improved irrigation practices, and community-based natural resource management as important responses to climate stress. The study emphasizes that financial capital enables households to adopt improved agricultural technologies, while social capital supports collective action and community resilience. However, unequal access to financial resources and institutional support continues to limit adaptation opportunities, particularly among marginalized households. This indicates that adaptive capacity is not determined only by exposure to climate risks but also by the availability of social, economic, and institutional resources.

The literature further reveals that climate vulnerability is strongly connected with broader socio-economic inequalities. Although climate change affects rural communities collectively, its consequences are unevenly distributed because households possess different levels of access to land, income, education, markets, credit, and extension services. Chapagain et al. (2025) argue that adaptive capacity is shaped by multiple dimensions, including economic resources, social networks, governance structures, and institutional accessibility. Therefore, communities experiencing historical exclusion often face greater difficulties in responding to climate pressures. Climate change consequently acts as a “threat multiplier” that intensifies existing vulnerabilities rather than creating entirely new forms of inequality.

Another important dimension emerging from the literature is the relationship between climate stress and migration. Declining agricultural productivity, livelihood insecurity, and limited employment opportunities have contributed to increased migration, particularly among economically active men seeking alternative income sources. While migration may provide additional household income through remittances, it also creates new social and gender challenges. Male outmigration frequently transfers greater agricultural and household responsibilities to women, children, and elderly family members who remain in rural areas. The ICIMOD (2022) assessment highlights that such processes contribute to the feminisation of agricultural labor in mountain regions, including Nepal, where women increasingly manage climate-stressed farming systems without equivalent access to resources, technology, or decision-making authority.

Overall, the findings indicate that climate change vulnerability in rural Nepal emerges from the interaction of environmental hazards, livelihood dependence, socio-economic inequality, and institutional limitations. Addressing these challenges requires adaptation approaches that move beyond technical solutions and strengthen the broader livelihood systems of rural communities. This includes improving access to financial resources, climate information, agricultural support services, and inclusive governance mechanisms that enable vulnerable groups to participate meaningfully in adaptation planning.

Gendered Vulnerability and Social Inequalities

The analysis demonstrates that climate change vulnerability in rural Nepal is deeply gendered and shaped by existing social inequalities. Although climate hazards affect entire communities, women often experience greater impacts because of unequal access to productive resources, limited control over household assets, restricted mobility, and lower participation in decision-making processes (Rai et al., 2021; ICIMOD, 2022). These inequalities are particularly significant in agriculture-dependent communities where women play central roles in farming, household management, and natural resource collection but often have limited authority over adaptation-related decisions.

Existing evidence shows that women's vulnerability is closely connected to their dependence on climate-sensitive resources. Women are frequently responsible for collecting water, fuelwood, and managing household food security, making them more directly exposed to environmental changes. As climate change increases resource scarcity, women's workloads increase substantially. Adhikari and Ghimire (2025) and Upadhyay and Bastola (2024) highlight that climate policies in Nepal often recognize agricultural vulnerability but pay insufficient attention to how climate impacts differently affect men and women. Consequently, women's labor contributions remain undervalued despite their critical role in sustaining rural livelihoods.

A major finding from the literature is that climate change creates a dual burden for women: increased responsibility combined with limited decision-making power. As water sources decline, agricultural productivity decreases, and household economic pressures increase, women spend more time managing basic livelihood needs. However, their involvement in formal adaptation planning, resource allocation, and local governance remains limited (Dhungana et al., 2023; Khadka & Schuett, 2024). This imbalance reduces women's ability to influence adaptation strategies and reinforces existing gender hierarchies.

The relationship between gender and adaptive capacity is further complicated by intersectionality. Women's experiences of climate vulnerability are not uniform; they vary according to caste, ethnicity, economic status, age, disability, and geographical location. Studies focusing on Dalit and Indigenous communities demonstrate that marginalized women experience multiple layers of disadvantage due to historical exclusion from land ownership, financial systems, education, and institutional support (Bishwakarma & Roongtawanreongsri, 2025; Ranjitkar & Haukanes, 2022). These overlapping inequalities reduce access to adaptation resources and limit the ability of vulnerable groups to recover from climate-related shocks.

The role of women's empowerment in strengthening adaptive capacity has received increasing scholarly attention. Khadka and Schuett (2024), examining 190 households from the Chepang community in Chitwan, found that women's empowerment

significantly improves household adaptive capacity. Their study provides empirical evidence that gender equality is not only a social justice concern but also an important pathway for strengthening climate resilience. Similarly, Dev and Manalo (2023), through a systematic review of 59 studies from developing countries, demonstrate that adaptive capacity is strongly associated with women's control over income, land, water resources, food security, and participation in community organizations. They argue that gender and climate adaptation relationships are context-specific and require locally grounded analysis rather than generalized assumptions.

However, research also reveals complexity in understanding gender differences in adaptation behaviour. Kumar et al. (2024), based on a large household survey of livestock farmers in Gandaki Province, found no statistically significant difference between male- and female-headed households in overall adaptation adoption after considering economic factors. Their findings suggest that access to credit, employment opportunities, and economic resources may sometimes influence adaptation outcomes more strongly than gender alone. Nevertheless, such household-level findings may not fully capture intra-household inequalities related to decision-making power, control over resources, and unpaid labor responsibilities.

At the policy level, studies reveal that Nepal's climate governance structures continue to struggle with meaningful gender inclusion. Rai et al. (2021) argue that women are frequently represented as vulnerable victims rather than as knowledge holders and active agents of climate adaptation. Similarly, Mainlay and Tan (2012) identify institutional and capacity gaps that limit women's meaningful participation in climate planning. Although gender equality is increasingly recognized in policy documents, implementation remains largely accommodative rather than transformative (ICIMOD, 2022). This means that policies acknowledge gender differences but often fail to redistribute resources, authority, and decision-making power.

Overall, the findings suggest that gendered vulnerability in rural Nepal cannot be separated from wider social and institutional structures. Climate adaptation strategies must therefore adopt intersectional and gender-transformative approaches that address not only exposure to climate hazards but also unequal access to resources, knowledge, and political participation. Without addressing these structural conditions, adaptation interventions may unintentionally reproduce existing inequalities rather than create equitable and resilient communities.

Health Impacts and Equity Dimensions

The analysis further demonstrates that climate change in Nepal has significant implications for human health, with disproportionate impacts on women, children, elderly populations, and socially marginalized communities. Climate-related hazards such as floods, droughts, heat stress, changing disease patterns, and water insecurity

create direct and indirect health risks, particularly in rural areas where healthcare infrastructure and social protection systems remain limited. Existing studies indicate that climate variability contributes to increased risks of waterborne diseases, vector-borne illnesses, malnutrition, respiratory problems, and psychosocial stress among vulnerable populations (Ghimire et al., 2025; Chalise et al., 2025). These impacts are intensified by poverty, geographical isolation, limited access to healthcare facilities, and inadequate sanitation services (Vig, 2025).

The health consequences of climate change are not experienced equally across social groups. Gender, caste, ethnicity, economic status, and geographical location significantly influence exposure and the ability to respond to climate-related health risks. Women often experience greater health burdens because of their responsibilities in household care, agriculture, and natural resource management. Increased scarcity of water and fuelwood requires women to spend additional time collecting essential resources, increasing physical exhaustion and exposure to environmental hazards. Furthermore, women's limited mobility, financial dependence, and restricted access to healthcare services can delay treatment and reduce their ability to manage climate-related health challenges (Paudel et al., 2025; Ghimire et al., 2025).

The gender dimensions of climate-related health vulnerability are particularly visible in reproductive health and nutrition outcomes. Climate-induced food insecurity affects household nutrition, with women and children often experiencing greater nutritional risks due to unequal access to food within households. Similarly, climate-related disruptions, including droughts and floods, can reduce access to menstrual hygiene resources and safe sanitation facilities, creating additional challenges for women and adolescent girls. Paudel et al. (2025) highlight that these conditions represent not only health concerns but also issues of dignity, rights, and social equity. Such evidence demonstrates that climate change interacts with existing gender inequalities to create deeper forms of vulnerability.

Mental health impacts represent another emerging concern within the climate change literature. Increasing uncertainty about livelihoods, agricultural losses, displacement risks, and environmental degradation contribute to psychological stress among rural populations. Studies suggest that women and adolescents in climate-sensitive areas may experience higher levels of anxiety, emotional distress, and social pressure because they often carry greater caregiving responsibilities and have fewer opportunities to access support services (Kaya et al., 2025; Vig, 2025). However, mental health dimensions remain relatively underexplored in Nepal's climate adaptation research, indicating the need for greater integration of psychosocial considerations into climate and health planning.

Intersectionality is central to understanding climate-related health inequalities. Marginalized groups, including Dalit, Indigenous, and low-income communities, face

multiple disadvantages due to social exclusion, limited political representation, poor living conditions, and restricted access to healthcare services (Anjum & Aziz, 2025; Bishwakarma & Roongtawanreongsri, 2025). These communities often live in climate-sensitive locations and have fewer resources to recover from environmental shocks. Therefore, climate change does not create vulnerability equally; rather, it amplifies existing patterns of social exclusion and inequality.

Despite increasing recognition of climate-health relationships, Nepal's policy responses continue to face implementation challenges. Although climate and health policies acknowledge vulnerable populations, there remains a gap between policy commitments and practical delivery mechanisms. Zavala et al. (2024) argue that climate-health interventions often lack systematic integration of gender and equity considerations, limiting their effectiveness among marginalized populations. This suggests that climate adaptation strategies require stronger coordination between health systems, local governments, and community organizations to ensure that vulnerable groups receive appropriate support.

Overall, the findings indicate that climate change and health vulnerability in rural Nepal are deeply connected with social and gender inequalities. Effective adaptation requires moving beyond hazard-focused approaches and addressing the structural conditions that shape health outcomes. Gender-responsive health planning, improved rural healthcare access, climate-resilient sanitation systems, and inclusive social protection mechanisms are essential for reducing unequal climate-related health impacts.

Adaptive Capacity, Knowledge Systems, and Policy Responses

The analysis reveals that adaptive capacity in rural Nepal is shaped by the interaction of local knowledge systems, social networks, economic resources, and institutional support. Rural communities have developed diverse strategies to respond to environmental uncertainty through generations of experience, including crop diversification, traditional water management practices, livestock adaptation, and ecological forecasting based on local observations (Chaudhary et al., 2025; Pokharel & Poudel, 2025). These knowledge systems represent important forms of community resilience, particularly in remote areas where formal climate services and government support remain limited.

Local knowledge plays a critical role because rural communities often experience climate change impacts directly and develop context-specific responses suited to their environments. Indigenous and traditional practices provide valuable insights into managing agricultural risks, conserving natural resources, and maintaining community cooperation. However, these knowledge systems are often undervalued within formal climate governance structures. Adaptation policies frequently prioritize scientific and technical solutions while giving limited recognition to locally developed strategies. This

creates a disconnect between policy interventions and the realities experienced by rural communities. Although local knowledge contributes to resilience, adaptive capacity depends heavily on access to resources and institutional support. Households with greater financial resources, education, social networks, and access to information are generally better positioned to adopt new adaptation strategies. Aryal et al. (2025) emphasize that climate awareness and preparedness are strongly influenced by access to information and communication networks. However, marginalized communities often face barriers in accessing climate information, agricultural technologies, credit facilities, and extension services. These inequalities limit their ability to anticipate climate risks and implement effective responses.

The relationship between knowledge access and adaptive capacity is particularly important from a gender perspective. Women contribute significantly to agricultural production, biodiversity conservation, and household resource management, yet they often have limited access to formal training, technology, and financial services. Khadka and Schuett (2024) demonstrate that women's empowerment contributes positively to household adaptive capacity, suggesting that strengthening women's agency can improve broader community resilience. Similarly, Dev and Manalo (2023) argue that gender-sensitive adaptation requires attention to control over assets, decision-making authority, and participation in community institutions.

However, adaptation opportunities remain uneven because of institutional and governance challenges. The literature identifies a persistent gap between national climate policies and local implementation. Although Nepal has developed climate adaptation frameworks and sectoral policies, implementation often remains fragmented and dependent on short-term projects. Shrestha et al. (2025) highlight that top-down approaches frequently overlook local realities, resulting in interventions that may not adequately respond to community priorities. This challenge is particularly significant in geographically diverse contexts such as Nepal, where adaptation needs differ substantially between mountain, hill, and Terai regions.

Perceptions and responses to climate change also vary among social groups. Phuyal et al. (2025) demonstrate that climate risk perceptions are influenced by personal experiences, economic conditions, and exposure to environmental hazards. Similarly, Pathak and Joshi (2025) emphasize that access to information sources shapes adaptation decisions, with marginalized populations often excluded from formal communication channels. These findings suggest that effective adaptation requires participatory approaches that recognize diverse experiences and incorporate multiple forms of knowledge.

The evidence also indicates that adaptive capacity should not be understood merely as the ability to adopt technical solutions. Rather, it represents a broader social process involving empowerment, governance, institutional relationships, and access to

resources. Chapagain et al. (2025) argue that adaptive capacity is multidimensional and shaped by social capital, institutional arrangements, and power relations. Therefore, strengthening resilience requires addressing structural inequalities that determine who has access to adaptation opportunities and whose knowledge is valued in decision-making processes.

Overall, the findings suggest that building adaptive capacity in rural Nepal requires integration between local knowledge systems and formal institutional frameworks. This involves strengthening climate education, expanding access to financial and technological resources, supporting community-based adaptation, and ensuring meaningful participation of women and marginalized groups in climate governance. Without addressing these social and institutional dimensions, adaptation efforts may remain limited in their ability to achieve long-term resilience.

Policy Gaps, Climate Justice, and Transformative Pathways

The analysis identifies significant gaps between climate policy commitments and their implementation in rural Nepal. Although Nepal has developed several climate-related policies and strategies aligned with international frameworks, including sustainable development commitments and climate adaptation priorities, challenges remain in translating policy objectives into effective local action. Many interventions continue to focus on technical adaptation measures while insufficiently addressing social inequalities, institutional barriers, and unequal access to resources (Shrestha et al., 2025).

One major limitation is the weak integration of gender considerations into climate policy implementation. While gender equality is increasingly mentioned in policy documents, practical mechanisms for ensuring women's participation, resource access, and leadership remain limited. Studies show that women are often included symbolically in climate programs but continue to face barriers in influencing decisions and accessing adaptation resources (Bishwakarma & Roongtawanreongsri, 2025; Kirkwood et al., 2025). This reflects a broader distinction between gender-sensitive and gender-transformative approaches. Gender-sensitive policies recognize differences between men and women, whereas transformative approaches seek to address the underlying power structures that create inequality.

The absence of intersectional approaches further limits the effectiveness of climate policies. Rural communities are not homogeneous, and vulnerability differs according to caste, ethnicity, gender, income, disability, and geographical location. Upadhyay and Bastola (2024) argue that Nepal's climate and agricultural policies often recognize vulnerability broadly but fail to adequately address gender-specific and socially differentiated impacts. Consequently, policies may not effectively reach groups facing

the greatest risks, including Indigenous communities, Dalit populations, and women-headed households.

The concept of climate justice provides an important framework for addressing these limitations. Climate change is not only an environmental challenge but also an issue of fairness, rights, and unequal responsibility. Although Nepal contributes relatively little to global greenhouse gas emissions, vulnerable communities experience significant climate impacts. A climate justice perspective therefore emphasizes equitable resource distribution, recognition of marginalized voices, and inclusive participation in decision-making processes (Ngcamu, 2023; Poudyal, 2025). This approach requires moving beyond viewing vulnerable communities as passive recipients of assistance and recognizing them as active contributors to climate solutions.

Transformative adaptation approaches further emphasize the need to address structural inequalities rather than focusing only on immediate coping strategies. Such approaches require strengthening women's agency, reforming governance systems, improving institutional accountability, and integrating local knowledge into formal planning processes. Evidence indicates that when women participate meaningfully in adaptation decision-making, community outcomes become more sustainable and inclusive (Kosec et al., 2026; Singh & Rampal, 2025). Therefore, empowering women and marginalized groups should be considered a central component of climate resilience strategies rather than an additional social objective.

Another important challenge is the fragmentation of climate governance across sectors. Effective adaptation requires coordination between agriculture, health, water management, disaster risk reduction, and social protection systems. Limited institutional coordination and inadequate resource allocation continue to restrict comprehensive climate responses. Strengthening local governments, improving community participation, and ensuring adequate financial mechanisms are essential for translating climate policies into meaningful outcomes.

In conclusion, achieving climate resilience in Nepal requires a shift from vulnerability-focused approaches toward justice-oriented and transformative pathways. Adaptation strategies must address not only environmental risks but also the social, economic, and institutional inequalities that determine people's capacity to respond. Integrating gender equality, social inclusion, local knowledge, and participatory governance into climate action is essential for building equitable and sustainable resilience in rural Nepal.

Synthesis of the Findings

Climate change vulnerability in Nepal's rural communities is shaped by the interaction between environmental risks, livelihood dependence, and social inequalities. Agriculture-dependent households face increasing challenges from changing rainfall patterns, water scarcity, and declining productivity, but their ability to adapt depends on

access to financial resources, knowledge, social networks, and institutional support (Adhikari et al., 2024; Chapagain et al., 2025). Local adaptation practices, including crop diversification, improved resource management, and community-based strategies, demonstrate rural resilience; however, unequal access to resources limits the adaptive capacity of marginalized groups (Gautam, 2025).

Gender plays a critical role in shaping both climate vulnerability and adaptation outcomes. Women experience greater burdens due to their responsibilities in agriculture, household management, and natural resource collection, combined with limited access to assets, information, and decision-making spaces (ICIMOD, 2022; Rai et al., 2021). However, women are also important agents of resilience. Evidence shows that women's empowerment improves household adaptive capacity through greater participation, resource control, and decision-making power (Khadka & Schuett, 2024). At the same time, adaptation outcomes are influenced by broader factors such as income, employment, credit access, caste, ethnicity, and institutional support (Kumar et al., 2024; Dev & Manalo, 2023). Climate change also carries significant health consequences, disproportionately affecting women's reproductive health, nutrition, and psychosocial well-being, further compounding gendered vulnerability (Ghimire et al., 2025; Vig, 2025).

Overall, climate resilience in rural Nepal requires approaches that address both environmental risks and structural inequalities. Moving beyond technical adaptation, transformative pathways should strengthen women's agency, integrate local knowledge, improve access to resources, and promote inclusive climate governance (Mainlay & Tan, 2012; Poudyal, 2025). A gender-responsive and justice-oriented approach is essential for building adaptive capacity among Nepal's diverse rural communities.

Conclusion

This study shows that climate change in rural Nepal is not only an environmental issue but also a social and gender justice challenge. Women, Indigenous groups, and marginalized communities face greater risks due to unequal access to resources, information, and decision-making opportunities. Climate change further threatens health and well-being, particularly for women and marginalized groups, reinforcing the need for gender-responsive health and social protection systems. Although rural communities use local knowledge and adaptation practices, stronger institutional support and inclusive policies are needed to strengthen resilience. Climate adaptation in Nepal should therefore focus on gender-responsive, locally grounded, and equitable approaches. Future research should examine climate experiences and adaptation strategies in diverse rural and high-altitude areas to generate evidence for policies that are inclusive, effective, and context-specific.

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