

Gender and social diversity integration in Nepal's forest fire research: A systematic scoping review

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Abstract

Forest fires in Nepal constitute a complex socio-ecological challenge extending beyond climatic determinants, with gender and community diversity fundamentally shaping how fire is experienced, understood, and managed. Despite this recognition, no baseline assessment exists on how gender and social diversity perspectives have been integrated into Nepal's forest fire research. This systematic scoping review examines research-based literature (n=40) from the Scopus database, national journals, and Google Scholar over the past five years (2021–2025) to identify predominant research foci and the extent of gender and social diversity integration. Findings reveal that Nepal's forest fire research remains overwhelmingly focused on biophysical, ecological, and spatial-temporal domains, with human and socioeconomic dimensions receiving superficial attention. Research persists in treating communities as homogeneous entities, reflecting a substantial gap in analysing how gender, caste, ethnicity, age, disability, and other social identities shape forest fire vulnerability and management capacity. The paper concludes that advancing sustainable forest fire management in Nepal necessitates a paradigm shift in Gender Equality and Social Inclusion (GESI) responsive forest fire research positioning gendered roles, social identities intersecting vulnerabilities, disproportionate impacts, and changing sociodemographic dynamics at the core of forest fire related research agendas, while also progressing on technical aspects.

Keywords: Forest fires, Nepal, Research, Gender diversity, GESI

INTRODUCTION

In the global climate landscape, Nepal stands among the most vulnerable nations to climate-induced disasters (Adil *et al.*, 2025). Multiple underlying factors contribute to this precarity, including extreme topographical variation, fragile geological structures, complex social structure, sensitive mountain ecosystems, and increasing climate variability (Bhattarai and Conway, 2021; David and David, 2025; Nyaupane, 2022; Ramya *et al.*, 2023).

Forest fires have emerged as one of the most serious of these climate-induced hazards. Over the past few decades, they have become noticeably more frequent and

severe along with increasing spatial coverage and damage- the trend consistent with the global observations (He *et al.*, 2025; Huang *et al.*, 2025; Villagra *et al.*, 2024; Zhang *et al.*, 2025). There is a strong connection between these fires and climatic conditions, such as prolonged dry seasons, increasing temperature, and variation in monsoon pattern (Chen *et al.*, 2025; Goldammer and Seibert, 1990; Hernández-Duarte *et al.*, 2024; Kumar *et al.*, 2025; Pontes-Lopes *et al.*, 2021; Yin *et al.*, 2024). However, attributing Nepal's forest fire dynamics purely to climate would be an oversimplification. Social factors including demographic shifts changing rural-urban and cross-border nexus, evolving forest-

people dynamics and governance challenges are equally instrumental for forest and forest fire dynamics (Bhattarai *et al.*, 2025; Poudyal *et al.*, 2023; Shahi *et al.*, 2022; Tiwari *et al.*, 2022). Therefore, forest fires in Nepal represent a complex socio-ecological challenge that demands interdisciplinary investigation (Krawchuk *et al.*, 2009).

In Nepal's forestry sector, considerable attention has been given to gender and social diversity, especially within participatory forest management approach (Chhetri *et al.*, 2013; Laudari *et al.*, 2024; Pandey and Pokhrel, 2021; Sapkota *et al.*, 2020). Currently, over 32,000 community-based forest user groups oversee approximately 2.86 million hectares of woodland, accounting for about 40 per cent of the nation's total forest cover (MoFE, 2025). These groups consist of members from varied gender, caste, ethnicity, age, disability, and economic backgrounds, and they are tasked with the frontline duties of forest conservation and disaster response. Despite their operational reach, these institutions frequently function within rigid social norms such as patriarchal values, gender roles, etc and established power imbalances between social hierarchies based on caste, class and other several factors leading to elite captures, exclusion and unequal benefit-sharing. This often results in what researchers call symbolic inclusion, where women and marginalised communities are present in name but remain systematically excluded in substantive governance and decision-making (Baral *et al.*, 2024; Bhattarai, 2020; Rai and Morales, 2025). Such ingrained inequalities strongly influence how various groups face forest hazards, react during emergencies, and plan for future risks (Walker *et al.*, 2020, 2021).

Evidence indicates that forest fires are not gender-neutral (Eriksen, 2014; Eriksen *et al.*, 2010). Nevertheless, environmental

disaster research often inaccurately portrays communities as homogeneous. In truth, intersecting social identities, including gender, ethnicity, class, geographic location, disability, and age, create markedly different levels of vulnerability and capabilities for response (Hoffman *et al.*, 2021). As a result, these varied experiences remain critically overlooked in forest fire research, prevailing the forest fire management as a masculine domain (González-Hidalgo and Iglesia, 2025).

Given that community-based forest management institutions are on the frontline of forest stewardship, it is essential to incorporate these gender and social dynamics into fire-related research. However, no systematic evaluation currently exists on how well gender and social diversity have been addressed in Nepal's scientific literature on forest fires. The scattered information regarding disproportionate impacts is mostly contained in government publications or journalistic accounts (Pokhrel, 2025) rather than in rigorous scholarly work. This gap is particularly concerning as forest fire incidents and damages escalate, making community-led fire management not merely convenient but necessary for successful prevention and response (Ranabhat *et al.*, 2022; Tiwari *et al.*, 2022).

To address this gap, this article offers the extensive scoping review of scholarly literature on Nepal's forest fire, explicitly focusing on gender and diversity integration. The review addresses three primary research questions: (a) what are the predominant research foci in forest fire studies from Nepal over the past five years (2021-2025), (b) to what extent have gender and diversity perspectives been incorporated into this research? and (c) what would GESI responsive forest fire research look like in the Nepalese context? Specifically,

this paper explores whether existing works document the differing effects on men, women, and other social groups; how their varied perspectives and contributions to fire management have been analysed; and whether they examine the power structures that influence fire vulnerability and responses. Through this systematic mapping, this paper aims to lay down essential groundwork to steer future studies and policy frameworks toward meaningful integration of gender equality and social inclusion into forest fire research and actions across Nepal.

METHODOLOGY

This study has adopted a systematic literature review approach following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. PRISMA is a well-established framework that provides a clear and structured process for conducting reviews, making it easier to thoroughly and efficiently identify research that is relevant to the topic (Bargali *et al.*, 2024; Wen *et al.*, 2025).

The research primarily focused on peer-reviewed journal articles. The search was performed across several sources, including the Scopus database, Google Scholar, and three key Nepalese journals: *Banko Jankari*, *the Journal of Forest and Livelihood*, and *the Journal of Institute of Forestry*.

A keyword search for "Forest Fire" OR "Wildfire" AND "Nepal" was used, which initially identified 1,483 articles in the Scopus database on 4 May 2026. These keywords were selected to capture the pool of forest fire research from Nepal for subsequent screening on gender and diversity dimensions. The relevant publications were then filtered using a set of inclusion criteria (IC):

IC1. Literature type and literature access

Publications had to be based on original research, be written in English, and open access (Wen *et al.*, 2025). Grey literature were not considered as this paper aimed to assess the status of research discourse (González-Hidalgo and Iglesia, 2025). A total of 378 papers were filtered from the Scopus database on 4 May 2026 and screened using IC2. Records were managed and screened in Microsoft Excel by a single author.

IC2. Literature focus

Publications had to be primarily focused on forest fire or wildfire with Nepal as the research country, as this paper aims to understand the research landscape of forest fire in Nepal. Upon screening titles and abstracts, 41 Scopus publications were identified as focused on forest fire research in Nepal. On 5 May 2026, the three national journals (*Banko Jankari*, *the Journal of Forest and Livelihood*, and *the Journal of Institute of Forestry*) and Google Scholar were accessed, from which 8 and 16 publications, respectively, were manually selected for the review, focused on forest fire avoiding duplication with the Scopus database.

IC3. Depth of focus

The 41 Scopus records, 8 national journal records, and 16 Google Scholar records were each categorised by depth of engagement with forest fire as a topic. Publications with forest fire as the major theme were categorised as "High focus"; those with forest fire as one of several key dimensions (e.g., disasters, impacts, factors) were categorised as "Moderate focus"; and publications that mentioned forest fire only in passing, without conducting specific research on it, were categorised as "Low focus"

(see Figure 1). Only High and Moderate focus publications were carried forward for full-text review: 16 of 41 Scopus records (11 High, 5 Moderate), all 8 of the national journal records (7 High, 1 Moderate), and all 16 of the Google Scholar records (16 High, 0 Moderate). The 25 Low focus Scopus records were excluded at this stage; no records were excluded on this basis from the national journals or Google Scholar.

This yielded a final set of 40 articles (34 High focus and 6 Moderate focus), comprising 16 from Scopus, 8 from national journals, and 16 from Google Scholar, which formed the basis of this paper.

The yielded articles were thoroughly reviewed to understand how and which aspect of

gender and diversity dimensions were covered by the research and what gaps exist, initiating with the keyword search such as “gender” OR “women” OR “feminist” OR “intersectional” OR “Indigenous Peoples” OR “Indigenous communities” OR “person with disabilities” OR “elderly” OR “religion” OR “community” OR “community forest users’ groups” OR “marginalised” OR “disadvantaged” (González-Hidalgo and Iglesia, 2025; Williams *et al.*, 2021). Aligning with the research questions, the reviewed articles were categorised based on their focus of study (Biophysical/Ecological, Spatial-Temporal, Technical Solution, Human/Socioeconomic, Policy/Governance), consideration of gender (no consideration,

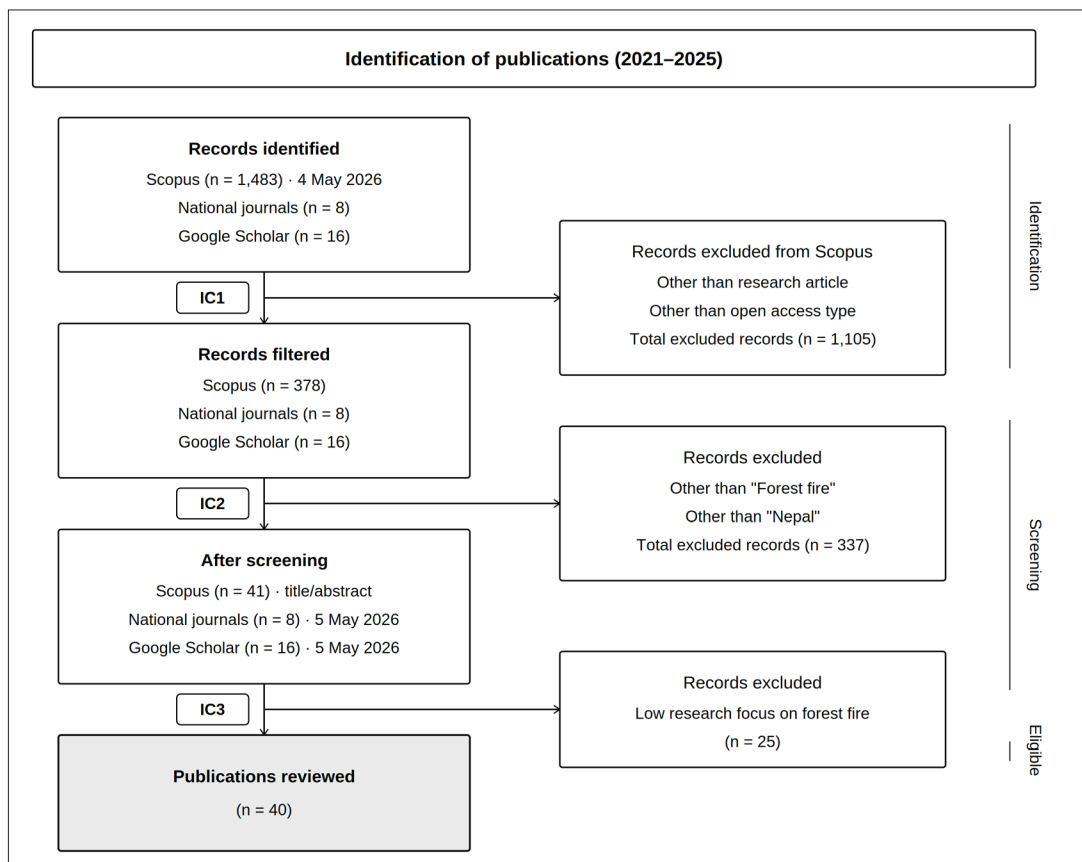


Figure 1. Flowchart of methodology for literature review

partial consideration, and integrated analysis), and diversity consideration (mentioned as vulnerable groups, studied distinctively and analysed intersectionality).

By restricting the review to Nepal, English language source, and research articles, this paper may have missed valuable Nepali language literatures and grey publications that might have documented the information relevant to this paper. Because of this limitation, the results may not be statistically generalisable beyond the country. The single author's screening may have introduced some risk of subjective judgement, particularly at the IC3 depth-of-focus stage.

FINDINGS

Thematic and geographical distribution of forest fire research

Forest fire research from Nepal in last five years is overwhelmingly focused on biophysical/ecological and spatial-temporal themes (see Table 1). About 70 per cent of the publications are centred on these technical aspects. These studies are primarily focused on forest fire distribution and vulnerability and risks assessment of sites across the country (Bhatta and Adhikari, 2024; Bhujel *et al.*, 2022; Dhakal *et al.*, 2024; Joshi *et al.*, 2023, 2024; Mishra *et al.*, 2023; Parajuli *et al.*, 2023; Paudel *et al.*, 2024; Rai *et al.*, 2025; Sapkota *et al.*, 2025; Thapa *et al.*, 2025) followed by impacts of forest fire on ecological components such as air quality, soil properties, vegetation

composition, biomass and carbon stock (Bhatta *et al.*, 2022; Dahal *et al.*, 2025; Das *et al.*, 2023; Dhakal *et al.*, 2024; Dhungana *et al.*, 2023; Dhungana, *et al.*, 2024a; Dhungana, *et al.*, 2024b; Khadgi *et al.*, 2024; Kuikel *et al.*, 2024, 2025; Kunwar *et al.*, 2025; Sapkota *et al.*, 2023, 2025) and climatic factors related to forest fire and forest fire as impact of climate change (Adhikari *et al.*, 2021; Bhattarai *et al.*, 2022; Bhujel *et al.*, 2021; Hamal *et al.*, 2022).

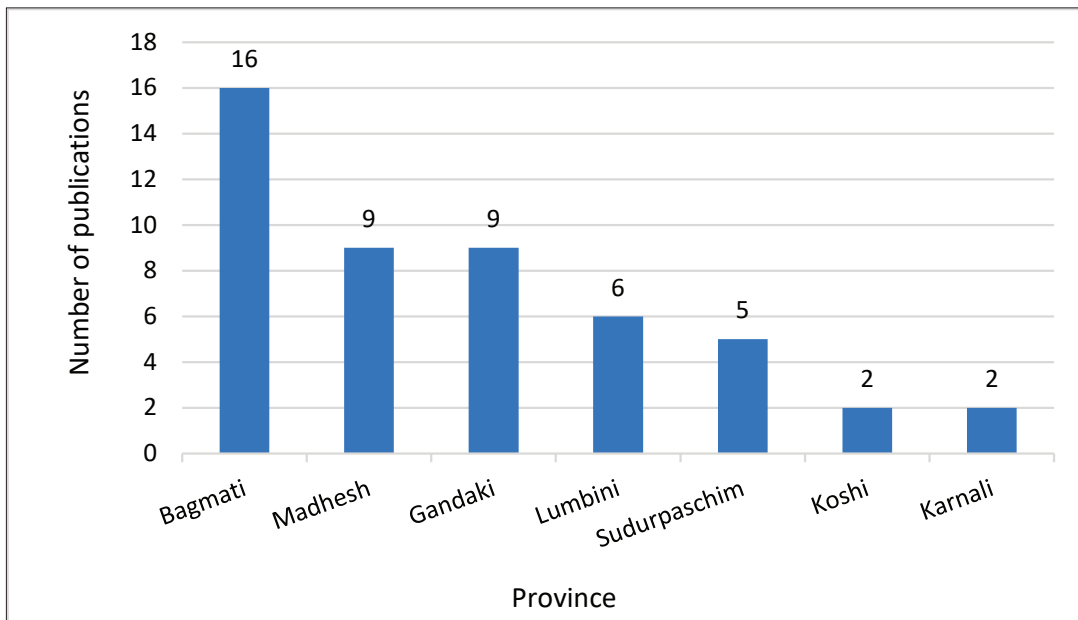
While one-fourth of the research have been conducted on the human/socioeconomic aspects of the forest fire, there exist huge gaps in the research focusing on technical solutions (2.5 per cent) and policy/governance (2.5 per cent) aspects. Research on socioeconomic dimensions were found to have discussed on the impact of forest fire on human capital (Koirala and Rahut, 2024; Paudel, 2021a, 2023, 2024), socioeconomic factors of forest fire dynamics (Joshi *et al.*, 2025; Paudel, 2021b; Tiwari *et al.*, 2022), and community perception and motivation on forest fire management (Bhusal *et al.*, 2025; Koirala and Rahut, 2024; Pandey *et al.*, 2025; Paudel, 2021a). Only one publication published in the last five years proposed the establishment of fire stations in accessible sites and participatory forest management through fire management committee in the remote sites as solutions for forest fire control and prevention (Ranabhat *et al.*, 2022). Similarly, Pandey *et al.* (2022) has investigated the forest fire policies and initiatives on forest fire prevention and control.

Table 1: Dominant research theme (2021-2025)

Theme Category	Description	No. of publications	Percentage
Biophysical/ Ecological	Fire behaviour, climate change impacts, fuel load assessment, biomass estimation, pollution monitoring	16	40
Spatial-Temporal Analysis	Fire distribution and mapping, Fire frequency trends, seasonal patterns, elevation-based distribution, NDVI analysis, hazard mapping, vulnerability assessment, risk assessment	12	30
Technical Solutions	Early warning systems, fire station, fire lines, suppression technologies, adaptation practices, equipment, fire station	1	2.5
Human/ Socioeconomic	Community perception, energy poverty, livelihood impacts, forest-people relationship	10	25
Policy/Governance	Institutional frameworks, government initiatives, management policies	1	2.5
Total		40	100

The findings on geographical distribution of the forest fire research over the past five years show uneven result with the highest concentrated on the Bagmati Province (16)

followed by Madhesh and Gandaki Provinces (9 each), with lowest number of studies from Sudurpaschim (5), Koshi (2), and Karnali (2) Provinces (see Figure 2 and 3).


Figure 2: Province-wise distribution of forest fire research (2021-2025)

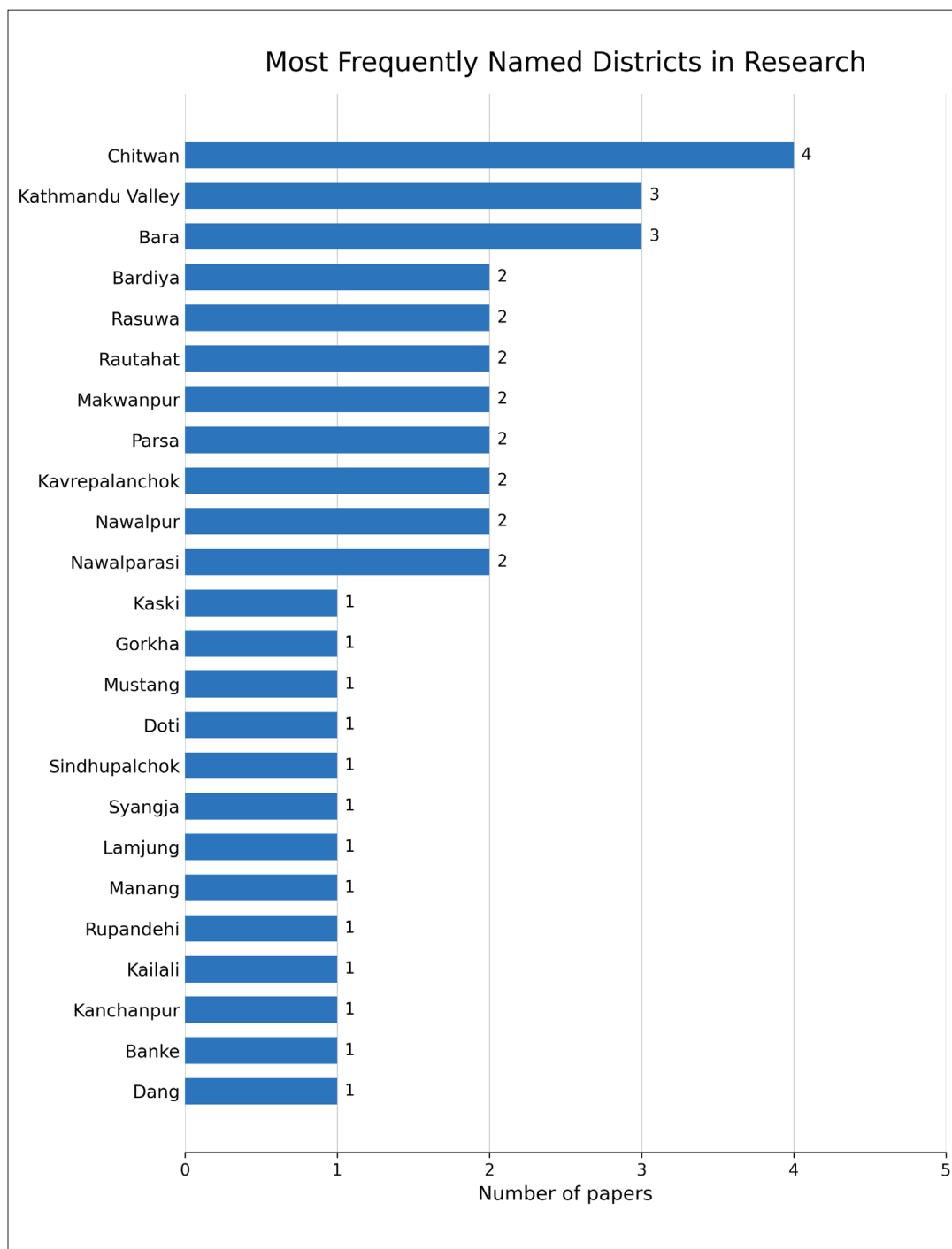


Figure 3: District-wise distribution of forest fire research (2021-2025)

Integration of gender perspective in forest fire research

About 85 per cent of the publications reviewed do not mention gender or women or female neither as a vulnerable group nor in the analysis or methodology (see Table 2). This can be attributed to majority of research focus on biophysical/ecological and spatial-temporal aspect which often tends to ignore the social aspect while prioritising technical aspects of the research. In addition, even some of the research with focus on socioeconomic theme tends to undermine the gendered vulnerability and disproportionate impacts of forest fire with the use of generic term as “community”, “users’ groups”, “local people”

and “public” (Joshi *et al.*, 2025; Parajuli *et al.*, 2022; Paudel, 2021a, 2021b, 2024).

Partial consideration of gender dimensions in research is limited to the consideration of gender as socio-demographic characteristics of respondents (Adhikari *et al.*, 2021; Aryal *et al.*, 2025), and acknowledgement of women as vulnerable groups (Tiwari *et al.*, 2022). The research integrating analysis of gender dimensions has analysed women’s roles and fuel choice (Koirala and Rahut, 2024), association between gender and leadership motivation in forest management (Bhusal *et al.*, 2025), and gendered impact of forest fire (Pandey *et al.*, 2025; Paudel, 2023).

Table 2: Gender integration in forest fire research (2021-2025)

Level of Integration	Description	Number of Publications	Percentage
No gender consideration	No mention of gender/women/female in analysis or methodology	34	85
Partial consideration	Mention of women in context, limited to descriptive statistics or simple acknowledgment	3	7.5
Integrated analysis	Gender-disaggregated data, analysis of differential impacts/roles	3	7.5
Total		40	100

Integration of social diversity perspective in forest fire research

The review findings show that none of the reviewed article systematically examined how social identities such as gender, caste, ethnicity, age, disability, religion, and economic status shape forest fire vulnerability, exposure, or management (see Table 3). Very few studies (less than 25 per cent) have discussed about social categories of diversity with some acknowledging the groups as vulnerable

groups, and some analysing the individual level data of the groups.

Some studies are limited to acknowledging women and other disadvantaged groups such as Dalits, Elderly, Persons with Disability (PwD), ethnic minorities, and poor as vulnerable groups (Bhatta and Adhikari, 2024; Dhakal *et al.*, 2024; Kuikel *et al.*, 2025; Tiwari *et al.*, 2022). Similarly, research with distinctive study on diverse groups included on the impact of forest fire on education attainment and



energy poverty among different caste, gender, and religion (Koirala and Rahut, 2024; Paudel, 2021a, 2023, 2024), perception analysis among gender, age, ethnicity, age, economic class, and marginality of the respondents (Aryal *et al.*, 2025; Bhusal *et al.*, 2025; Pandey *et al.*, 2025).

Table 3: Diversity integration in number of forest fire research (2021-2025)

Social category	Mentioned as vulnerable	Studied distinctively	Analysed intersectionality
Women	Yes (2)	Yes (2)	none
Caste	Yes (1)	Yes (1)	none
Indigenous Peoples	Yes (1)	Yes (1)	none
Adult/Elderly		Yes (1)	none
Yes (1)			
Persons with Disabilities (PwD)	Yes (1)	none	none
Ethnic minorities	Yes (2)	Yes (2)	none
Youths	none	none	none
Religion	none	Yes (1)	none
Economic status	Yes (1)	Yes (1)	none

DISCUSSION

Dominance of technical dimension in the forest fire research

The growing number of publications on forest fires in Nepal over the past five years suggests that this issue is receiving the attention as a national concern. However, the bulk of this research has concentrated on biophysical and technical aspects, treating fires largely as natural events rather than as complex interactions between ecological and social systems. This perspective carries significant policy implications, as framing forest fires primarily as climate-driven may overshadow the need for community-based solutions that tackle the underlying social causes. Given that forest fires often bring serious socio-economic consequences and that human activities are now the primary cause of forest fires worldwide, it is essential

to investigate the human dimensions of this problem (Calviño-Cancela and Cañizo-Novelle, 2018; McCaffrey *et al.*, 2013).

Nepal’s forest fire research has been shifting from conventional studies to machine learning techniques contributing to the more comprehensive understanding of forest fire dynamics in Nepal (Dhakal *et al.*, 2024; Joshi *et al.*, 2024; Mishra *et al.*, 2023; Parajuli *et al.*, 2023; Paudel *et al.*, 2024; Sapkota *et al.*, 2025). Yet, while attention to human factors is beginning to emerge, it remains superficial. This pattern echo with the global trends, where forest fire research often separates ecological questions from social realities (Li *et al.*, 2023). As Li *et al.*, (2023) suggests, forest fires cannot be fully grasped through any single academic lens, instead, there is need of stronger coordination across physical, biological, and social sciences to develop a truly integrated understanding.

Although, growing literature and research on disaster has integrated socioeconomic vulnerability (Aksha *et al.*, 2018; Bista, 2022; Gautam, 2017; Guragain and Doneys, 2022), forest fire-specific studies have been slow to incorporate these dimensions. Findings of this review reveal that even research on solutions is largely based on spatial-temporal aspect, with limited documentation of locally led innovations (Ranabhat *et al.*, 2022). Furthermore, studies examining the drivers of forest fires tend to emphasize climatic factors while giving far less attention to non-climatic influences such as human activities and socio-economic conditions. Although climatic drivers remain a dominant explanation, emerging evidence suggests that shifting social and economic trends, particularly rural outmigration, forest-people relationship and evolving energy consumption pattern, are equally pivotal yet under-researched (Koirala and Rahut, 2024; Tiwari *et al.*, 2022). It is also crucial to acknowledge that these findings are shaped by the methodological boundaries of the review process. The restriction to English language and research papers may have underrepresented locally documented knowledge and community-based insights typically published in Nepali language journals or grey literature. Consequently, the apparent dominance of technical research may be somewhat amplified, while socioeconomic dimensions may be less visible in the reviewed literature. Forest fires and social vulnerability are closely intertwined. Research shows that while fires reshape both the ecological and socio-economic landscape of communities, incorporating fire risk into preparedness strategies can strengthen community resilience (Chas-Amil *et al.*, 2022). Socio-economic dimensions are highly context-specific, shaped by gender relations, social diversity, power structures, institutional arrangements, and governance systems (Zabaniotou *et al.*,

2021). With the isolation of socioeconomic aspects of forest fire research, there exists critical research gaps on a) how the resource access, benefits distribution and governance, affect the social vulnerability and inclusive forest fire management, that ultimately have implications on forest fire risks and response, b) how increasing forest fire incidences and severity is impacting the socioeconomic vulnerability, c) how changing socioeconomic context impacts on participatory forest fire management through erasing of best traditional knowledge and practices on participatory management. Excluding these dimensions from research reduces their policy relevance, as they offer little guidance on where to invest in targeted interventions that would promote more inclusive and participatory approaches to forest fire management.

Silence around gender perspective in forest fire

Over the past decade, Nepal has made notable progress in incorporating gender and intersectional perspectives into disaster research (Bajracharya *et al.*, 2022; Bradley *et al.*, 2023; Yadav *et al.*, 2021). However, the vast majority of forest fire studies have remained remarkably disconnected from these concerns. The finding that about 85 per cent of the articles reviewed did not consider gender at all represents a significant oversight, particularly given women's disproportionate vulnerability, women's frontline roles in forest dependent livelihoods, and women's leadership in community-based forest institutions. While the figure is striking, the screening process, reliance on explicit keyword searches and five-years literatures consideration may not have captured the recent shifts in gender-responsive disaster research and gendered aspects documented in

Nepali language sources and grey literatures. However, the findings that the vast majority of studies reviewed either omit gender analysis or treat it superficially remains robust enough. There are a few exceptions, such as studies on human capital that have documented how forest fires differentially affect women's educational outcomes (Paudel, 2023). Yet these remain isolated examples rather than part of a broader research agenda.

The absence of gender analysis leaves many critical questions unanswered, for example, how women's daily routine and mobility influence their exposure to fire and ability to respond? what kind of gendered knowledge systems exist around preventing and managing fires? how are women's contributions to fire management documented and valued? how do power dynamics within household shape women's decisions related to fires? and what are the gendered effects of post-fire recovery on livelihoods? This research gap largely stems from the prevailing focus on biophysical, ecological, and spatial-temporal aspects of forest fires.

Given Nepal's challenging geography and limited financial capacity for high-tech fire suppression solutions, community at the forefront of the forest fire control and management has no option. Although policy discussions on forest fire management acknowledge the importance of community-based institutions and emphasize participatory approaches, the lack of attention to gendered differences in experience and vulnerability undermines the policy relevance of technical research, such as risk assessments and hazard mapping. Without incorporating such dimensions, even well-designed technical

studies may fail to guide effective and equitable interventions.

Findings of this review also show that even when gender is mentioned in research, it is often treated superficially limiting its consideration to a socio-demographic criterion or a mere description of the respondents. Many studies acknowledge gender in their methodology sections, but the analysis remains shallow and rarely influences the conclusions or recommendations (Adhikari *et al.*, 2021; Aryal *et al.*, 2025; Pandey *et al.*, 2025; Tiwari *et al.*, 2022). This is problematic because forest fires are not neutral when it comes to gender. Differences in gender roles, participation, leadership, dependency on forest resources, access to decision-making, agency, risk exposure, and capacity all shape how fires are prevented, managed, and responded to (Eriksen, 2014; Eriksen *et al.*, 2010). Women, in particular, rely heavily on forest-based ecosystem services for their daily subsistence needs, such as timber, fuelwood, fodders, food, etc. (Sedhain and Galang, 2022). Moreover, with increasing male outmigration, women have taken on added responsibilities for farm and forest management, on top of their existing household duties (Gautam *et al.*, 2023).

Against this backdrop, gender-responsive forest fire research is urgently needed to identify the different types of knowledge, levels of preparedness, and existing gaps among forest managers. Such research would provide evidence to shape policies and targeted interventions that promote inclusive and participatory forest fire management with the understanding of how gender and other social factors influence fire dynamics and responses.

Social diversity: seemingly unseen dimension in forest fire research

The intersectionality framework which has significantly advanced gender and disaster research in recent years (Bajracharya *et al.*, 2022; Walker *et al.*, 2020, 2021) has not been applied at all in Nepal's forest fire studies. Several of the studies reviewed (Parajuli *et al.*, 2022; Tiwari *et al.*, 2022) treats "community" or "users" as homogeneous population. They rarely examine the internal diversity of communities, thereby ignoring the distinct experiences of disadvantaged groups such as women, Indigenous Peoples, ethnic minorities, Dalits, the elderly, youth, PwD, and the poor. This oversimplification is especially problematic in Nepal, where multiple social identities create deeply layered hierarchies and context-specific realities that fundamentally influence how people experience disasters, cope with them, and recover (Finucane *et al.*, 2000; Hoffman *et al.*, 2021; Walker *et al.*, 2020, 2021).

Thousands of community-level forest management institutions across Nepal are made up of diverse members, yet forest fire research rarely examines how these institutional dynamics include or exclude different groups in fire-related decision-making. When studies mention "community participation," they seldom specify who within the community actually takes part, who leads, who has the capacity to act, who is vulnerable, whose knowledge is valued, and who ultimately benefits from forest fire management efforts. This lack of specificity obscures the reality that participation is often uneven and influenced by power relations.

Findings of this review, however acknowledging the methodological limitations as discussed in above two sections, reveal that even when research acknowledges diverse

identities, it tends to limit their consideration to being merely "vulnerable groups." Such studies fail to highlight these groups' potential as agents of change or to recognize the need for targeted interventions, resources, and capacity-building to strengthen their roles in forest fire management (Bhatta and Adhikari, 2024; Dhakal *et al.*, 2024; Kuikel *et al.*, 2025; Tiwari *et al.*, 2022). Indigenous women and elderly groups, for instance, bear a disproportionate financial, time-related, and technological burden from climate change (Pandey *et al.*, 2025). At the same time, they are key holders of traditional knowledge about forest fire management. Traditional knowledge of fire history, resistant species, and fuel-reducing practices (e.g., grazing, biomass extraction) effectively controlled fires while also helped in reducing the fire severity. In recent decades, however, fires have escalated into hazards, driven by socio-demographic transitions, fuel accumulation, and climate change. In addition, this knowledge is eroding as the elderly population declines, and younger people migrate out in search of work. This outmigration not only reduces the available workforce for fire response but also disrupts the intergenerational transmission of such traditional knowledge and practices. In addition, the disability across these social identities remains crucial concern as it exacerbates an individual's vulnerability and constrains their capacity to respond to disasters or hazards. On this backdrop, research gap exists concerning the efficacy of traditional knowledge/practices against the increasing severity of the forest fire and changing socio-demographic context as well as GESI responsiveness of evolving modern fire management tools, technologies, and existing interventions. Furthermore, intersecting social identities intensify disaster impacts and vulnerability among disadvantaged groups, including

women (Almuqati *et al.*, 2024). Therefore, assuming that "community" automatically means "democratic" and "inclusive" is deeply flawed in forest fire research. Such an assumption ultimately undermines the design of effective interventions for participatory fire management and response. What is needed is institutional analysis that goes beyond simply counting members to examine power dynamics, decision-making processes, and how benefits are distributed among people with intersecting identities. The absence of intersectional analysis has direct policy consequences as generic interventions fail to address the specific needs in terms of resource, access, capacity, services, etc of the most vulnerable groups, leaving them without adequate support and perpetuating existing inequalities.

CONCLUSION

Research on forest fires in Nepal has attracted growing attention from scholars over the past five years. However, until now, there has been no systematic evaluation of how gender and diversity have been addressed in this body of scientific work. This review concludes that forest fire research in Nepal from 2021 to 2025 remains largely disconnected from the country's progressive disaster management frameworks and lags well behind other disaster sectors in integrating gender and social diversity. This disconnect signals an urgent need for attention and cross-sectoral learning to bring forest fire research and management in line with broader national commitments to inclusivity.

Acknowledging the disproportionate impact of forest fire on forest-dependent groups, particularly women and disadvantaged groups, this scoping review also reveals three fundamental gaps in Nepal's

forest fire research. First, research has been overwhelmingly concentrated on technical aspects, including biophysical, ecological, and spatial-temporal factors, with human and socioeconomic dimensions receiving inadequate scholarly attention. Second, where gender is mentioned, it tends to be tokenistic, confined to brief acknowledgements in methodology sections, with little meaningful analysis and rarely any influence on conclusions or recommendations. Third, studies continue to treat communities as monolithic entities, failing to apply intersectional analysis that would reveal how overlapping social identities shape different experiences of vulnerability and capacity.

Community-led participatory and proactive forest fire management has no option in country like Nepal where forest lands are geographically sensitive, particularly in hills and high mountains and country's investment capacity as well as investment focus on high-tech modern fire suppression solutions is low. In such, adequate research focus on gender and social dimensions of forest dependent communities, particularly gendered roles and needs, resource use pattern and dependency, differential impacts and vulnerabilities across the intersecting social identities, changing sociodemographic context and livelihood priorities, local knowledge and capacities, and so on, as well as implications of these factors on forest fire control and management is crucial. A deeper and more nuanced exploration of such GESI dimensions may support policy, programmes and initiatives to design and implement GESI responsive, context-specific and resilient interventions for sustainable forest fire management, ensuring that efforts are not only equitable and inclusive but also practically tailored to the real-world realities of the frontline

communities who bear the greatest burden. Given the methodological limitation of this scoping, future research may triangulate these bibliometric findings with fieldwork and local documentation to validate and extend these findings.

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Conflict of Interest

The authors declared no competing interests.

Declaration of the use of AI

The authors used ChatGPT to improve grammar and clarity for writing quality. After using the tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the article.

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