# Forest fire policy efforts in Nepal: Present status and future vision

**Kanchan Ojha[1,*], Ankit Koirala[2,3]**

[1]*Environmental Science Graduate Program, Oregon State University, Corvallis, Oregon, USA*

[2]*Department of Agricultural Economics and Agribusiness Management, Agriculture and Forestry University, Nepal*

[3]*Forest Engineering, Resources and Management, College of Forestry, Oregon State University, Corvallis, Oregon, USA*

[*]*Corresponding author: ojhak@oregonstate.edu*

**Abstract**

In Nepal, forest fires are a growing environmental and socioeconomic disaster fuelled by complex socio-ecological forces, land-use dynamics, and climate change. Nepal's governance response remains fragmented and largely reactive, despite the increasing frequency and intensity of fires. This paper provides a policy review of Nepal's forest fire governance landscape by analysing 18 primary government instruments comprising Acts, Rules, Strategies, Guidelines, Plans, and Policies across federal, provincial, and local governance levels, alongside peer-reviewed and grey literature. The review provides the development of Nepal's institutional and legislative frameworks, from early conservation laws to modern climate adaptation and community forestry instruments, by evaluating each for its institutional mandates, implementation efficacy, and provisions related to forest fires. The results show that Nepal's governance system is vast in scope but is limited by dispersed institutional responsibilities, persistent underfunding, poor interagency coordination, and unequal implementation capacity across the country's federal structure. Nepal's sole comprehensive and specialised policy tool for managing forest fires, the Forest Fire Management Strategy 2010 has been recently upgraded with the release of the Forest Fire Preparedness and Response National Action Plan 2026. Nepal's Community Forest User Groups are among the most significant governance assets for local fire prevention, though their capacity remains inconsistent. The paper concludes with recommendations for consolidating Nepal's governance framework through a unified legal instrument, dedicated financing, strengthened community engagement, technology-enabled monitoring, and cross-border collaboration with neighboring Himalayan countries.

**Keywords**: Forest fire, Fire governance, Policy review, Nepal forestry, Forest fire legislation

## INTRODUCTION

Fire is a fundamental ecological process that supports diverse ecosystem functions such as resprouting, serotiny, and germination rate in response to heat and smoke exposure in plants (Keeley *et al.*, 2011) and social values of fires, such as management of agriculture, forestry & wildlife, and urban areas, along with infrastructure protection (Bowman *et al.*, 2011). Although fire naturally shapes many landscapes and is a common land-management tool, contemporary forest fires have intensified due to increased dryness, anthropogenic climate change, land-use patterns and past management practices (Abatzoglou and Williams, 2016; GoN, 2021; Wolters *et al.*, 2017) with rising temperatures, shifting precipitation patterns, and prolonged drought which is further altering fire regimes

worldwide, leading to more frequent and severe forest fires (Bisht and Singh, 2025; Chuvieco *et al.*, 2014; Halofsky *et al.*, 2020; Moritz *et al.*, 2014).

Uncontrolled forest fires remain a major cause of forest degradation in Nepal, hindering natural regeneration, destroying timber and non-timber forest products (NTFPs), and threatening biodiversity. The scale of this challenge is reflected in fire data of 2016, where fire frequency and burned area surged by 33 per cent and 42 per cent, respectively, compared to the preceding period (Bhujel *et al.*, 2017), while 2021 recorded an unprecedented 6,536 fire incidents nationwide (GoN, 2021). Together, these figures point to an intensifying crisis and raise serious questions about the adequacy of Nepal's current fire management and prevention frameworks.

## Why study forest fires in Nepal?

Fires are increasing in intensity worldwide, and Nepal is also not left alone to deal with this global issue. Studies have shown increased fire incidents and burned areas in the Chure and Middle Hill regions of Nepal (K. P. Joshi *et al.*, 2025), as well as the destruction of forest areas and biodiversity throughout the country (Ranabhat *et al.*, 2022). Research further highlights critical deficiencies in scientific infrastructure, technical capacity, training, and funding needed to understand and manage forest fires across Nepal and the broader Eastern Himalayan region (Wang *et al.*, 2021). Compounding this, a robust Random Forest Modeling analysis identified 11.1 per cent of Nepal's land area, including the Chure region, Terai, the southwestern region, and the Middle Mountain region, as very high fire-risk zones, underscoring the extent to which fire-vulnerable areas remain neglected in policy prioritisation (Sapkota *et al.*, 2025a).

Despite this escalating risk, Nepal's forest fire governance has historically rested on a single dedicated policy instrument: the Forest Fire Management Strategy 2010. This strategy guided forest fire management in the country for over a decade, yet with less than 0.5 per cent of the budget allocated to fire management, its implementation remained severely constrained (Pandey *et al.*, 2022). While awareness-raising initiatives such as celebration of forest fire management week, public dissemination (on media) of fire-related information, and distribution of fire-fighting tools have been undertaken under this framework, the strategy was never revisited to reflect the rapidly changing national and international context, or the growing socio-economic and ecological consequences of forest fires, including threats to carbon trading commitments and forest cover maintenance goals (Pandey *et al.*, 2022).

A significant policy shift occurred in 2026 with the introduction of the Forest Fire Preparedness and Response National Action Plan 2026, marking the first major expansion of Nepal's dedicated forest fire policy architecture in 15 years. This development creates a timely and critical opportunity to assess the broader governance landscape, examining what has existed, what has changed, and what remains unaddressed.

## Research problem and knowledge gap

Despite the growing severity of forest fire incidents in Nepal, a critical gap exists in the literature, as no comprehensive and systematic policy review has been catalogued and critically evaluated for the full spectrum of legislative, institutional, and strategic instruments governing forest fire management across Nepal's federal structure. Existing studies either focus narrowly on ecological drivers and

fire behaviour (Bhujel *et al.*, 2017; Hamal *et al.*, 2022) or provide fragmented assessments of individual policy instruments (Pandey *et al.*, 2022). The status of knowledge on how Nepal's evolving policy landscape, spanning conservation law, disaster risk reduction frameworks, community forest guidelines, and climate adaptation plans, collectively addresses forest fire risk remains unclear and understudied. We wanted to know: What legislative, strategic, and institutional instruments govern forest fire management in Nepal, how have they evolved, and how effectively are they implemented? This paper attempts to fill this gap by providing a critical analysis of Nepal's forest fire governance landscape, explicitly mapping policy strengths, weaknesses, and implementation challenges. The paper aims to a) document the range of policies, laws and strategies relevant to forest fire management in Nepal, b) identify strengths, gaps and inconsistencies in the current policy framework, and c) propose directions for future policy reform.

## Trends and major forest fire events

Over the past two decades, Nepal has witnessed a marked rise in forest fire frequency, burned area, and fire severity, particularly during the dry pre-monsoon season from March to May *(Bhujel et al.*, 2017; Hamal *et al.*, 2022). Satellite-based analyses and historical fire records indicate a steady upward trajectory in both the number of incidents and the total area affected, with particularly severe forest fire seasons recorded in 2016 and 2021 (Bhujel *et al.*, 2017; Pokharel *et al.*, 2023). There is an upward trend in the yearly fire count from 1748 fires in 2013 to 5216 fires in 2024, as shown in Figure 1 (GoN, 2026).

The 2016 forest fire season recorded a 33 per cent increase in incidents and a 42 per cent rise in burned area compared to the 2000-2015 average, resulting in 140 days of active burning, extensive loss of forest resources, and several human casualties (Bhujel *et al.*, 2017, 2022). Similarly, in spring 2021, Nepal experienced a record-breaking fire season, with 6536 active

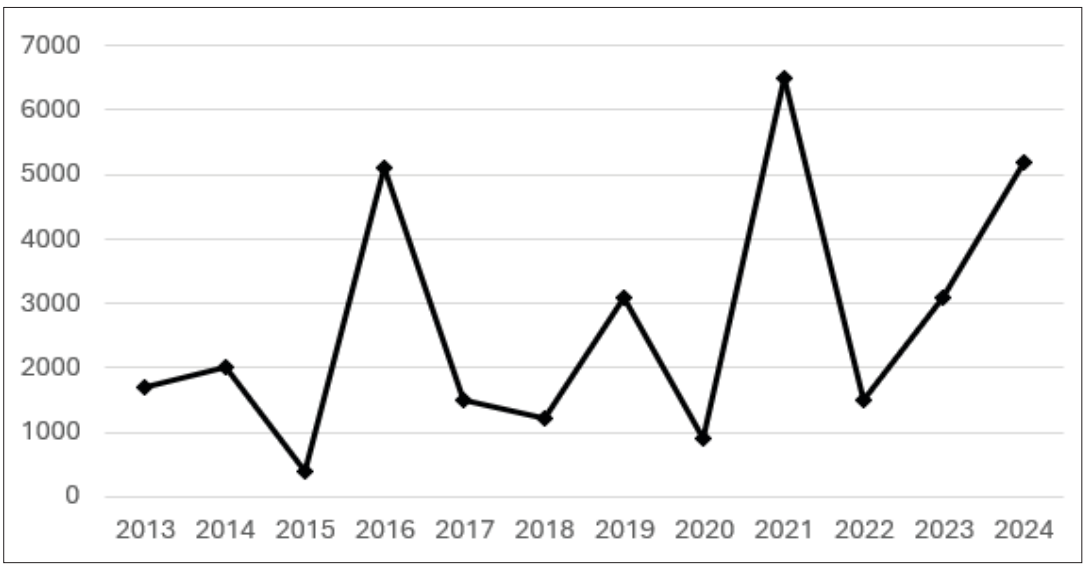


**Figure 1: Yearly forest fire counts in Nepal**

**(Data source: https://nepal.spatialapps.net/NepalForestFire/FireStats)**

fires detected at a rate nearly ten times higher than the 2002-2020 average, largely driven by prolonged drought and increasing climate variability (Pokharel *et al.*, 2023).

Forest fire activity in Nepal typically occurs from March to May, with high atmospheric temperatures, dry conditions, and extended winters creating favourable circumstances for ignition and spread (Parajuli *et al.*, 2015). The severity of these fires depends largely on fire weather, fuel load, and physiographic conditions. Once the monsoon establishes, typically by mid-June, fire activity gradually subsides (Matin *et al.*, 2017). Forest fires are mostly human-induced and occur during dry seasons, complicating suppression efforts due to Nepal's mountainous terrain; broadleaf deciduous forests in lower regions and needle-leaf forests in higher elevations are most affected (Joshi *et al.*, 2025; Matin *et al.*, 2017). High-risk zones are primarily concentrated in the Mid-Western Development Region, whereas the Eastern Region experienced relatively low fire risk due to higher precipitation levels. The biggest concentration of extremely high-risk forest fire areas is found in the Province of Lumbini, while the districts of Parsa and Surkhet are also in the most at-risk zone, with more than 50 per cent of their land at high risk (Sapkota *et al.*, 2025a).

Similarly, studies conducted by Mishra *et al.* (2023) show that Nepal's forest fire occurrence and burned area have increased steadily since 2001, with the pre-monsoon season accounting for the majority of incidents. Advanced modelling techniques such as maximum entropy (MaxEnt) and deep neural networks (DNNs) have revealed important spatial patterns of fire vulnerability, with DNNs offering improved predictive performance and supporting more targeted forest fire management interventions.

Collectively, these trends expose a growing vulnerability of Nepal's forests to climate-related fire hazards. The rising frequency and intensity of forest fires highlight the urgent need for better fire management strategies, enhanced monitoring systems, and climate adaptation policies to protect Nepal's forest ecosystems and rural communities.

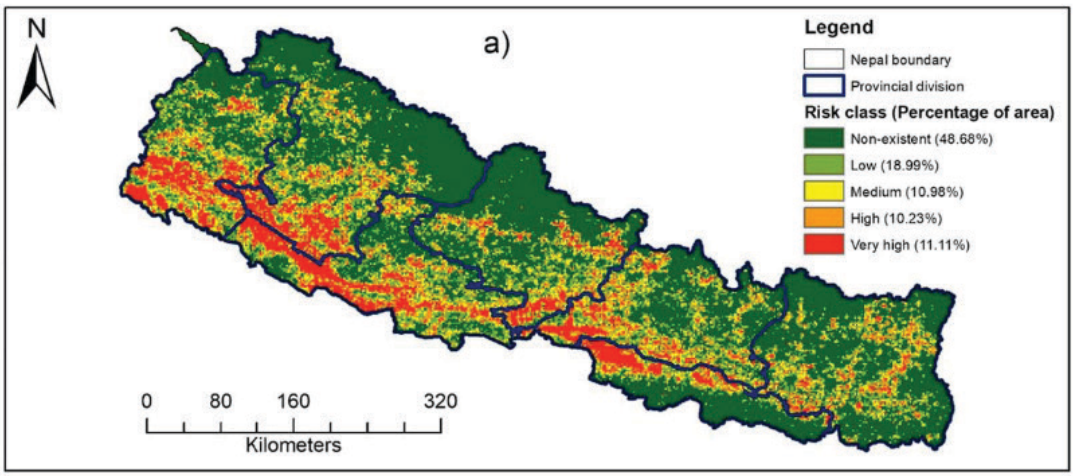


**Figure 2: Forest fire risk map of Nepal based on the validated Random Forest model**

**(Image source: Sapkota *et al.*, 2025a)**

## Drivers: climatic, anthropogenic, and forest management practices

Forest fires in Nepal are driven by climatic, anthropogenic, and forest management factors, each contributing uniquely to the frequency, intensity, and spatial distribution of fire events (GoN, 2021). Climatic drivers are particularly influential, with rising temperatures, prolonged droughts, and reduced precipitation significantly increasing fire risk (Bhujel *et al.*, 2021; Hamal *et al.*, 2022; Mansoor *et al.*, 2022). Studies have shown that ambient temperatures above 30°C and annual precipitation below 2400 mm are strongly associated with higher fire incidences, especially during the pre-monsoon season when nearly 90 per cent of fires occur (Bhujel *et al.*, 2021; Hamal *et al.*, 2022). Additionally, low humidity and dry soil conditions further enhance the flammability of forest fuels. El Niño is another driver of forest fires in Nepal, as it creates dry, warm conditions that increase fire risk, mainly during the pre-monsoon season (Hamal *et al.*, 2022). The El Niño hinders westerly moisture transport, causes moisture divergence, thereby exacerbating drought conditions, and creates favourable conditions for large-scale forest fires by providing more forest fuels (Hamal *et al.*, 2022; Pokharel *et al.*, 2023). Anthropogenic factors are equally critical, as the majority of forest fires are human-induced (KC *et al.*, 2017). Activities such as agricultural burning, land clearing, and carelessness near roads and settlements are major ignition sources (Mishra *et al.*, 2023) (Table 1). Forests located within 500 meters of roads and settlements are particularly vulnerable, highlighting the impact of human proximity and infrastructure development on fire risk with 89 per cent fire occurring during the pre-monsoon season (Ahmad and Saran, 2024; Bhujel *et al.*, 2021; Mishra *et al.*, 2023; Parajuli *et al.*, 2022).

**Table 1: Major causes of forest fires in Eastern Himalaya, including Nepal *(Source: Wang et al., 2021)***

| Fire category | Causes of forest fires |
|---|---|
| Accidental | Uncontrolled burning |
| | Campfires |
| | Roadside workers |
| Negligence | Debris or charcoal burning |
| | NTFP* collectors |
| | smokers/passer by |
| Deliberate | Agriculture burning/shifting cultivation |
| | Soil fertility |
| | fuel wood collectors |
| | poachers/ hunters |
| | NTFP collectors |
| | burning of grass by grazers |

**Non-timber forest products*

Forest management practices play an important role in shaping the typical frequency, intensity, duration, aerial extent and seasonality of forest fire disturbance in a particular ecosystem, commonly known as fire regimes. Fire management strategies such as prescribed burning, mechanical thinning and restoration of active fire regime can lower the fire intensity and severity by decreasing fuel availability and promoting heterogeneous forest structure (Furlaud *et al.*, 2023). While Community-Based Forest Management (CBFM) has improved forest cover, it can inadvertently increase fire risk by allowing fuel loads to accumulate if not properly managed. The effectiveness of fire prevention depends on the strength of local government, Community Forest User Groups (CFUGs), and the Divisional Forest Office (DFO), as well as on the implementation of fire lines and the availability of firefighting resources (Gautam & Shapkota, 2024; Oli *et al.*, 2025; Tiwari *et al.*, 2022). Studies have

shown that interaction and good governance between central and local authorities significantly impact forest fire management (Brotestes Panjaitan *et al.*, 2019). Similarly, Sapkota *et al.* (2015) found that in fire-prone areas such as the Siwalik, social capital and enforceable forest fire management rules emerge as key determinants of community participation in collective fire management. However, effective fire mitigation is hampered by significant institutional and regulatory deficiencies, including a lack of funding, a lack of specialised firefighting teams, and inadequate integration of climate risk into management plans. (Bhujel *et al.*, 2021). To address these issues and mitigate the growing threat of forest fires in Nepal, a comprehensive strategy that incorporates climate projections, strengthens community involvement, and improves policy implementation is needed (Bhujel *et al.*, 2021; Hamal *et al.*, 2022; Pokharel *et al.*, 2023; Tiwari *et al.*, 2022).

## Impacts: ecological, economic, health, and social dimensions

Forest fires in Nepal have profound and multifaceted impacts, spanning ecological, economic, health, and social dimensions. Ecologically, forest fires are a major driver of forest degradation, resulting in the annual burning of approximately 172,040 hectares of forest, the damage of 7.07 million tons of biomass, and the release of 3.3 million tons of carbon each year (Bhujel *et al.*, 2022). These fires disrupt plant community assemblages, reduce species diversity, and hinder the regeneration of woody species, particularly in the Terai, Mid-hill, and Mountain ecological zones (Sapkota *et al.*, 2025b). The loss of biodiversity and ecosystem services, such as watershed protection and soil conservation, is significant, and the increased carbon emissions contribute to both local air pollution and global climate change (Bhujel *et al.*, 2022; Kuikel *et al.*, 2025). Dahal *et al.* (2025) estimated that forest fire could release more than 1 could release more than 170 million tons of soil organic carbon and 325 million tons of above-ground wood carbon, along with the loss of biodiversity in Nepal. Increasing forest fire incidence is likely to affect Sustainable Development Goal (SDG) 13 (Climate Action) and SDG 15 (Life on Land) through impacts on air quality, ecosystem and soil health.

Economically, the consequences of forest fires are substantial. In the year 2023/24, forest fires caused an estimated economic loss of approximately NPR 87 crore (about USD 6.6 million), the largest loss in recent years in Nepal (Figure 3). According to a report from the National Disaster Risk Reduction and Management Authority (NDRRMA) (GoN, 2025b), over the past six years, there were 19,593 fire incidents that caused 593 fatalities. Studies have found that proximity to the nearest forest fire reduced firm revenue in recreational businesses in Oregon, USA, a pattern shaped by market access dynamics (Koirala *et al.*, 2025). Forest fires also reduce property values, with a 0.61 per cent decrease in residential property values for each unit increase in fire radiative power and a 4.48 per cent decline for every additional fire incident in Nepal (Paudel, 2022).

The health effects of forest fires are equally worrying. Fires significantly worsen air quality, especially in urban areas like Kathmandu, where PM2.5 levels can remain above safe limits for extended periods, increasing the risk of respiratory and cardiovascular problems (Bhujel *et al.*, 2022). In March and April 2021, forest fires affected air quality in the Kathmandu Valley (Khadgi *et al.*, 2024). From 2007 to 2021, at least 71 people lost their lives, with many others

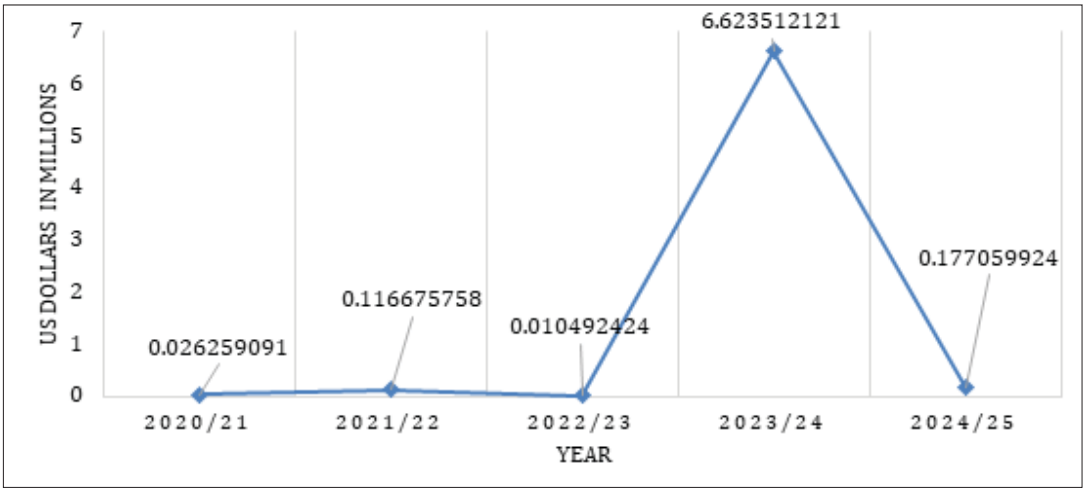


**Figure 3: Economic loss (in USD) due to forest fire in Nepal 2018-2024** ***(Data Source: NDRMA Report, 2025)***

experiencing injuries and health issues (Bhujel *et al.*, 2022). Socially, forest fires disrupt education by lowering school completion rates, especially among vulnerable and minority groups, and worsen food insecurity and economic hardship, particularly in rural areas (Paudel, 2022, 2023). The combined effects of these issues highlight the urgent need for integrated fire management and mitigation strategies that focus on ecological restoration, economic stability, public health, and social equality.

## METHODS

This study employs a policy review of forest fire management strategies to examine Nepal's forest fire governance landscape. The review followed a structured search and inclusion process across three categories of source materials: 1) primary legislative and policy documents, including Acts, Rules, Strategies, Guidelines, and Plans issued by the Government of Nepal, 2) peer-reviewed academic literature retrieved, and 3) grey literature, including government reports, international organization assessments, and national planning documents. In total, 17 primary government instruments were included, comprising 6 Acts, 2 Rules, 2 Guidelines, 3 Strategies, 3 Plans, and 1 Policy-alongside peer-reviewed articles that provided contextual and empirical grounding for the analysis.

Policy documents were identified through a systematic search of official government repositories (the Government of Nepal legislative database and Ministry of Forests and Environment publications) and verified against secondary academic sources. Inclusion criteria required that documents: (a) contain explicit provisions or references relevant to forest fire management, prevention, preparedness, or response; and (b) were enacted, amended, or remain operational within Nepal's current federal governance structure.

## RESULTS

This section presents the findings of the policy review, organised around the key legislative, strategic, and institutional instruments

governing forest fire management in Nepal. The review spans federal, provincial, and local governance levels, tracing the evolution of Nepal's forest fire policy landscape from early conservation legislation to recent climate adaptation and community forestry frameworks.

## Review and critical analysis of forest fire policies in Nepal

Nepal's forest fire governance has developed incrementally across multiple policy domains, resulting in a landscape that is broad in scope but uneven in implementation. The following review examines each major instrument for its forest fire-relevant provisions, institutional mandates, and practical effectiveness, drawing on peer-reviewed literature and government sources to assess both achievements and persistent gaps.

### National fire management policies in Nepal

Nepal's forest fire governance is relatively young, having developed mainly in an incremental and reactive way, with evidence indicating fire control largely depends on ad hoc response and fragmented activities rather than being backed by a coherent national framework (Pandey *et al.*, 2022). The 2010 Forest Fire Management Strategy represents the country's only forest fire-specific policy document; however, it lacks strong legal anchoring, sustained financing, operational impact on the ground, and systematic updating. The integration of forest fire into the disaster risk reduction era, notably through the Disaster Risk Reduction and Management Act (2017), not only expanded the institutional responsibility but also introduced coordination challenges between disaster authorities and forest-sector agencies. The federal Forest Act (2019) further decentralises responsibility to provincial and local governments and community institutions; however, it provides limited, clear guidance on forest fire risk governance. Overall, Nepal's forest fire policy landscape remains fragmented, heavily reliant on subsidiary guidelines, and constrained by uneven implementation capacity across governance levels.

| Year | Instrument | Type | Scope/forest fire-relevant provisions | Lead / responsible agency | Remarks |
|---|---|---|---|---|---|
| 1973 | National Parks and Wildlife Conservation Act (NPWCA) | Act | Core legal framework for protected areas; regulates activities in parks/reserves and enables rules for management that cover threats like fires within PAs. | Department of National Parks & Wildlife Conservation (DNPWC), Ministry of Forests & Environment (MoFE). | Conservation-oriented legislation where forest fire is treated implicitly as a management threat rather than as a distinct hazard; strong regulatory authority within protected areas but limited operational guidance on fire prevention and suppression. |
| 1974 | National Parks and Wildlife Conservation Rules | Rules | Operationalises NPWCA provisions for management and enforcement inside protected areas; complements Acts' controls relevant to ignition and control within PAs. | DNPWC / MoFE. | Provides administrative and enforcement mechanisms under NPWCA, enabling park authorities to act during fire events; however, forest fire management remains secondary to biodiversity protection objectives. |
| 2002 | Nepal Biodiversity Strategy | Strategy | Identifies forest fires as a major human-induced driver of biodiversity loss in Nepal | | The Strategy emphasises the urgent need for improved fire prevention, community awareness, and coordinated fire management across institutions to safeguard Nepal's ecosystems. |
| 2010 (2066) | Forest Fire Management Strategy | National strategy | Nepal's only comprehensive forest fire-specific strategy: prevention (fuel management, fire lines), preparedness, detection, suppression, community awareness, training, and planning guidance. | MoFSC (now MoFE); Department of Forests and Soil Conservation; CFUGs as implementers. | Nepal's first and only forest fire-dedicated national framework, emphasising community engagement and prevention; implementation has been uneven due to limited funding, weak institutional anchoring, and lack of periodic updating. |

| Year | Instrument | Type | Scope/forest fire-relevant provisions | Lead / responsible agency | Remarks |
|---|---|---|---|---|---|
| 2014 (guidelines updated; widely used post-2014) | Community Forestry Development Program Guidelines | Guidelines | Embeds fire protection activities in CF plans (fire line construction, workshops/ training, extension on forest fire control); integrates CFUG responsibilities for prevention/ response. | Department of Forests & Soil Conservation; CFUGs. | Operationalises forest fire prevention at the community level by mainstreaming fire control into forest operational plans; effectiveness depends heavily on CFUG capacity, local leadership, and external technical support. |
| 2017 (2074) | Disaster Risk Reduction and Management (DRRM) Act | Act | Establishes the national DRRM system (Council, Authority, committees) across all hazards, including forest fires; assigns multi-tier responsibilities for prevention, preparedness, response and recovery. | National Council & NDRRMA; federal, provincial, and local DRRM committees. | Marks a critical shift by formally recognising forest fires as a multi-hazard disaster risk; however, coordination between disaster authorities and forest-sector institutions remains a persistent challenge. |
| 2018 | National Policy for Disaster Risk Reduction & Strategic Plan of Action (2018-2030) | Policy & plan | National DRR policy umbrella that covers forest fire as part of multi-hazard risk reduction; frames roles across government tiers and planning cycles. | MoHA/ NDRRMA with sector ministries incl. MoFE; provincial & local governments. | Provides a unifying policy umbrella that integrates forest fire into national risk reduction planning; sectoral mainstreaming has progressed slowly, with limited translation into forest-specific operational protocols. |
| 2019 | DRRM Rules (supporting the 2017 Act) | Rules | Implements of DRRM Act-procedures and coordination for hazard management including forest fire early warning, preparedness, and response mechanisms. | NDRRMA; sectoral ministries; provincial & local DRRM bodies. | Clarifies procedural roles and coordination mechanisms for forest fire response across governance levels; effectiveness is contingent on local government capacity and interoperability with forest agencies. |

| Year | Instrument | Type | Scope/forest fire-relevant provisions | Lead / responsible agency | Remarks |
|---|---|---|---|---|---|
| 2019 (2076) | Forest Act, 2019 | Act | Modernises forest governance (national, community, protected, leasehold, private forests); establishes funds and responsibilities for conservation/ management with implications for fire prevention, response, and CFUG duties; recognizes setting up of fire in the national forest or to do any act that may cause fire as an offence. | MoFE; Dept. of Forests & Soil Conservation; provincial ministries; local governments; CFUGs. | Modernises forest governance by categorising forest into different types: government managed, community, collaborative, leasehold and private forest with corresponding governance arrangements and rights; under federalism and strengthens institutional responsibilities relevant to forest fire management; yet, explicit forest fire provisions remain limited, relying instead on subsidiary guidelines and strategies. |
| 2024 (amendment) | Amendment to NPWCA (Section 5A addition) | Amendment | Adds authority to designate "highly sensitive" areas within PAs; affects how risky activities and emergency responses (incl. fires) are managed inside protected areas. | DNPWC/ MoFE. | Introduces spatial risk differentiation within protected areas, potentially enabling more targeted fire management; practical implications for emergency response and inter-agency coordination are still emerging. |
| 2025 | Community Forestry Guidelines | Guidelines | As stated in Appendix 5, 2.1 toward forest conservations, CUFGs perform forest control, construction of fire breaks and fire line, conduct workshops and disseminate information regarding forest fire like newspaper, street acts, radio program.<br>CFUGs can provide immediate financial relief for the loss due to a forest fire | CFUGs | Forest fire is identified as one of the big challenges for the SDGs in the Community Forestry Guidelines, 2025. The activity evaluation regarding the forest fire is incorporated in evaluation form of DFO |

## Environmental and climate legislation

### Environment Protection Act

The Environment Protection Act (EPA), originally enacted in 1997 and significantly amended in 2019, is one of Nepal's key environmental laws; however, it clearly does not directly mention forest fire as an environmental threat. The 2019 amendment added a dedicated chapter on climate change (Chapter 4), including provisions on adaptation planning at both national and local levels (Article 24), and risk management (Article 26), which could, in theory, be broadly interpreted to cover forest fire as a climate-related risk. The Act does not include specific language, regulations, or formal policies regarding forest fire. This legislative silence creates a significant gap, leaving forest fire management fragmented across sector-specific policies rather than rooted in a clear and enforceable legal foundation.

### National Climate Change Policy

Unlike the EPA, Nepal's National Climate Change Policy, first issued in 2011 and revised in 2019, incorporates forest fire into the national governance agenda. The policy explicitly recognises forest fires as a climate change impact and commits to developing strategies and policies for forest fire preparedness and response, including monitoring, forecasting, and early warning systems for forest fire hazards (GoN, 2019a). It is also based on Nepal's international agreements under the Paris Agreement, the Sustainable Development Goals, and the Sendai Framework for Disaster Risk Reduction.

## Disaster risk reduction legislation

### Natural Calamity Relief Act

The Natural Calamity Relief Act of 1982 is Nepal's first legal framework for organised disaster response and laid the foundation for the country's disaster management (GoN, 1982). The explicit inclusion of fire in this Act is important, as it was the first legal recognition in Nepal that fire, including forest fire, required a formal state response system. However, despite its historical significance, the Act's treatment of fire was generic and did not differentiate among structural fires, forest fires, or forest-specific management rules. Fire was recognised as a disaster requiring relief, but not as a hazard requiring proactive management. The Natural Calamity Relief Act was eventually replaced by the Disaster Risk Reduction and Management Act of 2017, which aimed to address many of these issues within a more modern legislative framework.

### Disaster Risk Reduction and Management Act

The Disaster Risk Reduction and Management Act (DRRMA) of 2017 signifies a major shift in Nepal's disaster governance by replacing the four-decade-old Natural Calamity Relief Act with a comprehensive, constitutionally based legal framework. The Act explicitly recognises fire as a disaster category, reaffirming its statutory status within Nepal's disaster management system. The DRRMA 2017 was specifically designed to cover the entire disaster management cycle, from risk reduction and preparedness to response and recovery (GoN, 2017, 2019b). Although the DRRMA provides essential

institutional support for forest fire response, it lacks a dedicated, prevention-focused, and ecologically informed governance structure necessary to address the rising forest fire crisis.

### National Disaster Risk Reduction Strategic Action Plan

The National Disaster Risk Reduction Strategic Plan of Action (DRRNSPA) 2018-2030 is Nepal's most detailed operational commitment to disaster risk reduction (GoN, 2018). It is one of the first national planning tools to explicitly address forest fire as a key hazard requiring structured governance. The plan recognises Nepal's high vulnerability to various natural disasters, with forest fires identified as a major recurring hazard, especially in the Terai, mid-hills, and mountainous regions. The plan proposes specific forest fire strategies, including establishing a real-time fire monitoring system, developing community awareness and information kits, strengthening early warning systems and community preparedness training, improving firefighting equipment and communication between agencies, and integrating forest fire risk reduction into building codes, settlement planning, and industrial policies (GoN, 2018). Despite these ambitious goals, implementation has been inconsistent: forest fire risk reduction activities lack secure funding and are not fully integrated into provincial and local institutions. The plan's strategic initiatives have yet to be fully operationalised through dedicated annual budgets, technical capacity development, and monitoring systems (Joshi *et al.*, 2024; Pandey *et al.*, 2022). The DRRNSPA 2018-2030 marks an important step forward in Nepal's forest fire management efforts, but its transformative potential depends on sustained political will, inter-agency coordination, and adequate resource allocation.

## Specific forestry & fire-related policies and strategies

### Forest Fire Management Strategy

The Forest Fire Management Strategy (FFMS) of 2010, developed by the then Ministry of Forests and Soil Conservation (MoFSC), remains the only comprehensive policy specifically dedicated to forest fire management in Nepal. Its main goal is to reduce losses of life, property, biodiversity, and ecosystem functions through proper forest fire management, ultimately aiming to increase forest productivity (GoN, 2010). The Strategy is organised around four key pillars: strengthening and updating policies, laws, and institutional frameworks; expanding education, awareness, capacity building, and technological progress; promoting community-based fire management and supporting research; and improving coordination, collaboration, international partnerships, and infrastructure. Operationally, the Strategy seeks to establish and reinforce the policy and institutional foundations necessary for effective forest fire management; involve local communities, civil society organisations, and both government and non-governmental bodies in fire prevention and control; develop robust communication and information systems to support disaster mitigation; promote responsible fire use for ecosystem management and community livelihoods; and create conditions that enable the mobilisation of financial, technical, and other resources from national and international donors, including bilateral, multilateral, and other partners, to address challenges posed by uncontrolled and cross-border

fires and their climate and environmental impacts. It prioritised participatory forest fire management, public awareness campaigns, legal reforms, and capacity building for both government and community institutions.

Despite these ambitious commitments, implementation has fallen short of the Strategy's stated vision, with FFMS 2010's achievements lacking in preventive measures and only satisfactory in remedial efforts, with forest fire management provisions remaining scattered across multiple sectoral agencies. This fragmentation hampers policy coordination and integration (Pandey *et al.*, 2022). FFMS 2010 remains as a strategy whose transformative potential has been limited by chronic underfunding, weak inter-agency coordination, and the absence of a dedicated governance structure to drive its implementation (Joshi *et al.*, 2024).

## Redd+ Strategy and Safeguards

Nepal's National REDD+ Strategy, finalised by the Ministry of Forests and Environment (MoFE) in 2018 under the United Nations Framework Convention on Climate Change (UNFCCC), represents a significant policy effort to address forest fires as a major threat to Nepal's forest carbon stocks (MoFE, 2018). The strategy explicitly recognises forest fire as one of nine primary causes of deforestation and forest degradation in Nepal, making forest fire an acknowledged and measurable threat to Nepal's emission reduction commitments. Quantitatively, fires have caused about 13 per cent of tree cover loss in Nepal from 2001 to 2023, burning approximately 40,000 hectares of forest each year, with most fire incidents and affected areas recorded between March and May (GoN, 2024, p.10). Strategically, the REDD+ framework emphasises strengthening the fire control capabilities of DFOs, Protected Area Management Authorities, and CBFM groups through developing specific management plans, allocating dedicated financial and human resources, enhancing monitoring systems, adopting advanced technologies, and improving insurance mechanisms (MoFE, 2018). While the REDD+ Strategy marks a meaningful step in integrating forest fire into Nepal's international climate commitments and emissions-reduction efforts, its focus on fire governance largely centres on carbon accounting and emissions targets rather than on prevention, preparedness, and ecosystem management. Therefore, the REDD+ Strategy offers an important technical and institutional push for forest fire governance, but it is not a replacement for a dedicated, prevention-focused policy framework needed to address Nepal's rising fire crisis ( Joshi *et al.*, 2024; Pandey *et al.*, 2022).

## Recent initiatives and policy reforms

Recent policy reforms in Nepal demonstrate a clear shift toward institutionalising forest fire management within the broader framework of sustainable forest governance. In alignment with the National Forest Policy 2018 and operationalised through the National Forest Integrated Strategic Plan 2025-2043 (GoN, 2025), forest fire management has been mainstreamed into forest and environmental laws, management plans, and operational guidelines. The reforms mandate the formulation and implementation of federal and provincial forest fire management strategies, annual fire control plans at the DFO level, and the integration of fire risk identification into forest management operational plans. Importantly, fire risk modelling based on fuel load assessments has been introduced as a scientific basis for planning, reflecting a transition from reactive

suppression to risk-informed, and preventive management. These measures are further supported by institutional provisions for Special Forest Fire Fighting Teams at the district level and the establishment of Quick Response Teams involving forest officials, security forces, local governments, and CFUGs.

In addition, policy reforms emphasise fuel load reduction, participatory governance, and technology-enabled monitoring. Provisions for controlled burning, systematic management of slash materials and undergrowth, expansion of fire lines, and utilisation of biomass for commercial purposes (e.g., pellets and briquettes) indicate an integrated approach that links fire risk reduction with forest-based enterprise development. The reforms also prioritise modern technologies, including GIS, remote sensing, LiDAR, satellite imagery, and drones, to support fire risk mapping and early warning systems. The development of a forest fire disaster command system strengthened inter-agency coordination, and integration with disaster management committees further institutionalised multi-level governance mechanisms. Collectively, these initiatives reflect a policy transition toward a preventive, science-based, and community-engaged forest fire management regime aimed at enhancing climate resilience, biodiversity conservation, and sustainable forest productivity in Nepal (GoN, 2018, 2024).

## National Adaptation Plan (NAP)

As noted in the National Adaptation Plan (2021-2050), Nepal is one of the most climate-vulnerable countries in the world due to its mountainous geography, ecological complexity, and high levels of poverty and dependence on natural resources. Forest fires are among the climate hazards that will likely increase in frequency and severity (GoN, 2021). This will also threaten forests, biodiversity, and watershed conservation as damage and destruction from forest fires increase (GoN, 2021).

Nepal's National Adaptation Plan (NAP) 2021 identifies forest fires as a rapidly intensifying climate risk driven by rising temperatures, prolonged dry spells, and increasing drought conditions. The plan prioritises three core objectives: strengthening policy and regulatory frameworks for fire management; enhancing institutional and technological capacities of forest agencies; and improving the resilience of forest ecosystems and forest-dependent communities. Key actions include revising fire management strategies, developing a nationwide early warning system, mapping fire-prone districts, operationalising Joint Rapid Response Teams, and implementing fuel-load management practices. Additional measures such as constructing fire lines, expanding outreach and education programs, and equipping DFOs with modern firefighting tools aim to reduce fire incidence by 50 per cent by 2030 and minimise ecosystem and biodiversity losses by 2035. Collectively, these interventions position NAP 2021 as a comprehensive framework for climate-responsive forest fire management in Nepal.

## Forest Fire Preparedness and Response National Action Plan

The recent Forest Fire Preparedness and Response National Action Plan**,** 2082 (2026), issued by the NDRRMA under the Ministry of Home Affairs (NDRRMA, 2026) marks a meaningful shift in the trajectory of forest fire preparedness and response. Grounded in MODIS satellite data spanning 2013 to 2025, the plan operationalises a district-level risk classification framework and provides

an evidence base that prior instruments lacked. Structurally, the plan organises its response across seven thematic action areas: public awareness, fuel management, weather-based early warning, technology-assisted monitoring, inter-agency coordination, rescue and response, and research and assigns responsibilities across federal, provincial, and local tiers, with supporting roles for civil society and the private sector.

While the plan offers a more coordinated and data-driven approach than its predecessor, its success will ultimately depend on how well it bridges the institutional gap between the forestry and disaster management sectors and whether it receives the ongoing political and financial support that forest fire governance in Nepal has historically lacked.

## DISCUSSION

### Critical analysis of Nepal's legislative approaches

Nepal's forest fire governance landscape exhibits notable strengths, including a long-standing community forestry model, the recognition of forest fire issues across multiple national policies, and a decentralised governance structure that empowers local actors. However, these strengths are undermined by persistent weaknesses, including fragmented institutional responsibilities, limited enforcement capacity, inadequate technical and financial resources, and weak coordination among government agencies. Critical gaps remain, particularly the absence of a comprehensive forest fire law, insufficient integration of fire risk into climate adaptation and land-use planning, and weak monitoring and data systems. As noted by Wang *et al.* (2021), the lack of a dedicated policy framework is one of the most significant barriers to effective forest fire management in Nepal. Implementation challenges, including political instability, limited and inconsistent funding, capacity constraints at local and provincial levels, and substantial data and knowledge gaps, further impede progress toward a more coherent and effective forest fire governance system.

### Future directions and policy recommendations

Nepal's forest fire governance framework remains fragmented and largely reactive, underscoring the need for a consolidated, forward-looking approach. Establishing a dedicated forest fire Management Act or an equivalent comprehensive framework would unify dispersed legal provisions, clarify institutional mandates across forestry, environment, disaster management, and local governments, and strengthen enforcement. Improved coordination, potentially through a national forest fire Coordination Unit, should be complemented by formalised multi-stakeholder engagement with the MoFE, including CFUGs, NGOs, and provincial and local authorities. Strengthening CBFM remains central, requiring updated operational plans, targeted training, and the integration of scientific tools such as satellite detection, early-warning systems, and real-time monitoring, which could be included with indigenous knowledge and local practices. Sustainable financing, including increased national budg*et al.*ocations and provincial forest fire funds, is essential to support preparedness, awareness campaigns, and technological upgrades. Given Nepal's shared ecological vulnerabilities with its neighbours, cross-border collaboration on monitoring and response should also be prioritised. Finally, mainstreaming forest fire risk into climate adaptation planning and

land-use regulation will provide the structural coherence needed for long-term resilience. Collectively, these measures offer a realistic and actionable pathway toward more adaptive and effective forest fire governance in Nepal.

## CONCLUSION

Nepal's forest fire policy framework has evolved incrementally across conservation, forestry, disaster risk reduction, biodiversity, and climate policy domains. Early legislation, such as the National Parks and Wildlife Conservation Act (1973) and the Forest Act (1993), treated fire primarily as a prohibited activity or as a secondary management concern within broader conservation objectives. Although these instruments established regulatory authority, they did not conceptualise forest fire as a distinct, systemic, and climate-driven hazard. The Forest Fire Management Strategy (2010) marked the first comprehensive, forest fire-specific framework, emphasising prevention, preparedness, community engagement, and inter-agency coordination. However, uneven implementation, limited financing, and weak institutional anchoring constrained its sustained impact.

Subsequent disaster risk reduction legislation, including the Disaster Risk Reduction and Management Act (2017) and the National DRR Strategic Action Plan (2018-2030), reframed forest fire as a multi-hazard disaster risk, expanding responsibilities across federal, provincial, and local levels. Similarly, sectoral instruments such as the REDD+ Strategy (2018) and the updated Forest Act (2019) acknowledged forest fires as drivers of deforestation and forest degradation, yet continued to rely on subsidiary guidelines for operational specificity. Community Forestry Guidelines (2014; 2025) further mainstreamed forest fire prevention through fire-line construction, participatory hazard mapping, awareness campaigns, and localised response mechanisms, reinforcing the central role of CFUGs. The most recent policy advancement towards forest fire preparedness and response is the Forest Fire Preparedness and Response National Action Plan in 2026. Nevertheless, forest fire policy remains institutionally dispersed, with coordination gaps and variable implementation capacity under Nepal's federal structure.

Recent reforms indicate a gradual transition toward institutionalising preventive and science-based forest fire management. Integration of fire risk modelling, fuel-load management, rapid-response teams, and technology-enabled monitoring (e.g., GIS and satellite-based detection systems) reflects a movement toward risk-informed approaches. The National Adaptation Plan (2021-2025) consolidates this trajectory by explicitly identifying forest fire as a climate-induced hazard and prioritising early warning systems, ecosystem-based management, institutional strengthening, and community resilience. Its measurable targets, such as reducing fire incidence and minimising ecosystem loss, signal a policy shift from reactive suppression toward proactive, climate-responsive adaptation.

Collectively, Nepal's evolving policy landscape demonstrates growing recognition of forest fire as a complex socio-ecological and climate risk. Despite the expansion of legal and strategic instruments, the framework remains fragmented, with overlapping mandates and implementation constraints that limit coherence and effectiveness. Achieving integrated and proactive forest fire management will require strengthened inter-sectoral coordination, sustained

financing, periodic policy updating, and clearer alignment between forest-sector institutions and disaster management authorities. A consolidated, forward-looking forest fire framework, embedded within climate adaptation planning and grounded in community-based implementation, remains critical to enhancing Nepal's preparedness amid accelerating climate change.

In summary, Nepal's forest fire governance is fragmented across multiple sectoral laws and agencies without a unified, prevention-focused legal framework. Second, the Forest Fire Management Strategy (2010) the only dedicated policy instrument, but it has suffered from chronic underfunding, weak inter-agency coordination, and insufficient periodic updating. Third, CBFM through CFUGs is one of Nepal's most significant governance assets for local-level fire prevention, but community capacity and technical support remain inconsistent. Fourth, forest fire is an increasingly climate-driven hazard in Nepal, yet its integration into climate adaptation planning and land-use regulation is still partial and needs strengthening. Fifth, Nepal's federal restructuring has created new institutional layers for forest fire governance at provincial and local levels, but coordination mechanisms between these levels and the central government remain underdeveloped. Sixth, significant data and monitoring gaps persist, limiting evidence-based decision-making at all governance levels. These findings collectively underscore the urgent need for an integrated, proactive, and adequately resourced forest fire governance regime in Nepal.

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