

Understanding the Drivers of Deforestation and Forest Degradation in Nepal

For

National REDD+ Strategy (2025-2034)



Government of Nepal
Ministry of Forests and Environment
REDD Implementation Centre
Babarmahal, Kathmandu

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Abbreviation and Acronyms

CHAL	Chitwan-Annapurna Landscape
D&D	Deforestation and Forest Degradation
ERMR	Emission Reduction Monitoring Report
FCPF	Forest Carbon Partnership Facility
FECOFUN	Federation of Community Forest Users' Nepal
FRTC	Forest Research and Training Centre
HFLD	High Forest and Low Deforestation and Forest Degradation
MoFE	Ministry of Forests and Environment
NEFIN	Nepal Federation of Indigenous Nationalities
NRS	National REDD+ Strategy
REDD+	Reducing Emissions from Deforestation and Forest Degradation and Conservation and Enhancement of Carbon Stock and Sustainable Management of Forests in developing countries
REDD IC	REDD Implementation Centre
RPP	Readiness Preparation Proposal
UN-REDD	United Nations REDD

Executive Summary

As part of the assignment for updating the National REDD+ Strategy, the report aims to assess and update the drivers stipulating deforestation and forest degradation in Nepal. The report identified and prioritized the drivers by synthesizing the information about forest cover change and drivers of deforestation and forest degradation available from relevant literature, input from provincial forest authorities, and federal-level stakeholders including MoFE, FECOFUN, NEFIN, UN-REDD representatives, and experts.

Reviewing the relevant literature reflecting the global and Nepal-specific drivers of deforestation and forest degradation along with the inputs and consultation with relevant forest authorities and stakeholders at the provincial and federal levels, this brief report has considered eight direct drivers and seven broad underlying causes that underpin collectively direct drivers causing deforestation and forest degradation. The major direct drivers are (i) unregulated and haphazard infrastructure development, (ii) frequent forest fires, (iii) agricultural expansion, and (iv) forest encroachment for human settlement and urban expansion. Other direct drivers include (v) unsustainable and illegal forest product harvesting, (vi) unsustainable and unregulated livestock grazing, (vii) rapid expansion of invasive alien plant species, and (viii) unsustainable mining and excavation of stones, sand, and boulders. Of these, four drivers are directly associated with forest degradation only, two with deforestation only, and two with both deforestation and forest degradation.

The underlying causes are (i) policy and institutional factors (i.e., inconsistent policy and regulatory arrangements, weak coordination across the sectors and levels), (ii) governance-related factors (i.e., weak law enforcement and impunity), (iii) demographic factors (e.g., migration and localized population growth), and (iv) insecure and unclear land tenure. Other underlying causes are (v) technological factors, (vi) climate change, and (vii) socio-economic factors (i.e., high dependency on forest resources). The underlying causes are believed to be not independent and isolated. At least two or more underlying causes are responsible for underpinning the identified direct drivers.

The brief report presents the broader level of direct drivers and underlying causes relevant to the National scale. These can vary across the regions and provincial jurisdictions and change over time. Hence, an analysis of drivers is needed to identify the granular level of drivers and define associated strategies, measures, and actions to implement REDD+ initiatives effectively.

1. Introduction

Nepal's National REDD⁺ Strategy (NRS) for 2018-2022 has ended and in the process of formulating a new NRS considering the findings of a review of the NRS conducted in March 2024. One of the major recommendations of the review report is to have an understanding of the drivers causing deforestation² and forest degradation³ (D&D) in the changing context of the socio-economic and political situation in Nepal.

The drivers will change over time in Nepal and elsewhere due to rapid socio-economic development (Rademaekers et al., 2012). It is often recognized that the extent and nature of the direct drivers⁴ and underlying causes⁵ leading to D&D outlined in the previous NRS (2018-2022) might have changed in the changing socio-political context of Nepal. For example, participants at the cluster-level NRS review workshops organized in April-May 2024 revealed that the level of encroachment had currently decreased compared to the past while the incidence of forest fires has increasingly been observed in recent years. Similarly, the emission reduction monitoring report (ERMIR) of the FCPF Emission Reduction (ER) Program in Nepal's Terai Arc Landscape (TAL) area indicates unsustainable and illegal harvesting as a medium risk of displacement and reversal while these activities were recognized as the high-prioritized driver of the D&D in the previous NRS. In most cases, factors that hinder increasing and conserving carbon and sustainable management of forests (SMF) can differ from the drivers that stimulate deforestation and forest degradation (e.g., UN-REDD, 2018).

Given the context, the brief report aims to update the prioritization of drivers causing D&D in Nepal by reviewing the available literature, reports, and consultation with and input from provincial forest authorities, federal-level stakeholders, and relevant experts. The report is a part of the overall assignment of formulating the National REDD+ Strategy (2024-2034) entrusted to the team of consultants. The report provides the key drivers stimulating D&D in Nepal, key approaches and methodologies adopted to identify these drivers, and an overview of the forest cover change in Nepal as foundational information to define the measures and strategies for the new National REDD+ Strategy.

2. Methodology

The drivers and underlying causes of Deforestation and Forest Degradation were identified and prioritized through a combination of available literature review and consultation with key stakeholders including REDD IC and forest groups representatives including FECOFUN and NEFIN and the input of seven Provincial Forest Ministry and Forest Directorate, the Ministry of Forests and Environment (MoFE).

2.1 Literature review

In addition to the literature shown in the reference section, a range of Nepal-specific and beyond literature including government and non-government reports and articles

was reviewed to understand the overall idea of drivers of D&D. Some reviewed literature included government reports are Nepal's Readiness Preparation Proposal (RPP) for REDD, the existing NRS (2018-2022), UNEP reports and documents, Hario Ban Program of WWF report for the Chitwan-Annapurna Landscape (CHAL) area, Emission Reduction Monitoring Report (ERMR) of the FCPF ER Program (ERMR), and research articles (e.g., Subedi et al., 2023). Some non-Nepal-specific literature (e.g., Geist and Lambin, 2002; Kissinger et al., 2021; Hall et al., 2013; Hosonuma et al., 2012; Rademaekers, et al., 2012; Andoh et al., 2022) was also reviewed to obtain global and regional perspectives of drivers of D&D drivers concerning REDD+.

More importantly, the review has included information and data reflecting the status and trend of forest cover change in Nepal. The current trends of land and forest cover change were reviewed to understand the future scope of REDD+ in Nepal. Similarly, some factors including population growth, fuelwood consumption, and wood demands, will affect future deforestation and forest degradation.

2.2 Input from Provincial Forest Authorities

The identified drivers and underlying causes from the literature review were organized into a **Preference Value Ranking Matrix**⁶ and administered to the seven Provincial Forest Ministries and Forest Directors who are responsible for the management of the national forests and implementation of the REDD+ and carbon initiatives at the province level. As shown in Annex 1, the severity and magnitude of each direct driver and underlying causes were scaled from 1 as very low to 5 as very high for five parameters: (I) geographic coverage and distribution, (II) economic costs of reversal or control, (III) socio-political costs of reversal or control, (IV) the contribution to the carbon emission, and (V) future potential. Based on their jurisdictional context, observations, and experiences the respondents were requested to identify the additional drivers and underlying causes beyond those listed in the matrix.

2.3 Consultation with the Federal-Level Key Stakeholders

The potential drivers stimulating deforestation and forest degradation were discussed with some federal-level stakeholders including REDD IC, Forest Research and Training Centre (FRTC), Ministry of Forests and Environment (MoFE), Federation of Community Forest Users Nepal (FECOFUN), NEFIN, UN-REDD, and relevant experts in several occasions. Inputs from seven provincial forest authorities and federal-level stakeholders were synthesized with the information available from the literature review and the drivers of D&D were then presented in the report.

3. Limitations

The report has some limitations. The report has not included information related to the status and trend of forest degradation in Nepal. Secondly, the identification and prioritization of the drivers primarily relied on the literature review and could not organize consultations

in the local communities. To overcome these shortcomings, input, and perspectives were collected from the provincial forest authorities by administrating a set of preference value ranking matrices. Further, the drivers were finalized and prioritized in consultation with federal-level stakeholders including FECOFUN, NEFIN, FRTC, and MoFE authorities, and some experts.

4. Overview of Forest Cover Change in Nepal

The government records show an increasing trend of overall forest cover from 44.74% (of the total country land) in 2015 to 45.31% in 2022 and 46.06% in 2024 (Table 1). The forest cover increased after 1994 while the shrub area including other wooded land decreased from the same measurement. Noting that the forest cover change represents deforestation and shrubs to forest degradation, both phenomena decreased over this measurement. This presents a clear transition from a high deforestation and forest degradation trend to high conservation.

Table 1: Forest cover of Nepal in Different Periods (%)

Land Cover	LRMP 1978/79	NRSC 1984	Master Plan 1985/86	NFI 1994	FRA 2015	FRTC 2022	FRTC 2024
Forest	38.0	35.9*	37.4	29.0	40.36	41.69	43.38
Shrub	4.7	-	4.8	10.6	4.38**	3.62**	2.70**
Total	42.7	35.9	42.2	39.6	44.74	45.31	46.08

Source: DFRS, 2015; FRTC, 2022, FRTC, 2024
Wooded Land

*Includes some shrub area;

**Other

The measurement results between 2000 and 2019 reveal an inconsistent pattern of forest cover change (Table 2). Forest cover in the *Madhesh* and *Karnali* provinces decreased from 2000 and 2019 but slightly increased in 2022. Interestingly, forest cover increased continuously from 2000 to 2019 and 2022 in all provinces except for Madhesh and Karnali provinces. There has been a slight decline in other wooded land in the Koshi, Bagmati, Gandaki, and Karnali provinces. However, the wooded land area has increased in the rest of the Provinces with the highest in Madhesh province. The increasing trend of forests with a decline in shrubs in Gandaki province is also consistent with the findings of the Hariyo Ban Program (2013, p. 12) which estimated an increase in high canopy classes between 1990 and 2010.

The variation in the extent of deforestation and forest degradation across provinces (administrative jurisdiction) are differently influenced by varied drivers and actors arising from varied socio-economic and cultural contexts.

Table 2: Province-wise Forest cover in different periods (ha)

Province	2000		2019		2022	
	Forest	Other Wooded Land	Forest	Other Wooded Land	Forest	Other Wooded Land
Koshi	1,119,675	119,979	1,155,276	117,440	1,202,320	121,458
Madhesh	249,520	2,614	230,499	11,395	247,620	5,573
Bagmati	1,051,780	62,983	1,162,992	59,742	1,187,308	56,202
Gandaki	716,940	120,516	788,700	118,502	832,198	93,202
Lumbini	944,086	56,195	985,408	69,914	1,050,553	51,011
Karnali	858,890	108,584	842,584	99,728	854,823	87,062
Sudurpashchim	974,629	57,044	987,346	57,302	1,029,772	45,235
Total	5,915,520	527,915	6,152,806	534,023	6,404,594	459,743

Source: FRTC, 2022, FRTC, 2024

Forest cover has increased in the Terai, Siwalik, and Middle Mountain regions consecutively from 2000 to 2019 and 2022 (Table 3). Forest decreased in High Mountain and High Himal from 2000 to 2019 but it slightly increased in 2022. The area of other wooded land increased in the Terai and Siwalik regions from 2000 to 2019 whereas it decreased from 2019 to 2022 in these regions. Wooded land decreased in the Middle Mountain, High Mountain, and High Himal regions from 2000 to 2019 and 2022.

Table 3: Forest cover according to Physiographic Regions in different periods (ha)

Physiographic Region	2000		2019		2022	
	Forest	Other Wooded Land	Forest	Other Wooded Land	Forest	Other Wooded Land
Terai	373,238	10,026	392,240	17,338	401,089	12,334
Siwalik	1,322,210	14,880	1,345,929	37,251	1,392,791	14,527
Middle Mountain	2,361,959	166,191	2,611,307	157,408	2,769,246	130,741
High Mountain	1,727,499	270,888	1,701,021	266,293	1,714,722	197,872
High Himal	130,611	65,930	116,269	56,889	121,495	42,442
Total	5,915,517	527,915	6,166,766	535,179	6,399,343	397,916

Source: FRTC, 2022, FRTC, 2024

Forests, in all categories of Local Levels, cover about 6.2 million hectares of land in the country. The rest of the forests are distributed in the core part of the Protected Areas (namely the National Park, Wildlife Reserve, and Hunting Reserve) and Development Council Land. At the national level, nearly half of the land in the Municipality is covered with forests. Even near about one-third of the land in the Metropolitan is found with forest coverage. Table 4 below reveals the forest area statistics at local levels in the country. The Metropolitan and Sub-Metropolitan cities are relatively less covered with forests compared to Municipality and Rural Municipality (DFRS, 2018).

Table 4: Forest Area Statistics by Local Levels

Local Level	Area in ha		Forest Proportion in %	
	Total area	Forests	Within local level	In total
Rural Municipality	9,874,308	4,202,447	42.6%	67.4%
Municipality	4,028,588	1,891,860	47.0%	30.4%
Sub-Metropolitan City	240,751	99,254	41.2%	1.6%
Metropolitan City	118,920	36,976	31.1%	0.6%
Grand Total	14,262,567	6,230,537	43.7%	100.0%

Note: Forests including shrubs are excluded lying inside the Protected Areas and Development Council Land

Nepal's forestry sector strategy (2016-2025) has indicated mean annual deforestation and forest degradation rates in Terai and Siwalik (Chure region) are to be 0.44% and 0.18 respectively. The annual deforestation rate of the Terai between 1978 and 1994 was estimated to be 1.3% (DFRS, 1999).

Table 1 provides a national trend of forest transition noting that Nepal has slowly been shifting from high forests and high deforestation and forest degradation towards high forest and low deforestation and forest degradation (HFLD). This is probably due to improved management of forests. This suggests that systematic forest management strategies including the adaptive approach of REDD+ and similar carbon initiatives can contribute to stabilizing Nepal's forests.

Tables 2 and 3 present geographic (administrative jurisdiction and physiographic region) variation of forest cover change suggesting that the scope of REDD+ at the national level represents the combination of reducing emissions from D&D and enhancing carbon removals by accelerating the conservation of forest carbon stock, sustainable management of forests, and enhancing carbon stock through restoration and afforestation activities. However, the scope of REDD+ and associated strategies of carbon emission reduction and carbon removal depend on the jurisdiction where REDD+ and carbon initiatives are implemented.

5. Drivers and Underlying Causes of Deforestation and Forest Degradation

This section presents the drivers of D&D discussed in the available literature, the prioritization made by the provincial forest authorities, and federal-level stakeholders and experts. The final prioritization of drivers is presented which is further used in the updated NRS.

5.1 Drivers of D&D from the Literature Review

Geist and Lambin (2002) identified a global category of both direct drivers and underlying causes. The authors identified immediate human actions directly impacting forest cover change as direct drivers which include Infrastructure extension, agriculture expansion, wood extraction, and other factors. These drivers are underpinned by a complex system of five underlying driving forces (underlying causes) including demographic, economic, technology, policy, and institutional and cultural factors.

In an analysis of the drivers-related data of 46 sub-tropical developing countries of Asia, Africa, and Latin America, Hosonuma et al. (2012) observed agriculture expansion as the main driver of deforestation. Both commercial and subsistence agriculture together account for over 70% of deforestation in the studied countries. They observed timber extraction and illegal logging drive most of the forest degradation, followed by fuelwood extraction, charcoal production, uncontrolled forest fires, and heavy livestock grazing.

Rademaekers et al. (2010) also indicated agriculture expansion as a main direct driver of deforestation in Southeast Asia including Nepal. This is followed by wood extraction and infrastructure expansion as direct drivers causing deforestation and natural disasters and exploitation of natural resources including mining as direct drivers for forest degradation. Similarly, the authors identified fast economic growth, an increasing trend of demand for forestry products, demographic drivers such as population growth and migration, and technological and governance-related drivers as underlying causes of D&D. The authors categorized three levels of actors that are involved in both direct and indirect drivers namely. Local farmers, loggers, and ranchers were recognized as the primary actors while government authorities and agencies acted as the secondary actors. International institutions and companies, policy instruments were third-level actors who indirectly influenced deforestation in Southeast Asia (Rademaekers et al., 2010).

Kissinger et al., (2012) also estimated agriculture expansion to be the proximate driver for around 80% of deforestation worldwide. As equal to commercial agriculture, subsistence agriculture accounts for one-third of deforestation in tropical Asia and Africa. Their findings indicated that mining, infrastructure, and urban expansion are important, but less prominent on a global scale. However, timber extraction and logging activities are estimated to be more than 70% of the total degradation in Asia and Latin America.

Kissinger et al. (2012) presented several underlying causes that act at multiple scales: International (markets, commodity prices), national (population growth, domestic markets, national policies, governance), and local circumstances (subsistence, poverty). In their synthesis of the REDD Readiness Plan, Kissinger et al. (2012) found weak forestry sector governance and institutions, a lack of cross-sectoral coordination, and weak law enforcement as critical underlying drivers.

In an analysis of drivers of D&D of 29 REDD+ participant countries, Andoh et al. (2022) found the expansion of both commercial and subsistence agriculture as the predominant driver of deforestation, while both industrial and small-scale exploitation and logging as the main driver of forest degradation. Infrastructure development and mining were specified as other major drivers leading to deforestation in the REDD+ participant countries. Following the logging activity, livestock grazing and fuelwood extraction were considered as major direct drivers leading to forest degradation.

Nepal-specific drivers were analyzed by MoFSC in 2010 through a consultative process to align them with the Readiness Preparation Proposal (RPP) for REDD submitted to the Forest Carbon Partnership Facility of the World Bank. A total of nine direct drivers were specified stimulating deforestation and forest degradation. The direct drivers were high dependency on forests and forest products, illegal harvest of forest products, unsustainable harvesting practices, forest fires, encroachment, overgrazing, infrastructure development, resettlement, and expansion of invasive species.

Each direct drivers were underpinned by the combination of at least three or more underlying causes. Some major underlying causes were poverty and lack of livelihood alternatives, insufficient forest product use, weak law enforcement and impunity, weak governance and vacuum, market failure, insecure tenure, insufficient technical inputs, and expansion of agriculture. Some of the underlying causes such as weak governance and vacuum, and weak law enforcement are responsible for several direct drivers.

The analysis interestingly reveals that each direct driver and associated underlying causes are prevalent in the Terai region, while almost equal drivers (but not the same) are represented in the mid-hills and high mountain regions. The drivers were categorized into six areas of issues including social, governance, market, technical, economic, policy, and natural. In terms of the origin of drivers, they are internal, outside the forest ministry, and both internal and external.

Similarly, the previous NRS (2018-2022) specified nine direct and 10 underlying causes of deforestation and forest degradation through the synthesis and analysis of the drivers in the RPP, national, and sub-national studies which were verified and prioritized through stakeholder consultations in regional, district, and local level workshops (MoFE, 2018). The magnitude ranging from 1 (very high) to 5 (very low effect) was assigned to each direct driver with their severity in four geographic regions – Terai, Siwalik, middle mountain, and high mountain. Unlike RPP, underlying causes were considered cross-cutting and assigned to all direct drivers (MoFE, 2018, p.8).

The direct drivers in the NRS have been classified as relevant to only deforestation or forest degradation or relevant to both deforestation and forest degradation. Of the total nine direct drivers, five are associated only with forest degradation while three drivers are related to only deforestation and one (mining/excavation of sand, boulders, and stones) represents both deforestation and forest degradation. Unsustainable and illegal

harvesting relevant to forest degradation has been considered as the highly prioritized direct drivers. Increased forest fires are the second priority direct drivers associated with forest degradation. Infrastructure development is responsible for deforestation.

Disproportionate population distribution and migration patterns, policy gaps and contradictions among sectors and jurisdictions, poor policy implementation, poverty, limited livelihood opportunities, and high dependency on forest products and demand-supply gaps are some of the underlying causes. Other causes are insecure land tenure and land use policy, poor governance, weak political support, weak coordination and cooperation among stakeholders, inadequate human resource development and management, low priority of research and development, and poor coping strategies for natural disasters and climate change.

A study by the Hariyo Ban Program (2013) has identified 10 direct or proximate drivers of deforestation and forest degradation in the Chitwan-Annapurna Landscape (CHAL) area. These include (i) over and unsustainable harvest of forest products (mostly illegally); (ii) infrastructure development; (iii) forest encroachment for resettlement and urban expansion; (iv) agriculture expansion (permanent and shifting cultivation); (v) uncontrolled forest fires; (vi) overgrazing; (vii) invasion by alien plant species; (viii) landslides and floods; (ix) stone mining; and (x) recreation.

The study found most of the drivers are common to all physiographic regions (i.e., Terai, Siwalik, Midhills, and High Mountain) but the degrees of effects of these drivers vary across the regions. The report has recognized invasive alien plant species (e.g., in Chitwan National Park) as the major drivers. However, it has not occurred yet in high mountains and high Himal. The unregulated construction of rural roads is the major driver in mid-hills. The problem of overharvesting and illegal harvesting of forest products and forest encroachment for agriculture expansion, settlement, and urban expansion are common in all regions but these are severe in Terai and Siwalik.

The study has considered 10 underlying causes that trigger alone or collectively direct drivers lead to the direct drivers. The underlying causes included (i) demographic factors; (ii) economic factors; (iii) land scarcity; (iv) political and institutional factors; (v) technological factors; (vi) governance-related factors; (vii) cultural factors; (viii) ambiguous tenure; (ix) lack of alternative sources of energy; and (x) climate change.

A study report by Poudel et al. (2014) for UNEP and the Ministry of Forests and Soil Conservation has identified four priority direct drivers: illegal logging, fuelwood consumption, encroachment, and road construction. The study recognized 10 priority underlying causes including increased demand for forestland and products, high dependency on forests, lack of a deliberative and inclusive forest policy process, poor transparency and corruption, weak law enforcement, and weak land tenure. Other underlying causes are prolonged political transition and instability, social differentiation and inequality, population growth,

migration, pressure on resources and related conflicts, and limited access to improved technology.

The study found neither the proximate drivers nor the underlying causes are independent, nor do they operate in isolation. The study shows that REDD+ interventions could potentially support a range of measures to reduce deforestation and forest degradation. Some of the interventions relating to REDD+ that the study recommends are designing sustainable management of forests, establishing clear linkages between governance reform, reduction in deforestation and degradation and increase in payments to local forest managers, strengthening law enforcement, supporting technological and economic interventions to farmers for agricultural intensification. The study further recommends implementing interventions such as bringing the sustainability of roads into public debate and promoting technological and institutional innovations related to clean energy sources and energy use.

Through several consultations with the federal and provincial levels stakeholders, altogether nine drivers have been specified for LEAF Jurisdiction in Nepal (Draft Description of ER Program Intervention for LEAF Jurisdiction, Nepal, 2024). Forest fires have been considered the main driver followed by infrastructure development, grazing, and encroachment. Other drivers include illegal cutting, weak management practices, invasive species, land use conversion, and mining and excavation.

In a municipal-level study in the Terai region of Nepal, Subedi et al. (2023) specified infrastructure development as the main driver followed by illegal logging, agricultural expansion, livestock grazing, forest fire, fuelwood collection, settlement and resettlement, invasive alien species, and floods and landslides. The general identification of drivers is similar to a large geographic scale or broader level. However, their extent and magnitude can vary linked to context-specific factors.

The findings of the above cases reveal that deforestation drivers are generally large-scale processes while forest degradation drivers mostly small-scale processes. Agriculture expansion appears one of the major direct drivers causing deforestation suggested in most cases. Unplanned infrastructure development and unregulated mining activities are other major deforestation drivers. Biomass extraction activities such as logging and over-harvest represent the major proximate drivers for forest degradation. Fuelwood extraction and linear infrastructure development such as road construction appear major proximate drivers causing forest degradation.

Poor governance, weak law enforcement, inconsistent policy, and regulatory arrangement across the sectors, increasing forest dependency, increased population growth and migration, poverty, and inadequate livelihood opportunities are the major underlying causes underpinning the proximate drivers responsible for deforestation and forest degradation. The review indicates that underlying causes are a result of a combination of internal and external factors in the forestry sector. The proximate drivers are underpinned by an interplay of at least two or more underlying causes.

Increased incidence of invasive alien plant species and uncontrolled forest fires have appeared as emerging drivers for deforestation and forest degradation. These phenomena have been missing several studies but have been recognized by recent studies and reports. The review also reveals that prominent drivers and their magnitude of effect varies across the physiographic regions, and administrative jurisdictions probably due to differing socio-economic, political, and natural contexts. The identification of drivers for specific locations that are of interest to REDD+ initiatives can provide better granularity in defining measures and strategies to address these drivers thereby achieving targets for reducing carbon emissions.

5.2 Prioritization of Drivers of Deforestation and Forest Degradation

Tables 5 and 6 show a summary of the proximate drivers and underlying causes respectively prioritized by the provincial forest authorities of seven provinces. Overall (national) level prioritization was estimated based on the provincial aggregation and prioritization as indicated in Annexes 2, 3, and 4.

Infrastructure development, especially unregulated rural road construction has been reported as the major direct driver in all provinces except in Koshi. Frequent forest fire incidences are the second major driver in all provinces. Agriculture expansion and Human resettlement, especially Sukumbasi (squatter settlement) rehabilitation are commonly reported as the major drivers of deforestation and forest degradation. Notably, unsustainable fuelwood collected has been reported to be low-prioritized drivers in all provinces except in Bagmati. This indicates fuel wood extraction is still a problem in specific locations where local communities do not have livelihood alternatives and alternative fuel wood energy. Generally, a similar level of prioritization has been reported for other drivers across the provinces except in some cases.

Table 5: Prioritization of Direct Drivers of D&D from Provincial Forest Authorities

SN	Broader categories of Proximate drivers	Details of proximate drivers	Province-level prioritization (1 is highly prioritized)							Overall Prioritization (from 1-high to Low)
			Koshi	Madhesh	Bagmati	Gandaki	Lumbini	Karnali	Sudurpashcim	
1	Biomass extraction and Unsustainable harvesting	Illegal and unsustainable logging	5	7	3	5	6	3	8	6
		Unsustainable fuelwood collection	7	8	1	6	9	9	9	8
2	Livestock grazing	Uncontrolled and unregulated grazing	6	9	3	6	8	8	7	7
3	Agriculture expansion	Encroachment for agricultural purposes	4	4	1	4	3	5	4	3

4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	4	1	1	1	1	1	1	1
		Hydropower dams, transmission lines, and cement factory	8	4	3	7	4	4	5	5
5	Human resettlement and urban expansion	Human (Sukumbasi) resettlement	2	5	2	5	3	6	2	3
		Unplanned urbanization (rapid urban expansion)	9	3	3	2	4	5	3	4
6	Mining and excavation	Unsustainable mining and excavation (Stone, sand, and boulder)	10	6	4	5	5	7	6	7
7	Forest fires	Uncontrolled and frequent forest fires	1	2	2	3	2	2	1	2
8	Invasive alien species	Rapid expansion of alien invasive species	5	4	2	3	7	6	8	6

Policy and institutional factors are known as the major underlying causes (Table 6). High political interference triggered some development activities such as rural road construction is the notable indirect driver. Weak coordination between forestry and non-forestry sector authorities, and different government levels of forest authorities (e.g., federal and provincial), weak law enforcement, migration, and climate change have been reported as the major indirect drivers stimulating direct drivers causing D&D. Underlying causes associated with the socio-economic factors are reported to have less impact triggering direct drivers of D&D.

Table 6: Prioritization of Underlying Causes of D&D from Provincial Forest Authorities

SN	Categories of drivers	Potential Underlying causes	Province-level prioritization (1 is highly prioritized)							Overall Prioritization (from 1 high to low)
			Koshi	Madehs	Bagmati	Gandaki	Lumbini	Karnali	Sudurpaschhim	
1	Socio-economic	Increased demand for forest products	7	9	5	1	5	5	4	6
		High dependency on forests for livelihoods	8	10	7	3	8	6	6	8
		Limited alternative livelihood options	9	10	1	5	8	7	8	8
		Decreased collective action	4	8	2	5	7	8	7	7

2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction) & weak political commitment	3	2	5	3	1	1	1	1
		Poor coordination within the forestry sector governance (i.e., Federal and Provincial governments)	1	7	1	6	7	5	4	4
		Weak inter-agencies coordination (Forestry and non-forestry sectors)	3	4	2	7	3	7	2	3
		Inconsistency in the forestry sector cross-sectoral policy, strategies, and legislations.	1	5	3	4	3	4	4	4
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, monitoring of development projects) & impunity	2	5	4	5	4	2	3	3
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	4	3	4	4	2	3	1	2
		Localized population growth	6	4	7	7	6	8	8	7
5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	5	4	6	5	5	5	5	5
6	Technological factors	Limited access to improved technology (harvesting and forest fire control)	6	6	3	3	6	5	5	5
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating the spread of invasive alien species	4	1	6	2	2	4	2	2

Table 7 presents the list of drivers and their association with deforestation and forest degradation, their overall prioritization (from Tables 5 and 6), and their affecting regions which are synthesized based on the prioritization of the provincial forest authorities and relevant literature.

Unregulated and haphazard infrastructure development is the major direct driver of both deforestation and forest degradation in all physiographic regions and provinces. This is generally stimulated by high political interference, weak political commitment and law enforcement, and weak coordination between forestry and non-forestry sectors. Forest fires are the second major in all regions. Agriculture expansion, human resettlement, and unplanned urban expansion appeared emerging drivers.

Table 7: Direct Drivers, Affected Regions, Priority, and Associated Underlying Causes

SN	Direct Drivers	Drivers for Deforestation or Forest Degradation	Affected regions (T, S, MH, and HM) with magnitude ranging from 1 to 3 (High to low)	Priority	Associated underlying causes
1	Unregulated and haphazard infrastructure construction, especially rural road construction	Forest degradation and Deforestation	T (1), S (1), MH (1) and HM (2)	1	• Weak coordination among forestry and non-forestry (e.g., local government and infrastructure development) • High political interference, • Weak political commitment
	Unplanned infrastructure development projects (e.g., Hydropower dams, transmission lines, and cement factors)		T(3), S(3), MH (1), HM(1)	5	• Weak coordination among forestry and non-forestry (e.g., local government and infrastructure development) • Weak law enforcement (e.g., EIA, IEE, monitoring of development projects.)
2	Frequent forest fires	Forest degradation	T (1), S(1) MH(1), HM (1)	2	• Prolonged drought due to climate change, • Lack of awareness among local communities • Weak law enforcement • Limited technology and skills
3	Agriculture expansion (Encroachment for subsistence agriculture)	Deforestation	T (1), HM 2), MH (3)	3	• Unclear and insecure land tenure • Population growth in a specific area due to migration • Weak law enforcement • Political motivation

4	Forest encroachment for human (in the name of Sukumbasi) resettlement	Deforestation	T (2), MH (2)	3	• Weak coordination among forest authorities and with non-forestry authorities across the levels, • High political interference/motivation • Inconsistency policies, strategies, legal provisions • Weak law enforcement and impunity
	Unplanned urbanization (rapid expansion)		T(1), S(3) MH(2), HM(3)	4	• Increased Migration from rural to urban areas and mid-hills to terai (Localized effects) • Scarcity of land in urban/semi-urban areas
5	The rapid spread of invasive alien species	Forest degradation	T(1), S(1), MH (2), HM(2)	6	• Temperature increased due to climate change inducing a conducive environment for alien plant species. • Limited technology, research, and skills of management
6	Unsustainable and illegal logging and harvesting.	Forest degradation	T (2), S (1), MH (3), HM (1)	6	• Weak law enforcement & impunity • Unclear and insecure land tenure • Inadequate technologies and skills
	Unsustainable fuelwood extraction		T (3) S(2), MH (3), (HM(1)	8	• High forest dependency for specific communities • Lack of livelihood alternatives for some forest-dependent households • Inadequate alternative energy sources
7	Uncontrolled and unregulated livestock grazing	Forest Degradation	T(2) S(1), MH(2), HM (1),	7	• A large number of low-productive livestock • Unclear and insecure land tenure • Weak law enforcement and impunity
8	Unsustainable mining and Excavation (Stone, sand, and boulder)	Forest degradation and Deforestation	T(2) S (1), MH (2), HM(3)	7	• Weak coordination among forestry and non-forestry authorities (e.g., Local Government, Land Management, and Infrastructure Development Authorities) • High political interference/motivation

HM- High mountains, MH-Middle hills, T-Terai, S-Siwalik, 1-High, 2, Medium, 3- Low

Table 7 presents the most relevant underlying causes underpinning direct drivers. Figure 1 depicts the overall interplay of underlying causes and their influence on proximate drivers associated with deforestation and forest degradation. The figure suggests several underlying causes related to demographic, socioeconomic, governance-related factors, climate change, and policy and institutional aspects collectively trigger the direct drivers causing deforestation and forest degradation across physiographic zones and provinces in Nepal.

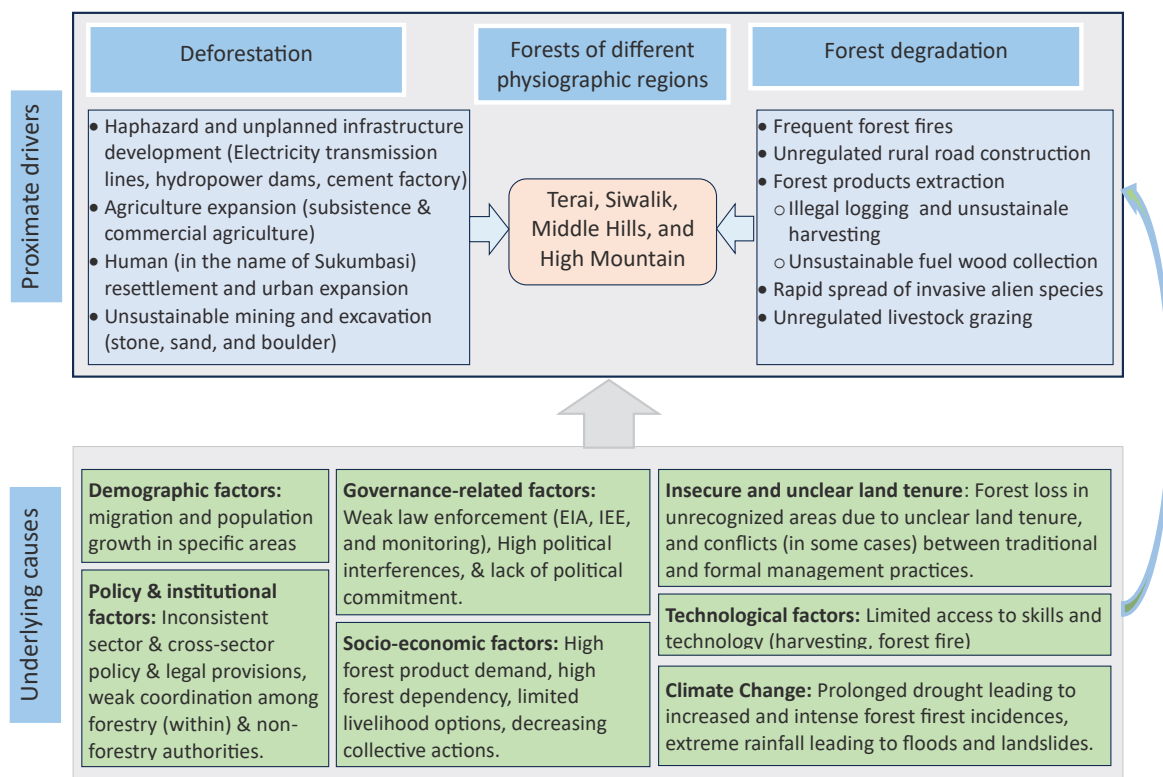


Figure 1: The interplay among proximate drivers and underlying causes of Deforestation and Forest Degradation in Nepal

Brief explanatory notes and some direct and underlying causes drivers are discussed in section 5.3.

5.3 Direct Drivers of Deforestation and Forest Degradation

5.3.1 Unplanned and Haphazard Infrastructure Development (Unregulated rural road construction and hydropower dams, transmission lines) (Deforestation and Forest Degradation)

The development of infrastructures inside forests is an important driver of deforestation and forest degradation. Unplanned and haphazard construction of rural roads by local

government is reportedly one of the key direct drivers of forest degradation, particularly in mid-hills and high mountains. Rural roads are generally constructed in forest areas (i.e., community forests and government-managed forests) to avoid unnecessary hurdles with private landowners. Construction of roads in and around forests greatly stimulates deforestation and forest degradation by lowering transport costs (Wunder, 2004). Most rural roads are often constructed without proper surveys, designs, and environmental impact assessment. Lack of fulfilling standards and timely maintenance and proper structures such as retaining walls and drainage can increase risks of landslides and mass movement during monsoon which eventually leads to the loss of forests.

Unplanned construction of playgrounds, community-building, schools, hospitals, recreational facilities (e.g., picnic spots), temples, and monasteries inside forests are common practices in Siwaliks, Midhills, and high mountains. Additionally, there are several cases of planned conversion of forest lands to infrastructures by the government to implement national-pride activities including hydropower, electric transmission lines, water reservoirs, irrigation canals, cable car/ropeway, army barracks, and police camps. The government report shows that more than 19,523 ha of forest land has been provided for other uses mainly for development projects as of July 2022 (MoFE, 2024).

Such activities are likely to continue threatening further forest degradation in the coming years due to inadequate coordination and cooperation among the forestry sector and other sectors. In some cases, efforts of forest conservation by forest authorities and local communities have been undermined by other ministries due to a lack of political commitment to forest conservation, allowing private companies and public sector companies to set up industries (e.g., cable car, mining, hydropower, etc) which also ultimately lead to loss of forest areas.

5.3.2 Frequent Forest fires (Forest Degradation)

Uncontrolled and frequent forest fire is a prominent driver of forest degradation throughout the countries, particularly in Terai, Siwalik, and Mid-hills. High severe forest fires severely damage and degrade forest quality, destroy non-forest products, and prohibit regeneration and tree growth. The recurrent forest fires destroy biodiversity, inhibit the recovery of native vegetation reduce resilience, and induce landslides and floods due to the destruction of natural vegetation.

Deliberate forest fire is often used to clear land for agriculture and promote new growth for livestock grazing. This practice is commonly used in all Siwalik, Mid-hills, and high mountains. It becomes uncontrolled when the fire escapes and degrades forests. Similar experiences were reported by the participants of the stakeholder consultation during the NRS review in March 2024 that forest fire incidences have increased in recent years due to favorable conditions mediated by climatic factors (e.g., prolonged drought and increased temperature).

Bhujel et al. (2022) estimated around 3,098 fire incidences occur annually damaging 172,040.65 hectares (ha) of forests and causing biomass loss of 7.07 million tons accounting for the emission of 3.30 million tons of carbon annually (Bhujel et al., 2022). Anthropogenic causes are dominant drivers in complementing natural causes such as climate change. Bhujel et al. (2021) observed more than 20 factors including 12 anthropogenic leading to forest fires. Pandey et al. (2022) predicted increased forest fire incidences in the future primarily due to a lack of comprehensive policy provisions (except “Forest Fire Management Strategy, 2010”) and institutional arrangements to guide forest fire management in Nepal. The authors pointed out enhancing political commitment to financial support and revising policy provisions as measures to address these drivers.

5.3.3 Agriculture expansion (Deforestation)

Forest encroachment for agricultural purposes is a main driver of deforestation in Nepal. In some parts of the Siwalik region, this phenomenon is pronounced to satisfy the food demand of smallholder farmers with limited livelihood options. Agriculture expansion often occurs spontaneously by smallholder farmers, usually driven by underpinning social and economic factors such as scarce land resources or demographic forces (migration). The problem is more pronounced in the Siwalik region and in government-managed of other regions where population density is high with low productivity of land and inadequate monitoring of the government. However, due to effective monitoring of forests by local communities, agriculture expansion has been reported to be reduced in the mid-hills and other parts of countries.

In some parts of the mid-hills, cultivated lands are found to be abandoned due to labor shortages caused by the outmigration of youths, diminishing land productivity, and decreasing irrigation facilities caused by water source depletion (Subedi et al., 2021). Similarly, the government data (FRTC, 2022 p.ix) shows a shrink in agricultural land by 2.1% with the expansion in the built-up area and grassland from 2000 to 2019 reducing food supply and production capacity. Hence, the expansion of subsistence agriculture likely continues to satisfy ever-increasing food demand due to forest area-centric migration and diminishing cropland for other purposes of Terai and Siwalik. Besides, land conversion to cash crops and other estate crops such as tea and coffee has increased in recent years which seems to continue in the future leading to the loss of forests.

5.3.4 Forest Encroachment for Human Resettlement and Urban Expansion (Deforestation and forest degradation)

Illegal settlements inside forests greatly cause the loss of forest area and degradation in the Terai and Siwalik. Besides, the government resettlement program (e.g., Sukumbasi rehabilitation) has compounded the illegal settlement in the name of Sukumbasi stimulating deforestation and forest degradation, particularly in some Terai districts. A total of 204.29 ha of encroached forest land in 2021/22, 797.08 ha in 2019/20, 2,044 ha in 2018/19, and

920 ha in 2017/18 were evacuated and restored respectively. However, around 4,039 ha of land is under encroachment within Nepal's Protected Area as of the fiscal year 2022/23 (DNPWC, 2023).

Urban expansion has a significant impact on forests. It leads to the subsumption of forests, resulting in fragmentation, loss of forest areas, and degraded conditions (Bhattari et al., 2023). Nepal has experienced rapid urbanization. Urban dwellers increased from 11% in 2011 to 66% in 2017 (CBS, 2021). Urban area has increased in Nepal at the cost of forest areas. Bhattarai et al., (2023) estimated one percent increase in urban land area would lead to a decrease in 0.42% of forest land cover suggesting that an increase in urbanization without an effective plan would cause negative effects on forests in several ways.

The GoN has formulated the Forest Encroachment Control and Management Strategy, 2012 to address the problem of forest encroachment in Nepal. As per Rule 119 of the Forest Regulations 2022, there is a district-level Encroachment Control Committee chaired by the respective Chief District Officer. Despite such arrangements, forest encroachment persistently occurs probably due to ineffective enforcement of laws and mobilization of these arrangements. Such a phenomenon will likely continue unless effective measures are adopted.

5.3.5 Rapid expansion of Invasive Alien Plant Species (Forest Degradation)

Invasive alien plant species (IAPS) have been realized as emerging drivers of deforestation and forest degradation (MoFSC, 2014). Rapid spread and invasion of *Mikania micrantha* is widespread in the Terai and Siwalik regions causing catastrophic effects on native vegetation (Dhungana, et al., 2024). Lamichhane et al. (2014) and Murphy et al. (2013) observed an intensification of *Mikania* between 2008 and 2011 posing a threat to the conversion of forests into other habitat types (e.g., short grassland). Forests in management regimes are invaded by *Lantana camara* and *Eupatorium adenophorum* in lower mid-hills, Siwalik, and Terai. Of the 28 IAPS recorded in Nepal (Shrestha et al., 2021), Shrestha & Shrestha, 2019 observed the distribution of 24 IAPS across 70 districts. This indicates that IAPS is spreading into all physiographic regions and all forest management regimes (Khaniya & Shrestha, 2020). Lamsal et al. (2018) projected a likely increase in the expansion of some IAPS (e.g., *Ageratina Adenophora*, *Chromolaena odorata*, and *Lantana camara*) towards the north under both RCPs 4.5 and 8.5 and will invade Nepal's Himalayan region by 2070. As reported by Ghimire et al., (2021), the spreading of IAPS is likely to increase in high altitudes at a faster rate in light of favorable conditions due to a warming environment posing threats to replacing native species and degrading forest quality.

5.3.6 Unsustainable and Illegal Harvesting of Forest Products (Illegal logging and unsustainable fuelwood collection) (Forest degradation)

Excessive harvesting of forest products is a major driver of forest degradation. The emission Reduction Monitoring Report of the FCPF ER Program (ERMR) for Nepal's Terai

Arc Landscape (TAL) has indicated unsustainable and illegal harvesting as a medium risk of displacement and reversal while this was considered as the highly prioritized driver in the previous NRS (2018-2022). However, in other parts of the country especially Siwalik, timber harvest is heightened by the illegal extraction of timber and fuelwood for sale. Similarly, the excessive harvest of timber for household use, Illegal cross-border smuggling of timber to the Tibet Autonomous Region, and fodder lopping are to be considered the major forest degradation drivers in the high mountains.

Increased fuelwood consumption is partly attributed to a lack of capacity and income sources to use alternative energy sources caused by persistent poverty of land poor, landless, and marginalized households. Secondly, the limited availability of alternative energy sources especially in high mountains is the reason behind high forest consumption.

Nepal has experienced a steady increase in the demand for timber over the past years. The over 70% of the total harvested timber is supplied from the private-owned forests (CFD, 2017). There is still a huge gap between the demand for and the supply of timber (OAG, 2024). According to OAG (2024), the import of timber has been in an increasing trend in recent years due to undersupply from the domestic forests. This trend looks to continue over the coming decades with an attribution to economic growth and rapid urbanization. In particular, the consumption of and demand for wood-based products is likely to increase substantially. In the demand-supply gap situation, there is a high threat of increased pressure on forests and unsustainable timber harvest to satisfy the increasing need for building construction and industrial production.

5.3.7 Uncontrolled and Unregulated Livestock Grazing (Forest degradation)

Unregulated livestock grazing in forests by sedentary small farmers is a common practice in Terai and Siwalik regions. These practices negatively affect the regeneration and growth of plants which ultimately reduces forest restoration and causes forest degradation. The livestock grazing practices in and around the forests were common in mid-hills in the past. However, this has substantially decreased with the initiation of community forestry.

Livestock grazing by nomadic herders- generally recognized as a traditional transhuman system is a widespread practice throughout the high mountains. The system is recognized as a customary practice of taking seasonal migration of livestock. The grazing lands under this system are generally public property or commons which are gradually transformed into community forests. This has resulted in conflicts between transhuman pastoralists and members of community forest user groups, where livestock grazing is prohibited, limiting pastoralists' traditional use rights (Banjade and Paudel, 2008).

According to the Government data, there is no substantial change in livestock (i.e., cattle, buffaloes, sheep, and goat) numbers between FY 2006/07 and FY 2020/21 (DLS, 2021, p.22). Hence, feeding practices, sustainable grazing, and inclusive pasture management are critical to address persistent problems of grazing in Nepal.

5.3.8 Unsustainable Mining and Excavation (Deforestation)

Stone and minerals mining including extraction of sands, gravel, and boulders is a localized driver of deforestation. Mining areas are often located in and around forest areas, contributing to forest degradation and complete deforestation depending on the size and type of the mining operation. A case in point, the operation of stone mining industries in Chapagaon, Lalitpur has caused a loss of vast forest areas (Dev, 2013). The government report shows that stone mining is operated in several parts of the country (Hariyo Ban Program, 2013).

Several local municipalities in Nepal have allowed to export of sand and boulders from rivers in their jurisdictions to generate revenues. Recent data from the Comptroller General's Office shows that 96 rural municipalities have operated such activities in 2022 (<https://nepalitimes.com/banner/a-nation-built-on-sand>). The government developed Guidelines for Stone, Gravel, and Sand extraction sales in 2020 with the procedures of receiving permission and environmental impact Assessment to regulate such activities sustainably. However, inadequate monitoring coupled with unregulated and unsustainable mining extraction and quarrying can negatively affect forests in ecologically fragile areas such as Siwalik and mid-hills.

5.4 Underlying Causes of Deforestation and Forest Degradation

5.4.1 Policy and Institutional Factors:

Fiscal policies and legislative arrangements and incentives – the ways how the government uses taxes and revenues and penalizes certain actions and behaviors are important determinants for future forest conversion because they influence resource use patterns and land-use practices, especially in the forestry sector. For example, multiple tax provisions from local, provincial, and federal governments on the community forestry fund have already created conflicts among the local communities and the government authorities in Nepal (Acharya et al., 2022). Such provisions can have an impact on several aspects- ownership of forests among local communities, disincentives to collective actions, and voluntary contribution.

Besides, inconsistent regulatory arrangements and provisions at the federal, provincial, and local government levels regarding forest management, harvests, and sales of forest products from the national forests (e.g., government-managed and community-managed) are known as a major barrier to better collaboration for forest management. Similarly, harmonization among the sectoral policies and regulatory arrangements has been a key concern in maintaining a balance of forest conservation and infrastructure development. As in the case, contradictory provisions between the Forest Act 2019 and the Lands Act 1964 (8th Amendment 2019), especially for the use of land for squatters and unmanaged settlers (NRS review report, 2024). There is an increasing realization of lacking proper functional coordination even within the federal level and provincial level forestry sector

authorities (DRCN, 2020). Such gaps largely exist between the forestry authorities and non-forestry authorities, especially with the local governments, land management, and infrastructure development authorities (Dahal et al., 2021). The level of policy conflict is likely to increase due to weak or lack of coordination among the within the forestry and with non-forestry sector authorities. The impact is currently low, however, the situation can massively intensify if such contradictory provisions and coordination gaps persistently exist in coming years leading to further the loss of forest lands.

5.4.2 Climate Change

Climate change has appeared additional challenge to forest management in Nepal and elsewhere (MoFE, 2022). These effects can vary across different ecological regions, the existing forest types, and human responses and activities. However, climate change can aggravate pre-existing problems in the conservation and management of forest resources. Two climatic stressors – an increase in temperature and change in precipitation along with associated hazards including prolonged droughts, floods, landslides, and extreme rainfall events collectively can affect different aspects of forest conditions, including health, vitality, and distribution. As discussed above (*in this section itself*), climate change is believed to be responsible for prolonged drought that stimulates severe forest fire incidences and the rapid spread of invasive alien plant species causing forest degradation.

Climate change is also responsible for vegetation range shift (Gaire et al., 2017; Bhuju et al., 2016), and phenological change (Panta and Mandal, 2017) that can alter forest ecosystems, and resilience and ultimately reduce forest conditions and vitality. Several cases of loss and degradation of both natural and plantation forests have been experienced caused by the rapid infestation of insects, pests, and pathogens accelerated by climate change (Lehman et al., 2020). Seedlings in forest nurseries were witnessed in feeble conditions due to various fungal diseases (Pokharel, 2017).

In some cases, climate change favors the pathogen's biological process and life cycle including reproduction (Bebber, 2015). A case in point, Malla and Pokharel (2018) documented a few insects and pests that are increasingly affecting Nepal's major tree species including Sal, Teak, Eucalyptus, Rajbrikschha (*Cassia fistula*), and Vijayasal (*Pterocarpus marsupium*) forests. The authors have warned that Nepal's forests are under threat of increasing outbreaks of pests and pathogens accelerating due to the combined effect of climate change and anthropogenic disturbances. Forests are highly vulnerable sectors to the increasing climatic hazards. While temperature is an increasing trend, climate change effects are likely to be intense in Nepal's forests in the coming years.

5.4.3 Demographic factors

Migration (Internal and International): Migration both inside and outside of the country has been believed to have a direct and indirect relationship with future deforestation and forest degradation. Migration can change population dynamics which can affect the use

and management of forest resources. Several studies (e.g., Chhetri et al., 2023; Oldekop et al., 2018; Jaquet et al., 2015) have identified that the high rates of international migration which are mediated by decreased population density might have a positive effect on forest resource consumption and forest cover.

From Nepal's perspective, outmigration has appeared as a pronounced factor changing the mode of forest-people interaction and their relationships, reducing collective action, and management practices (Laudari, et al., 2023). A shortage of youth is already experienced in rural Nepal (Jaquet et al., 2015, K.C., 2017) which is needed in the conservation of forests especially the protection of the forest from natural disasters (such as forest fires), and leadership transformation can create negative effects on forest management in the long run. Besides, an increase in abandoned forest lands due to lack of human resources can foster the growth of invasive alien plant species which ultimately degrade the forests and reduce productivity.

Nepal has experienced an increased trend of migration from rural hills to low-land terai, urban, and semi-urban areas (Internal migration) (KC., 2017). Such phenomena are known to have generated positive effects on the origin of migration (e.g., in rural hills) in increasing forest cover as discussed above. However, it creates a severe effect on the destination (hotspots) in resource consumption and loss of forest area and quality due to increased demand for forest resources and agricultural land arising from concentrated population density in a specific area.

Nepal's migration rate has been increasing over the years (was 5.70 per 1000 population in 2023, a 16.47% increase from 2022) particularly from rural to urban areas of Madhesh, Bagmati, and Lumbini provinces. This trend likely continue in the coming years due to globalization, regional disparities of urban facilities, development, education, and economic opportunities within the country and outside. Persistent outflow can further generate an asymmetric distribution of human resources needed to manage forests sustainably across the regions and can increase the pressure and reliance on forests only in specific locations with increased demand for forest resources leading to further loss of forests.

Localized Population Growth: The current population of Nepal is 29,164,578 as per the 2021 census (GoN, 2021). The annual population growth rate is 0.92%, which declined compared to the previous census (1.35% as per the 2011 census), however, it is still higher than the global growth rate (0.87% in 2024). Although correlating population growth with forest use patterns is difficult, it is widely believed that localized population growth can affect the loss of forests and their quality in various ways. National Population Census (NSO, 2021 p. 22) estimated an increased population density and households in the Terai region compared to the previous census while reduced in mid-hills and high mountains. Province-wise, the density increased in Madhesh, Bagmati, and Lumbini Provinces due to internal migration from high mountains and mid-hills to Terai, and rural to urban areas. The livelihood of the majority of the population is forest-based and adopts subsistence agriculture. Given the limited agricultural land, the ever-increasing population can collectively increase the

demand for food and forest products, energy, cultivation land, and infrastructure, which ultimately exerts pressure on forests.

5.4.4 Governance-related factors

Weak enforcement of regulatory provisions and overall poor governance of the forestry sector have long been realized as major underlying factors of deforestation and forest degradation in Nepal. Several good laws exist but are not fully implemented due to a lack of political commitment, human resources, and financial capacity within the forestry sector. High political interferences, especially for infrastructure development projects are often noticed in the forestry sector which has undermined the conservation efforts. Besides, poor implementation of EIA, IEE, and their monitoring of some development projects, especially infrastructure development have been major causes of forest degradation and loss.

Besides, there is a lack of effective mechanisms to recognize the performance, reward, and punishment for government staff is also the reason for weak law enforcement, corruption, and impunity.

Weak law enforcement is also noticed at the community level. Forest Operational Plans (FOP) of about 40% of the total (over 23,000) community forest user groups (CFUGs) are backlogged to get their amendments. Without the updated FOP, CFUGs are not legally allowed for sustainable management-related forest activities. Financial misconduct by the executive committee (EC) members and local elites of the CFUGs are reported in some cases resulting from a lack of financial transparency and timely reporting along with weak/regular monitoring and guidance by the forest authorities (e.g., Division Forest Offices (DFOs) and group network (e.g., Federation of Community Forest Users' Nepal- FECOFUN). These dynamics can collectively cause poor forestry sector governance.

5.4.5 Technological factors

Insufficient knowledge of forest management is perceived to be a reason for low productivity. Failing to generate optimal income from the forestry sector undersupply to meet the demand for forest products. Technological knowledge and skill gaps in resource harvesting, value chain of forest-based enterprise, forest resource inventory, and planning are negatively associated with per-unit forest productivity. While Nepal started sustainable-based management of forests, limited access to improved technology, knowledge gaps, and inadequate trained human resources, can be a barrier to maximizing forest productivity to achieve multidimensional forest management goals including reducing forest degradation, enhancing carbon stock, improving livelihoods, and conserving biodiversity.

5.4.6 Insecure and Unclear Land Tenure

Land tenure security is associated with less deforestation in Nepal and elsewhere particularly when it produces a situation of unrecognized tenure. The forests in Nepal are managed with

different land tenure under government-managed, community-managed, and privately-owned forests. However, there are forest lands mostly in high mountains without recognized land tenure legally and de facto. Forests without clear land tenure and forest user rights are perceived to be open access. Open access perception especially in some parts of high mountains creates a situation of “tragedy of commons” whereby traditional forest users tempt unsustainable activities maximizing benefits at the cost of society. Such activities can result in the overuse and harvest of forest resources. Additionally, this stimulates conflict between traditional tenure systems and contemporary forest legislation.

Besides, there are some cases mainly in mid-hills of contested forest areas that are not registered legally but are being managed by individuals (Helvetas, 2012). These types of forests are highly unsecured in terms of tenure rights and deforestation phenomena were noticed in these areas (Helvetas, 2012). Besides, both unrecognized and insecure land tenure situations have been a barrier to scaling up forest management activities including restorations supporting REDD+ initiatives.

5.4.7 Socio-Economic Factors

High Dependency on Forest Resources: The number of people and households relying on traditional biomass such as fuelwood for energy can determine the future loss of forests and degradation. Biomass-based fuelwood accounts for roughly 62% of Nepal’s total final energy consumption (MoF 2020). Around 90% of biomass is predominantly and traditionally used for cooking and heating purposes in households (WECS, 2023). Fuelwood consumption varies across the physiographic regions with the highest in high mountains (nearly 85%) (NSO, 2021). The majority of the sources of fuelwood are national and private forests where fuelwood is often not harvested in the sustainable increment principle. While supply potential in Nepal seems greater than the annual fuelwood demand (exceeding it by 5.6 million tons of dry matter) (WECS, 2023), demand and supply potentially are not evenly distributed across the physiographic regions and administrative jurisdictions or even districts, or rural municipalities.

OAG (2023) estimated annual demand for timber and derivative products in Nepal is 119 million cft. However, only a total of 30.18 million cft of timber were supplied in the fiscal year 2022/23, while nearly 87.37 million cft of timber were harvested in four fiscal years (2019/20-2022/23) (MoFE, 2024). Policy constraints lead to the under-harvested as compared to the potential sustainable supply of timber (annual potential harvest of timber and fuelwood is 21.7 million m³- MSFP, 2026). To meet the undersupply, the country imported wood and wood-based products worth NRs. 2.33 billion in 2020/21 and NRs. 7.99 billion in 2021/22 and 6.4 billion in 2022/23 due to the non-availability of wood as per requirements (OAG, 2023). The gaps in the timber supply can induce illegal timber harvest leading to loss of forests and degradation.

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Annexes

Annex 1: Checklist for Identification and Prioritization of Drivers of D&D (Provincial Forest Authorities)

A. Matrix for prioritization of Proximate drivers⁷ of deforestation and forest degradation

1. Please kindly review the indicated activities that trigger deforestation and forest degradation.
2. Add any drivers that you experience and observe in your jurisdiction.
3. Provide your judgmental value of each driver based on your experiences, observations, and available information (if any) from 1 to 5 as follows. Where,
 - 1- Very low
 - 2- Low
 - 3- Moderate
 - 4- High
 - 5- Very high

SN	Global categories of drivers (Geist and Lambin, 2002)	Potential proximate (direct) drivers relevant to Nepal	Extent and intensity of impact					Total aggregation	Priority
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging							
		Unsustainable fuelwood collection							
2	Livestock grazing	Uncontrolled and unregulated grazing							
3	Agriculture expansion	Encroachment for agricultural purposes							
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands							
		Hydropower and transmission lines							
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi							
		Unplanned urbanization (rapid expansion)							

6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders							
7	Forest fires	Uncontrolled and frequent forest fires							
8	Invasive alien species	The rapid expansion of alien invasive plant species							

B. Matrix for prioritization of Underlying causes⁸ of deforestation and forest degradation

1. Please kindly review the indicated underlying causes that lead to the **Underlying (Indirect) causes of** deforestation and forest degradation.
2. Add any drivers that you experience and observe in your jurisdiction.
3. Provide your judgmental value of each driver based on your experiences, observations, and available information (if any) from 1 to 5 as follows. Where,
 - 1- Very low
 - 2- Low
 - 3- Moderate
 - 4- High
 - 5- Very high

SN	Global categories of drivers (Geist and Lambin, 2002)	Potential Underlying causes relevant to Nepal	Extent and intensity of impact (From 1-Low to High)					Total aggregation (25 is the maximum)	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-Economic	Increased demand for forest products							
		High dependency on forests for livelihoods							
		Limited alternative livelihood options							
		Decreased collective action							
2	Policy and institutions	High political interference in some activities (e.g., unregulated rural road construction)							
		Poor coordination within the forestry sector across the levels							
		Weak interagency coordination (between forestry and non-forestry authorities- e.g. Forest							

		authorities and Local governments)							
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)							
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity							
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations							
		Population growth in specific areas (Localized)							
5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)							
6	Technological factors	Limited access to improved technology							
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species.							

C. Based on your experiences and observations, please provide key barriers to enhancing and conserving the forest carbon stock.

Annex 2: Prioritization of province and national- level Proximate Drivers of Deforestation and Forest Degradation

SN	Broad categories of Proximate drivers	Detail proximate (direct) drivers	Province-level total aggregation (25 is the maximum of five parameters shown in Annex 1)							Average cumulative aggregate value (Maximum 25 & higher number represented highly prioritized)	National Priority (1 represents highly prioritized)
			Koshi	Madhesh	Bagmati	Gandaki	Lumbini	Karnali	Sudurpaschhim		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	19	14	13	14	12	20	11	15	6
		Unsustainable fuelwood collection	17	12	15	12	7	10	10	12	8
2	Livestock grazing	Uncontrolled and unregulated grazing	18	11	13	12	10	12	12	13	7
3	Agriculture expansion	Encroachment for agricultural purposes	20	21	15	15	18	17	17	18	3
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	21	24	15	19	23	24	22	21.1	1
		Hydropower dams, transmission lines, and cement factors	16	21	13	11	17	18	16	16	5
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	23	20	14	14	18	16	19	18	3
		Unplanned urbanization (rapid expansion)	15	22	13	17	17	17	18	17	4
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	13	17	11	14	13	13	13	13	7
7	Forest fires	Uncontrolled and frequent forest fires	25	23	14	16	22	22	22	20.6	2
8	Invasive alien species	The rapid expansion of alien invasive plant species	19	21	14	16	11	16	11	15	6

Annex 3: Prioritization of Province and National- level Underlying Causes of Deforestation and Forest Degradation

SN	Categories of drivers	Potential Underlying causes	Province-level total aggregation <i>(Maximum 25 of five parameters shown in Annex 1)</i>							Average cumulative aggregate value (Maximum 25 & higher number represented highly prioritized)	National Priority (1 represents highly prioritized)
			Koshi	Madhes h	Bagmati	Gandaki	Lumbini	Karnali	Sudurpashchhim		
1	Socio-economic factors	Increased demand for forest products	16	14	13	17	15	16	15	15	6
		High dependency on forests for livelihoods	13	13	11	15	8	15	12	12	8
		Limited alternative livelihood options	10	11	18	13	8	14	9	12	8
		Decreased collective action behavior	20	15	16	13	12	13	10	14	7
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	21	24	14	15	22	24	22	20	1
		Poor coordination within the forestry sector across the levels	25	18	18	12	12	16	15	17	4
		Weak interagency coordination (between forestry and non-forestry authorities- e.g, Forest authorities and Local governments)	21	21	16	11	19	14	21	18	3
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)	25	20	15	14	19	19	15	18	3

3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity	23	20	14	13	17	23	16	18	3
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	20	22	14	14	20	21	22	19	2
		Population growth in specific areas (Localized)	17	21	11	11	14	13	9	14	7
5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	19	21	13	13	15	16	13	16	5
6	Technological factors	Limited access to improved technology	17	19	15	15	14	16	13	16	5
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	20	25	12	16	20	19	21	19	2

Annex 4: Prioritization of drivers from Provincial Forest Authorities (Koshi, Madhesh, Bagmati, Gandaki, Lumbini, Karnali, and Sudurpashchim)

1a. Koshi- Proximate drivers

SN	Categories of drivers	Potential proximate (direct) drivers	Extent and intensity of impact (From 1- Low to High)					Total aggregation	Priority (From 1- High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	3	4	4	4	4	19	5
		Unsustainable fuelwood collection	3	3	4	3	4	17	7
2	Livestock grazing	Uncontrolled and unregulated grazing	3	4	4	3	4	18	6
3	Agriculture expansion	Encroachment for agricultural purposes	2	5	4	5	4	20	4
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	5	5	4	3	4	21	4
		Hydropower dams, transmission lines, and cement factors	4	4	3	3	2	16	8
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	5	5	4	5	4	23	2
		Unplanned urbanization (rapid expansion)	3	3	3	3	3	15	9
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	3	3	3	2	2	13	10
7	Forest fires	Uncontrolled and frequent forest fires	5	5	5	5	5	25	1
8	Invasive alien species	The rapid expansion of alien invasive plant species	4	4	4	3	4	19	5

1b. Koshi-Underlying Causes

SN	Categories of drivers	Potential Underlying causes	Extent and intensity of impact (From 1-Low to 5 High)					Total aggregation	Priority (From 1-high to low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-economic factors	Increased demand for forest products	3	4	3	3	3	16	7
		High dependency on forests for livelihoods	2	2	3	3	3	13	8
		Limited alternative livelihood options	2	2	2	2	2	10	9
		Decreased collective action behavior	4	4	4	4	4	20	4
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	5	4	4	4	4	21	3
		Poor coordination within the forestry sector across the levels (Federal and provincial level)	5	5	5	5	5	25	1
		Weak interagency coordination (between forestry and non-forestry authorities- e.g, Forest authorities and Local governments)	5	4	4	4	4	21	3
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)	5	5	5	5	5	25	1
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity	5	5	5	4	4	23	2
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	4	4	4	4	4	20	4
		Population growth in specific areas (Localized)	3	4	4	3	3	17	6
5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	4	4	3	4	4	19	5
6	Technological	Limited access to	4	4	3	3	3	17	6

	factors	improved technology							
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	4	4	4	4	4	20	4

2a. Madhesh- Proximate drivers

SN	Categories of drivers	Potential proximate (direct) drivers	Extent and intensity of impact (From 1-Low to 5 High)					Total aggregation	Priority (From 1-Hight to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	3	3	4	2	2	14	7
		Unsustainable fuelwood collection	3	2	4	1	2	12	8
2	Livestock grazing	Uncontrolled and unregulated grazing	2	2	3	2	2	11	9
3	Agriculture expansion	Encroachment for agricultural purposes	4	4	5	4	4	21	4
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	5	5	5	4	5	24	1
		Hydropower dams, transmission lines, and cement factors	4	4	3	5	5	21	4
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	4	4	5	3	4	20	5
		Unplanned urbanization (rapid expansion)	5	4	4	4	5	22	3
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	3	4	4	3	3	17	6
7	Forest fires	Uncontrolled and frequent forest fires	5	5	3	5	5	23	2
8	Invasive alien species	The rapid expansion of alien invasive plant species	5	5	3	3	5	21	4

2b. Madhesh- Underlying Causes

SN	Categories of drivers	Potential Underlying causes	Extent and intensity of impact (From 1-Low to 5 High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-economic factors	Increased demand for forest products	3	3	3	2	3	14	9
		High dependency on forests for livelihoods	3	2	3	2	3	13	10
		Limited alternative livelihood options	2	2	2	2	3	11	10
		Decreased collective action behavior	3	3	3	2	4	15	8
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	5	5	5	4	5	24	2
		Poor coordination within the forestry sector across the levels	3	4	4	3	4	18	7
		Weak interagency coordination (between forestry and non-forestry authorities- e.g, Forest authorities and Local governments)	4	4	4	4	5	21	4
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)	4	4	4	4	4	20	5
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity	3	3	5	4	5	20	5
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	5	4	4	4	5	22	3
		Population growth in specific areas	5	4	4	4	4	21	4

		(Localized)							
5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	4	5	4	4	4	21	4
6	Technological factors	Limited access to improved technology	4	4	4	3	4	19	6
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	5	5	5	5	5	25	1

3a. Bagmati- Proximate drivers

SN	Categories of drivers	Potential proximate (direct) drivers	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	3	2	3	3	2	13	3
		Unsustainable fuelwood collection	3	2	3	5	2	15	1
2	Livestock grazing	Uncontrolled and unregulated grazing	2	2	3	2	3	13	3
3	Agriculture expansion	Encroachment for agricultural purposes	3	3	2	4	3	15	1
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	3	4	3	2	3	15	1
		Hydropower dams, transmission lines, and cement factors	3	2	3	2	3	13	3
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	3	3	3	3	2	14	2
		Unplanned urbanization (rapid expansion)	3	3	2	3	2	13	3
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	2	3	2	2	2	11	4
7	Forest fires	Uncontrolled and frequent forest fires	4	3	2	3	2	14	2

8	Invasive alien species	The rapid expansion of alien invasive plant species	3	3	2	3	3	14	2
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3b. Bagmati- Underlying causes

SN	Categories of drivers	Potential Underlying causes	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-economic factors	Increased demand for forest products	3	2	3	3	2	13	5
		High dependency on forests for livelihoods	2	2	2	3	2	11	7
		Limited alternative livelihood options	5	4	3	3	3	18	1
		Decreased collective action behavior	4	4	3	2	3	16	2
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	4	4	3	2	1	14	5
		Poor coordination within the forestry sector across the levels (federal and provincial government)	5	4	3	3	3	18	1
		Weak interagency coordination (between forestry and non-forestry authorities- e.g, Forest authorities and Local governments)	4	4	3	2	3	16	2
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)	4	2	3	3	3	15	3
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity	4	3	3	2	2	14	4
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	4	3	3	2	2	14	4
		Population growth in specific areas (Localized)	2	2	2	3	2	11	7

5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	4	2	2	2	3	13	6
6	Technological factors	Limited access to improved technology	4	3	3	4	1	15	3
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	4	2	2	2	2	12	6

4a. Gandaki- Proximate drivers

SN	Categories of drivers	Potential proximate (direct) drivers	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1 High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	3	3	2	2	4	14	5
		Unsustainable fuelwood collection	3	3	2	2	2	12	6
2	Livestock grazing	Uncontrolled and unregulated grazing	3	2	2	2	3	12	6
3	Agriculture expansion	Encroachment for agricultural purposes	4	3	2	3	3	15	4
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	4	4	4	3	4	19	1
		Hydropower dams, transmission lines, and cement factors	3	2	1	2	3	11	7
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	3	2	2	3	4	14	5
		Unplanned urbanization (rapid expansion)	4	2	4	3	4	17	2
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	3	2	2	3	4	14	5
7	Forest fires	Uncontrolled and frequent forest fires	4	2	2	4	4	16	3
8	Invasive alien species	The rapid expansion of alien invasive plant species	4	2	2	4	4	16	3

4b. Gandaki- Underlying causes

SN	Categories of drivers	Potential Underlying causes	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1 High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-economic factors	Increased demand for forest products	3	4	3	3	4	17	1
		High dependency on forests for livelihoods	3	3	3	3	3	15	3
		Limited alternative livelihood options	2	2	2	3	4	13	5
		Decreased collective action behavior	3	2	2	3	3	13	5
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	4	2	2	4	3	15	3
		Poor coordination within the forestry sector across the levels	2	2	2	3	3	12	6
		Weak interagency coordination (between forestry and non-forestry authorities- e.g., Forest authorities and Local governments)	2	2	2	2	3	11	7
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)	4	2	3	2	3	14	4
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity	4	2	2	2	3	13	5
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	3	3	2	3	3	14	4
		Population growth in specific areas (Localized)	3	2	2	2	2	11	7

5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	3	3	2	3	2	13	5
6	Technological factors	Limited access to improved technology	4	2	2	3	4	15	3
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	4	2	3	4	3	16	2

5a. Lumbini- Proximate drivers

SN	Categories of drivers	Potential proximate (direct) drivers	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	2	3	3	2	2	12	6
		Unsustainable fuelwood collection	1	1	2	1	2	7	9
2	Livestock grazing	Uncontrolled and unregulated grazing	1	2	3	2	2	10	8
3	Agriculture expansion	Encroachment for agricultural purposes	3	4	4	3	4	18	3
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	4	5	5	4	5	23	1
		Hydropower dams, transmission lines, and cement factors	3	3	3	4	4	17	4
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	3	4	4	3	4	18	3
		Unplanned urbanization (rapid expansion)	3	3	3	3	5	17	4
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	2	3	3	2	3	13	5
7	Forest fires	Uncontrolled and frequent forest fires	4	4	4	5	5	22	2
8	Invasive alien species	The rapid expansion of alien invasive plant species	2	2	2	2	3	11	7

5b. Lumbini- Underlying causes

SN	Categories of drivers	Potential Underlying causes	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-economic factors	Increased demand for forest products	3	3	3	3	3	15	5
		High dependency on forests for livelihoods	1	2	2	1	2	8	8
		Limited alternative livelihood options	1	2	2	1	2	8	8
		Decreased collective action behavior	2	3	3	2	2	12	7
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	4	5	5	3	5	22	1
		Poor coordination within the forestry sector across the levels	2	3	3	1	3	12	7
		Weak interagency coordination (between forestry and non-forestry authorities- e.g., Forest authorities and Local governments)	4	4	4	3	4	19	3
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)	5	3	3	4	4	19	4
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of	3	3	4	3	4	17	4

		development projects) and impunity							
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	4	4	4	3	5	20	2
		Population growth in specific areas (Localized)	3	3	2	3	3	14	6
5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	3	2	3	3	4	15	5
6	Technological factors	Limited access to improved technology	3	3	3	2	3	14	6
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	4	4	4	4	4	20	2

6a. Karnali- Proximate drivers

SN	Categories of drivers	Potential proximate (direct) drivers	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	4	4	3	5	4	20	3
		Unsustainable fuelwood collection	3	2	3	1	2	10	9
2	Livestock grazing	Uncontrolled and unregulated grazing	4	2	3	1	1	12	8
3	Agriculture expansion	Encroachment for agricultural purposes	4	4	4	2	3	17	5
4	Infrastructure development	Unregulated/haphazard infrastructure	5	5	5	4	5	24	1

		development (e.g., rural road construction) inside forest lands							
		Construction of hydropower dams, transmission lines, and cement factors	4	3	4	3	4	18	4
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	3	3	5	2	3	16	6
		Unplanned urbanization (rapid expansion)	3	4	4	2	4	17	5
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	3	3	2	2	3	13	7
7	Forest fires	Uncontrolled and frequent forest fires	5	4	4	5	4	22	2
8	Invasive alien species	The rapid expansion of alien invasive plant species	4	3	2	3	4	16	6

6b. Karnali- Underlying causes

SN	Categories of drivers	Potential Underlying causes	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-economic factors	Increased demand for forest products	3	3	3	4	3	16	5
		High dependency on forests for livelihoods	3	3	4	3	2	15	6
		Limited alternative livelihood options	3	3	3	3	2	14	7
		Decreased collective action behavior	3	3	3	1	3	13	8
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	5	5	5	4	5	24	1

		Poor coordination within the forestry sector across the levels	5	3	2	3	3	16	5
		Weak interagency coordination (between forestry and non-forestry authorities- e.g, Forest authorities and Local governments)	4	3	2	2	3	14	7
		Inconsistency in policy and strategies (forestry across three tiers of government and between forestry and non-forestry)	5	4	3	3	4	19	4
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity	5	5	3	5	5	23	2
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	4	4	5	4	4	21	3
		Population growth in specific areas (Localized)	3	2	3	2	3	13	8
4	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	5	2	4	3	2	16	5
5	Technological factors	Limited access to improved technology	4	5	2	2	3	16	5
6	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	3	4	4	4	4	19	4

7a. Sudurpashchim – Proximate Drivers

SN	Categories of drivers	Potential proximate (direct) drivers	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Unsustainable harvesting and biomass extraction	Illegal and unsustainable logging	2	3	2	2	2	11	8
		Unsustainable fuelwood collection	2	2	2	2	2	10	9
2	Livestock grazing	Uncontrolled and unregulated grazing	2	3	3	2	2	12	7
3	Agriculture expansion	Encroachment for agricultural purposes	3	4	4	3	3	17	4
4	Infrastructure development	Unregulated/haphazard infrastructure development (e.g., rural road construction) inside forest lands	5	5	4	4	4	22	1
		Hydropower dams, transmission lines, and cement factors	4	4	3	2	3	16	5
5	Human resettlement and urban expansion	Human resettlement (Sukumbasi) - in the name of Sukumbasi	3	4	4	4	4	19	2
		Unplanned urbanization (rapid expansion)	4	4	3	4	3	18	3
6	Mining and excavation	Unsustainable mining and excavation of stone, sand, and boulders	3	4	2	2	2	13	6
7	Forest fires	Uncontrolled and frequent forest fires	5	5	3	5	4	22	1
8	Invasive alien species	The rapid expansion of alien invasive plant species	2	2	2	2	3	11	8

7b. Sudurpashchim – Underlying Causes

SN	Categories of drivers	Potential Underlying causes	Extent and intensity of impact (From 1-Low to High)					Total aggregation	Priority (From 1-High to Low)
			Geographical coverage and distribution (1-5)	The economic cost of reversal or control (1-5)	Social-political cost of reversal or control (1-5)	The contribution to carbon emission (1-5)	Future potential (1-5)		
1	Socio-economic factors	Increased demand for forest products	3	3	3	3	3	15	4
		High dependency on forests for livelihoods	2	3	3	2	2	12	6
		Limited alternative livelihood options	1	2	2	2	2	9	8
		Decreased collective action behavior	2	2	2	2	2	10	7
2	Policy and institutional factors	High political interference in some activities (e.g., unregulated rural road construction)	4	5	5	4	4	22	1
		Poor coordination within the forestry sector across the levels	3	3	3	3	3	15	4
		Weak interagency coordination (between forestry and non-forestry authorities- e.g., Forest authorities and Local governments)	4	5	4	4	4	21	2
		Inconsistency in policy and strategies (forestry across three tiers of	4	3	3	3	2	15	4

		government and between forestry and non-forestry)							
3	Governance-related factors	Weak law enforcement (e.g., no proper IEE, EIA, Monitoring of development projects) and impunity	3	3	5	2	3	16	3
4	Demographic factors	Migration – increased periurban population and pressure on forests of specific locations	4	5	5	4	4	22	1
		Population growth in specific areas (Localized)	3	2	2	1	1	9	8
5	Insecure and unclear land tenure	Insecure and unclear land tenure (unrecognized land)	3	2	2	3	3	13	5
6	Technological factors	Limited access to improved technology	2	3	2	3	3	13	5
7	Climate change	Prolonged drought leads to increased forest fire incidences, stimulating invasive alien species	4	5	4	4	4	21	2



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