On behalf of:
Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection
of the Federal Republic of Germany

IKI INTERNATIONAL CLIMATE INITIATIVE

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RECAP4NDC

RECAP4NDC Project

CAPACITY BUILDING FOR FOREST LANDSCAPE RESTORATION IN UTTARAKHAND: A KEY STAKEHOLDER-BASED TRAINING NEEDS ASSESSMENT

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION, DEHRADUN

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Forest Survey of India

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Creating Innovative Solutions for a Sustainable Future

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Capacity Building for Forest Landscape Restoration in Uttarakhand: A Key Stakeholder-Based Training Needs Assessment

Output-V: Development of Capacities, Knowledge and Communication Mechanisms for Forest Landscape Restoration

Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) Project

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION
(An Autonomous Council of the Ministry of Environment, Forest and Climate Change, Government of India)
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FOREWORD

The threat of global climate change is both real and increasingly evident, impacting nature and humanity alike. Forests play a crucial role in maintaining ecological balance, environmental stability, sustainable development and essential ecosystem services. One of the greatest challenges facing humanity is managing natural resources in a way that meets growing human demands while preserving the health and resilience of ecosystems.

I have had the opportunity to witness first-hand the significant efforts invested in the Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) Project. This report on training needs assessment is of critical importance, as it provides valuable insights into the capacity gaps identified within the State Forest Department, Other Line Departments and Local Communities of Uttarakhand in relation to Forest Landscape Restoration. The findings from the Training Needs Assessment will play a key role in designing effective capacity-building modules and developing appropriate training manuals on Forest Landscape Restoration and related topics for capacity development under Output V: Development of Capacities, Knowledge and Communication Mechanisms for Forest Landscape Restoration of the RECAP4NDC Project being implemented by ICFRE in collaboration with ICIMOD and GIZ.

Development of capacities, knowledge and communication mechanisms for Forest Landscape Restoration (FLR) is a key component of the RECAP4NDC Project, aimed at achieving the forest sector targets under the Nationally Determined Contributions, Land Degradation Neutrality targets, the Bonn Challenge and the Sustainable Development Goals. This report represents the culmination of several months of dedicated field research, including interviews with officers and staff of the State Forest Department, Other Line Departments and members of local communities across Uttarakhand. It presents a comprehensive analysis of the data collected from the field and provides valuable insights into the training and capacity-building needs of these stakeholders. The findings highlight the critical areas where capacity building is needed to effectively implement FLR activities in the state. This report also offers practical recommendations to support future actions for building institutional and community-level capacities, ultimately contributing to the successful realization of FLR-related programmes and projects.

I am pleased to present this report on 'Capacity Building for Forest Landscape Restoration in Uttarakhand: A Key Stakeholder-based Training Needs Assessment'. I hope this report will inspire further discussion and concrete action to address the capacity-building needs essential for effective FLR, while also strengthening existing institutions to achieve the desired outcomes.

I commend Dr. R. S. Rawat, Principal Investigator and team of RECAP4NDC Project of ICFRE for bringing out this key stakeholder-based training needs assessment report for the state of Uttarakhand.

Date: 30 June 2025

(Kanchan Devi)

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The forests of Uttarakhand are not only rich reservoirs of biodiversity but also vital lifelines for both upstream and downstream communities, providing sustenance, livelihoods and essential ecological services. As stewards of these invaluable forest landscapes, the Forest Department along with Other Line Departments bears the critical responsibility of conserving, restoring and sustainably managing these ecosystems to ensure the well-being of both present and future generations. Local communities in Uttarakhand, particularly women, have played a pivotal role in forest conservation. One of the most iconic examples is the Chipko Andolan, where women led efforts to protect trees from deforestation through non-violent resistance. Additionally, the Van Panchayats (a traditional system of community-based forest management) have been instrumental in conserving the forest resources. These grassroots initiatives highlight the deep-rooted connection between the people of Uttarakhand and their forest landscapes.

This report titled 'Capacity Building for Forest Landscape Restoration in Uttarakhand: A Key Stakeholder-Based Training Needs Assessment', represents a vital step toward building the collective capacity needed to address the challenges of forest landscape restoration in the state of Uttarakhand under the RECAP4NDC Project. Through a comprehensive analysis, it identifies key capacity gaps, key knowledge areas and strategic interventions necessary to empower stakeholders. The findings aim to enhance the ability of relevant actors to restore degraded forest landscapes while balancing ecological integrity with developmental priorities.

I would like to express my sincere gratitude to Ms. Kanchan Devi, Director General, ICFRE, for her invaluable guidance, insightful direction and unwavering support throughout the successful completion of this report. I gratefully acknowledge the invaluable guidance, wholehearted support and encouragement provided by Dr. Rajesh Sharma, Deputy Director General (Research), ICFRE.

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The dedicated efforts of Sh. Monish Mullick, Sh. N.P.S. Nain and Dr. Md. Shahid, Consultants of the RECAP4NDC Project at ICFRE, in data collection, analysis and report preparation are thankfully acknowledged and appreciated.

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LIST OF ABBREVIATIONS

CBD	Convention on Biological Diversity
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CO_2	Carbon Dioxide
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
EBS	Ecosystem Based Solution
FLR	Forest Landscape Restoration
FPO	Farmer Producer Organisation
FSC	Forest Stewardship Council
FSI	Forest Survey of India
FTI	Forest Training Institute
GCF	Green Climate Fund
GCP	Green Credit Programme
GEF	Global Environment Facility
GIM	Green India Mission
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit/German Society for International Cooperation
GoI	Government of India
ha	Hectare
ICFRE	Indian Council of Forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
IKI	International Climate Initiative
ISFR	India State of Forest Report
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
LDN	Land Degradation Neutrality
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
mha	Million Hectares
NABARD	National Bank for Agriculture and Rural Development
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organisation
NWTP	Non-wood Forest Products
PEFC	Programme for the Endorsement of Forest Certification
RECAP4NDC	Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India
REDD+	Reducing Emissions from Deforestation and Forest Degradation, Sustainable Management of Forests and the Conservation and Enhancement of Forest Carbon Stocks
RFA	Recorded Forest Area
SDG	Sustainable Development Goal
SFD	State Forest Department
SHG	Self Help Group
SMC	Soil and Moisture Conservation
SOC	Soil Organic Carbon
sq km	Square Kilometer
TERI	The Energy and Resources Institute
TGA	Total Geographical Area
TNA	Training Needs Assessment
UFTA	Uttarakhand Forest Training Academy
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests

EXECUTIVE SUMMARY

Forests in India play a vital role in supporting the economy, livelihoods and ecological stability. Forests support the livelihoods of about 300 million people including tribal communities who rely on forest produce such as fuelwood, bamboo, medicinal plants, etc. Recognizing the importance of forests, India has set ambitious national target of increasing forest and tree cover to 33% of its geographical area and creating an additional carbon sink of 2.5 – 3 billion tonnes of CO_2 equivalent through additional forest and tree cover under its Nationally Determined Contributions. India is committed to the international conventions like the United Nations Framework Convention on Climate Change, United Nations Convention to Combat Desertification, Convention on Biological Diversity, Sustainable Development Goals and also the Bonn Challenge pledge. These commitments underscore the central role of forests in India's strategy for sustainable development and climate resilience. Competing uses of land for agriculture, infrastructure development, human settlement and industries exerts tremendous pressure on the forests. Rising atmospheric carbon dioxide concentration and climate change are additional stress on the forests and making them more vulnerable. Despite these challenges, India is pursuing to achieve its national targets and international commitments related to forests and environment. To fully realize the potential of forests in meeting the national targets and international commitments, it is essential to strengthen forest governance, invest in forest landscape restoration and promote meaningful community participation for achieving national targets and international commitments related to forests and environment.

Several programmes and projects are being implemented in the country that integrate ecological restoration, biodiversity conservation, socio-economic development, robust policy frameworks and advanced monitoring technologies. An Indo-German Cooperation project titled 'Restore, Conserve and Protect Forest and Tree Cover for Nationally Determined Contributions Implementation in India (RECAP4NDC)' is being implemented in the selected landscapes of Delhi and National Capital Region, Uttarakhand, Maharashtra and Gujarat. RECAP4NDC Project empowering the stakeholders to effectively plan, finance, implement and monitor initiatives related to forest landscape restoration in project area. Development of capacities, knowledge and communication mechanisms for forest landscape restoration is one of the components of the RECAP4NDC Project. ICFRE is mainly responsible for execution of this component along with ICIMOD and GIZ.

A comprehensive Training Needs Assessment (TNA) on Forest Landscape Restoration was conducted for the State Forest Department, Other Line Departments and Local Communities of Uttarakhand. The objective of the TNA was to identify gaps in the knowledge and capacity of key stakeholders regarding Forest Landscape Restoration (FLR) and to develop targeted training modules to address identified gaps for the successful implementation of FLR initiatives in the State of Uttarakhand.

The findings of TNA highlight the significance of focused, practical and interactive trainings to fill in the knowledge and capacity gaps with reference to the domestic and international funding for FLR, forest carbon stocks measurement, carbon market, forest certification, springshed management, green credit programme, REDD+, gender mainstreaming in forest management, value chain of non-wood forest products and ecotourism are required for officers of the State Forest Department. Capacity building of the frontline staff of State Forest Department is required to be done on India's NDC targets under the Paris Agreement, forest carbon stocks measurement, springshed management, sustainable harvesting of non-wood forest products and their role in livelihood generation, gender mainstreaming in forest management, community forest management, ecotourism and policies, laws and regulations for conservation of forests and biodiversity. Capacity building of the Other Line Departments is required to be done on invasive species and their

management, springshed management, legal framework for conservation and protection of environment, gender mainstreaming in natural resource management, international agreement/conventions related to environment, ecotourism, disaster management/disaster risk reduction and LiFE style for environment and sustainable development goals. Capacity building of the local communities of the Uttarakhand is required on FLR, soil and water conservation, sustainable land management, climate change mitigation and adaptation, livelihood generation through non-wood forest products, agroforestry, farm forestry and horticulture practices, management of invasive species, human-wildlife conflict and forest fire management and community forest management and role of Van Panchayats.

The development of comprehensive and targeted training modules on FLR is essential for effective capacity building of key stakeholders of Uttarakhand State. Enhanced capacity of the stakeholders will contribute to the restoration of degraded forest landscapes, promote ecosystem-based approaches, and ensure the delivery of essential ecosystem services such as water regulation, carbon sequestration and biodiversity conservation. Moreover, strengthening the capacity of key stakeholders will support the development of climate-resilient forest landscapes. This will not only help in mitigating the impacts of climate change but also enhance the resilience of local communities and improve their access to sustainable livelihood opportunities. Therefore, need-based training modules on FLR are being developed for capacity building of the State Forest Department, Other Line Departments, Van Panchayats and Local Communities of Uttarakhand State under the RECAP4NDC Project.

1 INTRODUCTION

As per the India State of Forest Report 2023, total forest cover of the country is 715342.61 sq km (21.76% of the total geographical area) and total tree cover of the country is 112014.34 sq km (3.41% of the geographical area). The total forest and tree cover of the country is 25.17% (827356.95 sq km) of its total geographical area. Forest and tree cover play a vital role in ecological and economic development of the country. While their direct contribution to Gross Domestic Product is around 1.7% and this figure underrepresents the real value of the forests, as it excludes the contribution of ecosystem services like Carbon sequestration, Water regulation and Soil conservation and Non-Wood Forest Products. Forests support the livelihoods of about 300 million people including tribal communities who rely on forest products such as fuelwood, bamboo, medicinal plants, etc. Recognizing the importance of forests, India has set ambitious national target of increasing forest and tree cover to 33% of its geographical area under the National Forest Policy 1988, and creating an additional carbon sink of 2.5 – 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030 under its Nationally Determined Contributions. India is committed to the international conventions like the United Nations Framework Convention on Climate Change (UNFCCC), United Nations Convention to Combat Desertification (UNCCD), Convention on Biological Diversity (CBD), Sustainable Development Goals (SDGs) and also the Bonn Challenge pledge. These commitments underscore the central role of forests in India's strategy for sustainable and climate resilience development.

Competing demands of land for agriculture, infrastructure development, human settlement and industrial expansion exert immense pressure on the forests. Rising atmospheric carbon dioxide concentration and climate change are additional stress on the forests and making them more vulnerable to climate change. Despite these challenges, India remains committed to achieving its national targets and international commitments related to forests and environment. The Government of India is implementing a range of programmes and projects that focus on restoration of degraded forests, biodiversity conservation, socio-economic development, robust policy frameworks and use of advanced monitoring technologies.

To fully realize the potential of forests in achieving national targets and fulfilling international commitments, it is essential to strengthen forest governance, invest in forest landscape restoration and promote meaningful participation of the local communities. These measures are crucial for ensuring the climate resilience and long-term sustainability of India's forest ecosystems.

2 OVERVIEW OF UTTARAKHAND STATE

Uttarakhand was established as the 27th state of India on 9th November 2000. Its formation was driven by the region's distinct cultural identity, challenging mountainous terrain and specific developmental needs. Since then, Uttarakhand has grown in significance, emerging as a state of considerable religious, ecological and strategic importance. Uttarakhand, one of the Himalayan states of India, shares international borders with China (Tibet) to the north and Nepal to the east. Domestically, it is bordered by Himachal Pradesh to the northwest and Uttar Pradesh to the south. The state features a diverse landscape, spanning snow-capped peaks and glacial rivers in the north to dense tropical forests and fertile plains in the south. The state is divided into two regions: Garhwal Mandal in the west and Kumaon Mandal in the east. Garhwal Mandal comprises seven districts (Dehradun, Haridwar, Uttarkashi, Tehri Garhwal, Pauri Garhwal, Rudraprayag and Chamoli) whereas Kumaon Mandal consists of six districts (Pithoragarh, Bageshwar, Almora, Nainital, Champawat and Udham Singh Nagar). In total, Uttarakhand has 13 districts which are further subdivided into 95 development blocks. The administrative map of Uttarakhand is given in Fig. 1.

The climate of Uttarakhand varies significantly from region to region owing to its wide range of altitudes from the low-lying plains to high peaks of the Himalaya. In the plains and lower foothills, including regions like Dehradun, Haridwar and Udham Singh Nagar, the climate is typically subtropical. Summers here, lasting from March to June, are hot and dry, with

temperatures often rising above 35° C. Winters, from November to February, are mild with temperatures ranging between 5° C and 20° C, often accompanied by morning fog. Moving up to the middle Himalayan region, which includes towns like Nainital, Almora and Pithoragarh, the climate becomes more temperate. Average temperatures in summer range from 15° C to 30° C. These regions enjoy a relatively balanced climate, which supports diverse flora and fauna. In the higher Himalayan region, including areas such as Kedarnath, Badrinath, Gangotri and Yamunotri, the climate is alpine or glacial. Due to the altitude, this region experiences long, harsh winters with temperatures frequently dropping below -10°C and heavy snowfall from December to March. Uttarakhand receives a significant amount of rainfall during the monsoon season, especially from June to September. While this rain is vital for agriculture and replenishing water sources. The higher regions experience regular snowfall in winter and contribute to the water supply of the rivers originating from the state.

Uttarakhand State is richly endowed with abundant forest and water resources. It hosts over 12,000 glaciers and eight major river catchments, which serve as the lifeline for the entire hydrological system of the Indo-Gangetic plains. Two of India's most important rivers, the Ganga and the Yamuna originate from Uttarakhand. In addition, the state features numerous lakes and streams, further enhancing its ecological wealth. Uttarakhand boasts rich biodiversity, including 175 rare species of medicinal and aromatic plants. Its diverse climatic zones foster a wide range of commercial activities in agriculture, horticulture and floriculture.

Out of the state's total geographical area of 5.35 million hectares, approximately 4.6 million hectares (86%) comprise hilly terrain, while only 0.74 million hectares (14%) consist of plains. Due to the challenging topography, just 14% of the land is suitable for cultivation. Despite these constraints, the state's diverse climate and strategic location present significant opportunities for the development of horticulture, agro-based industries, organic farming, off-season vegetable production and the cultivation of medicinal and aromatic plants. Agriculture plays a vital role in the state's economy, contributing approximately 23.4% to the State Domestic Product. The average landholding size in Uttarakhand is 0.95 hectares, significantly smaller than the national average of 1.57 hectares. The state also has a higher proportion of small and marginal landholdings compared to the national level. Moreover, agriculture in Uttarakhand remains heavily dependent on rainfall, making it vulnerable to climatic variability. Uttarakhand is divided into four Agroclimatic Zones (Table 1).

Table 1: Details of Agroclimatic Zones of the state

S. No.	Zone	Farming situation	Soil	Rainfall (mm/ year)	Districts	Main farm produces and Livestock
1.	Zone A up to 1000 m	Tarai Irrigated	Alluvial	1400	Udham Singh Nagar, Haridwar	Rice, wheat, sugarcane, lentil, chickpea, rapeseed mustard, mango, litchi, guava, peach and plums. Livestock: Buffalo and cattle
		Bhabar Irrigated	Alluvial mixed with boulders and shingles	1400	Nainital, Dehradun, Pauri Garhwal	Rice, wheat, sugarcane, rapeseed mustard, potato, lentil, mango, guava and litchi. Livestock: Buffalo and cattle
		Irrigated lower hills	Alluvial sandy soil	2000 -2400	Champawat, Pauri Garhwal, Dehradun, Nainital, Tehri Garhwal	Rice, Wheat, onion, chilly, peas, potato, radish, cauliflower, pulses, oilseeds, soybean, mango, guava, plums and peaches. Livestock: Buffalo and cattle

		Rain -fed lower hills	Residual sandy loam	2000 -2400	Champawat, Nainital, Pauri Garhwal, Dehradun, Tehri Garhwal, Bageshwar	Finger millet, Maize, rice, wheat, pulses, mango, guava, plums and peaches. Livestock: Buffalo, cattle and goat
2.	Zone B 1000 - 1500 m	Mid hills south aspect	Sandy loam	1200 -1300	Champawat, Nainital, Almora, Dehradun, Tehri Garhwal, Bageshwar	Rice, finger millet, wheat, potato, tomato, peas, pulses, peach and plums. Livestock: Cattle, sheep and goat
3	Zone C 1500 - 2400 m	High hills	Red to dark	1200 -2500	Pithoragarh, Almora, Chamoli, Bageshwar	Amaranth, finger millet, French beans, Cole crops, potato, peas, peaches, plums, pears, apples and stone fruits. Livestock: Cattle, sheep and goat
4.	Zone D >2400 m	Very High hills	Red to dark black clay	1300	Pithoragarh, Chamoli, Uttarkashi	Amaranth, buckwheat, peas, Cole crops, apple and potato. Livestock: Sheep and goat

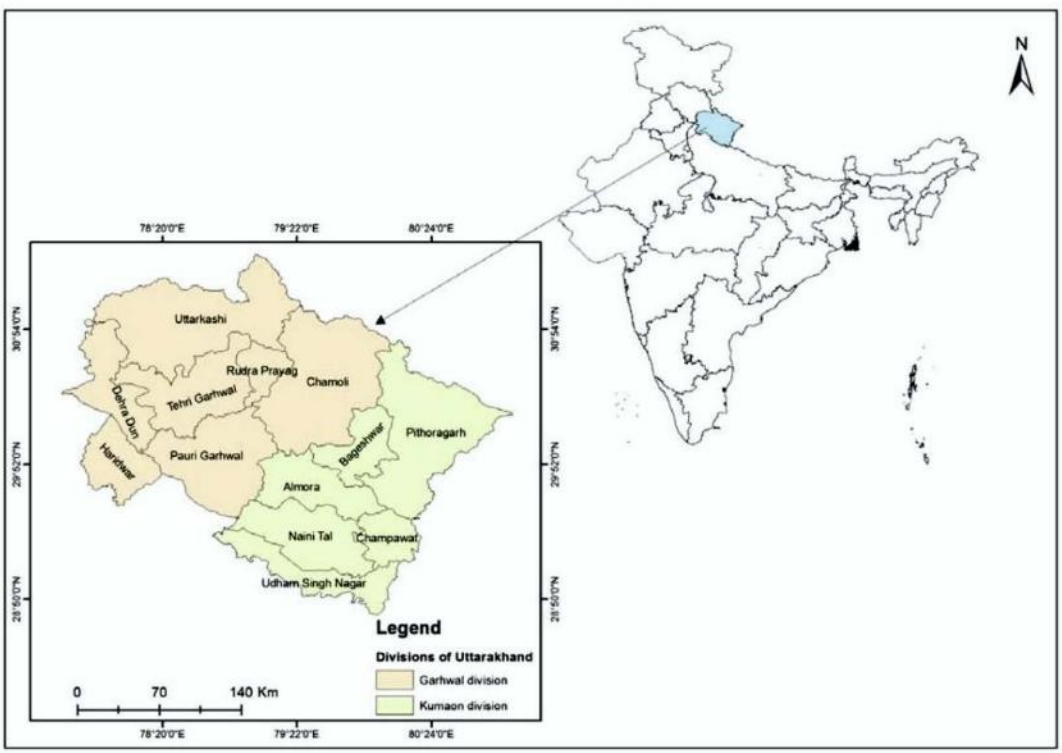


Fig. 1: Administrative Map of Uttarakhand

The Government of Uttarakhand has implemented a range of policy measures and incentives to attract investment across various sectors, fostering sustainable economic development.

3 FORESTS AND TREE COVER

Uttarakhand is rich in forest resources with a recorded forest area of 38,116.6 sq km, accounting for 63.51% of the state's total geographical area and 4.9% of India's national forest area. The state's forest cover stands at 24,303.83 sq km, representing 45.44% of its total area and 3.61% of the country's total forest cover. Additionally, Uttarakhand has a tree cover of 1,001 sq km, which is 1.87% of its geographical area. As per the Champion and Seth's Classification of Forest Types (Champion and Seth, 1968), the forests in Uttarakhand belong to nine Forest Type Groups. Forest types reported in the state of Uttarakhand are presented in Table 2.

Table 2: Forest types found in Uttarakhand

S. No.	Forest type	Area (sq km)	% of Forest Cover
1	3C/C2a Moist Siwalik Sal Forest	3402.49	12.84
2	3C/C2b (1) Bhabar - dun Sal Forest	251.06	0.95
3	3C/C2b (1) Moist tarai Sal Forest	401.60	1.51
4	3C/C2d (i) Western Light Alluvium Plains Sal Forest	165.52	0.62
5	3C/C3a West Gangetic Moist Mixed Deciduous Forest	1055.48	3.99
6	4C/FS2 Sub-montane Hill-Valley Swamp Forest	0.76	0.00
7	5B/C1a Dry Siwalik Sal Forest	455.92	1.72
8	5B/C1b Dry Plains Sal Forest	8.31	0.03
9	5B/C2 Northern Dry Mixed Deciduous Forest	903.31	3.41
10	5/DS1 Dry Deciduous Scrub	39.02	0.15
11	5/1S2 Khair-Sissu Forest	252.36	0.95
12	9/C1a Lower or Siwalik Chir Pine Forest	43.15	0.16
13	9/C1b Upper or Himalayan Chir Pine Forest	7295.76	27.52
14	9/DS1 Himalayan Subtropical Scrub	379.26	1.43
15	9/DS2 Subtropical Euphorbia Scrub	28.37	0.11
16	12/C1a Ban Oak Forest (*Quercus incana*)	3647.31	13.75
17	12/C1b Moru Oak Forest (*Q. dilatata*)	122.71	0.46
18	12/C1c Moist Deodar Forest (*Cedrus*)	395.23	1.49
19	12/C1d Western Mixed Coniferous Forest (Spruce, Blue Pine, Silver Fir)	1340.10	5.05
20	12 /C1e Moist Temperate Deciduous Forest	202.07	0.76
21	12/C1f Low-Level Blue Pine Forest (*Pinus wallichiana)*	27.66	0.10
22	12/C1/DS1 Oak Scrub	29.93	0.11
23	12/C1/DS2 Himalayan Temperate Secondary Scrub	14.09	0.05
24	12/C2a Kharsu Oak Forest (*Q. semecarpifolia*)	832.04	3.14
25	12/C2b West Himalayan Upper Oak/ Fir Forest	1452.52	5.48
26	12/C2c Moist Temperate Deciduous Forest	201.57	0.76
27	12/1S1 Alder Forest	8.13	0.03

28	12/2S1 Low Level Blue Pine Forest	22.49	0.08
29	13/C2b Dry Deodar Forest (*Cedrus*)	194.73	0.73
30	13/C5 West Himalayan Dry Juniper Forest *(Juniperus macropoda)*	4.28	0.02
31	13/1S1 *Hippophae/Myricaria* Scrub	67.66	0.26
32	14/C1b West Himalayan Sub-Alpine Fir Forest	184.29	0.69
33	14/C1 a West Himalayan Sub-Alpine Birch/ Fir Forest (Betula/ Abies)	542.11	2.04
34	14/1S1 *Hippophae/Myricaria* Brakes	20.23	0.08
35	14/1S2 Deciduous Sub- Alpine Scrub	42.77	0.16
36	15/C1 Birch/ *Rhododendron* Scrub Forest	117.18	0.44
37	15/E1 Dwarf *Rhododendron* Scrub	12.95	0.05
38	16/C1 Dry Alpine Scrub	2.78	0.01
39	16/E1 Dwarf Juniper Scrub	29.92	0.11
	Sub-total	**24,199.12**	**91.24**
40	Plantation/ TOF	487.09	1.84
	Total Forest cover & Scrub	**24,686.21**	
	Grassland forest types (outside forest cover)		
41	3C/C2/DS1 Moist Sal Savannah	8.75	0.03
42	3/1S1 Low Alluvial Savannah Woodland (*Salmalia-Albizzia* combination)	3.30	0.01
43	12/DS2 Himalayan Temperate Parkland	12.38	0.05
44	12/DS3 Himalayan Temperate Pastures	84.66	0.32
45	14/DS1 Sub-alpine Pastures	212.05	0.80
46	15/C3 Alpine Pastures	1514.99	5.71
	Sub-total	**1,836.13**	**6.92**
	Grand total	**26,522.34**	**100**

Source: FSI, 2020

In terms of forest canopy density classes, the State has 5,266.58 sq km under Very Dense Forest, 12,517.63 sq km under Moderately Dense Forest and 6,519.62 sq km under Open Forest. Forest Cover in the State has increased by 8.04 sq km. (Table 3).

Table 3: Forest Cover in Uttarakhand

S. No.	Class of Forest Cover	Area (sq km)	Percentage
1	Very Dense Forest	5266.58	9.85
2	Moderately Dense Forest	12517.63	23.40
3	Open Forest	6519.62	12.19
	Total	**24303.83**	**45.44**
4	Scrub	412.88	0.77

Source: FSI, 2024

With nearly half of its land area covered by forests, Uttarakhand plays a critical role in biodiversity conservation and maintaining ecological balance. The state is home to extensive oak and rhododendron forests in the Himalayan region, which support a diverse range of wildlife. These verdant ecosystems not only contribute to the region's natural heritage but also serve as essential reservoirs of ecological stability, underscoring Uttarakhand's importance as an environmental treasure.

4 LAND USE PATTERN

According to the Nine-Fold Classification of land, total cultivated land of the Uttarakhand state is approximately 593680 ha. Land use pattern in Uttarakhand is given in Table 4. Status of land use is given in Table 5.

Table 4: Land use pattern in Uttarakhand

S. No.	Land Use Types	Area (in thousand ha)	Percentage
1	Geographical Area	5348.00	
2	Reporting area for land utilization	6001.53	100
3	Forests	3811.66	63.51
4	Not available for land cultivation	440.90	7.35
5	Permanent pastures and other grazing lands	207.77	3.46
6	Land under misc. tree crops and groves	393.69	6.56
7	Culturable wasteland	348.57	5.81
8	Fallow land other than current fallows	107.89	1.80
9	Current fallows	97.37	1.62
10	Net area sown	593.68	9.89

Source: Land Use Statistics 2021-22, Ministry of Agriculture and Farmer's Welfare, GoI.

Table 5: Status of land use in Uttarakhand (*As per Nine-fold Classification of land*)

Nine-Fold Classification of Land	Non-Agricultural Land					Agri. Land/ Cultivable Land				Reporting Land Area (in Th. Ha)
	Forests	Not available for Cultivation		Other uncultivated land excluding Fallow land			Fallow Lands		Net Area Sown	
Geographical Area (in Thousand Hectares) 5348.00		Non-Agricultural uses	Barren & Unculturable	Pastures & Grazing lands	Misc. Tree Crops & Groves	Culturable Waste land	Fallow Lands other than current Fallows	Current Fallows		
	1	2	3	4	5	6	7	8	9	10
Area	3811.87	192.06	249.68	207.67	393.73	362.52	151.85	64.22	568.38	6001.98
%age	63.51	3.20	4.16	3.46	6.56	6.04	2.53	1.07	9.47	100

(Source: Land use Statistics 2022-23, Ministry of Agriculture and Farmer's Welfare, GoI)

The land use land cover pattern of Uttarakhand has undergone significant changes over the ten-year period from 2005-06 to 2015-16 (Table 6). Notable changes were observed primarily in agricultural fallow lands and croplands followed by changes in waterbodies, snow cover and built-up areas. A considerable rise in land surface temperature contributed to a marked decline in snow cover, which in turn put pressure on existing water resources. This environmental shift led to an

increased reliance on agriculture as reflected in the expansion of agricultural land and its growing role in the region's economy. Simultaneously, the expansion of built-up areas has intensified biotic pressure on natural resources, posing challenges for sustainable development in the State.

Table 6: Land use land cover area change statistics

S. No.	Land Use Land Cover Classes		Area (in sq km)		Area Change (in sq km)
	Primary classes	Secondary classes	2005-06	2015-16	
1	Agriculture	Crop land	7445.69	9679.65	2233,96
		Fallow	3859.25	924.04	-2935.21
		Plantation	224.83	175.21	-49.62
2	Barren/ Unculturable/ Wastelands	Barren rocky	3848.17	3236.36	-611.81
		Gullied Ravine	0	0.06	0.06
		Sandy area	8.59	49.25	40.66
		Scrub Land	438.73	1183.90	745.17
3	Built-up	Mining	2.21	26.29	24.08
		Rural	202.98	211.81	8.83
		Urban	134.18	412.58	278.40
4	Forest	Deciduous	7628.64	6277.77	-1350.87
		Evergreen/ Semi-evergreen	15801.30	16159.78	358.48
		Forest Plantation	792.97	792.18	-0.79
		Scrub Forest	1115.62	2088.55	972.93
		Swamp /Mangrove	0	7.17	7.17
5	Grass/ Grazing	Grassland/ Grazing land	3479.54	3804.28	324.74
6	Snow & Glacier	Snow / Glaciers	7430.84	7227.74	-203.10
7	Wetlands/ Waterbodies	River/ Stream/ Canal	900.53	1030.50	129.97
		Reservoir/Lakes/ Ponds	168.94	195.89	26.95
		Total Area	**53483.01**	**53483.01**	

Source: Mani *et al.*, 2023

5 FLORAL AND FAUNAL DIVERSITY

Uttarakhand's diverse altitudinal range from the Gangetic plains to the high Himalayan peaks supports a wide variety of flora and fauna. The state is home to approximately 4,048 species of angiosperms and gymnosperms, of which around 116 are endemic to the region. Additionally, about 161 species are classified as rare, endangered and threatened. The faunal diversity of Uttarakhand includes 102 species of mammals, 710 species of birds, 124 species of fish, 69 species of reptiles and 19 species of amphibians. The forests of Uttarakhand provide critical habitat for several highly endangered faunal species such as Snow Leopard, Musk Deer, Bengal Tiger, Asiatic Elephant, Kalij Pheasant and King Cobra. Due to its rich biodiversity, Uttarakhand has designated 12% of its total geographical area as protected areas. These include 6 national parks, 7 wildlife sanctuaries, 4 conservation reserves and 1 biosphere reserve. The state is home to several rare species of plants and animals, many of which are safeguarded within these protected areas. Uttarakhand is endowed with a rich and diverse floral heritage, encompassing many species of both national and global importance. The state is home to approximately 1,608 species of medicinal and aromatic plants, which has earned it the distinguished title of the 'Herbal State.'

6 FOREST CARBON STOCKS

The total carbon stocks of forest in the State (including the tree outside forest patches which are more than 1 ha in size) is 376.61 million tonnes which is 5.16% of total forest carbon stocks of the country. Pool wise forest carbon stocks and pool wise carbon density of the forests of the Uttarakhand are given in Table 7.

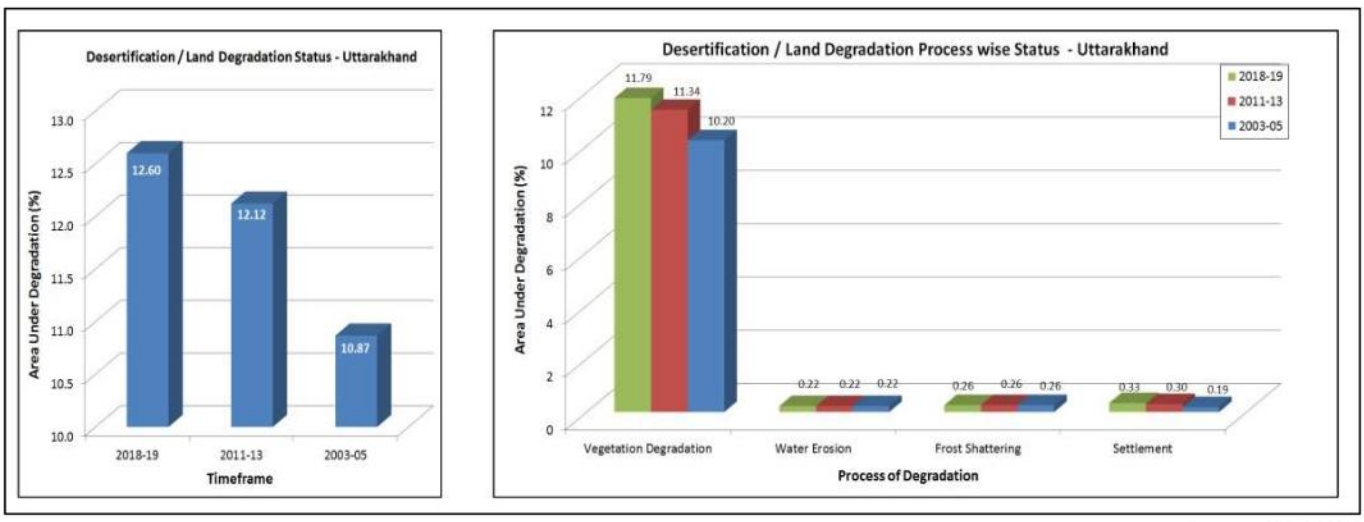
Table 7: Forest Carbon stocks in Uttarakhand

Area (sq km)	Forest Carbon Stocks (in thousand tonnes)					
	Above Ground Biomass	Below Ground Biomass	Dead wood	Litter	Soil Organic Carbon	Total
24442	1,59,353	42,777	1416	4,749	1,68,317	3,76,612
	Forest Carbon Stocks Density (t/ha)					
	65.57	17.60	0.58	1.95	69.26	154.96

Source: FSI, 2024

7 LAND DEGRADATION, DESERTIFICATION AND DROUGHT

The 'Desertification and Land Degradation Atlas of India' highlighted that Uttarakhand state is experiencing significant land degradation. An analysis of land degradation in the state of Uttarakhand indicates that 12.60% of the state's total geographical area (approximately 673,894 ha) was affected by desertification and land degradation during 2018-19. This marks a gradual increase from 12.12% (648,253 ha) in 2011-13 and 10.87% (581,241 ha) in 2003- 05. Vegetal degradation was reported as a main degradation process in the state (SAC, 2021) as depicted in Fig. 2.



Source: SAC, 2021

Fig. 2: Status of desertification and land degradation in Uttarakhand

The primary causes of land degradation in Uttarakhand include deforestation, unsustainable agricultural practices such as over-cultivation and overgrazing, mining activities, steep slopes, fragile geological formations, heavy rainfall and soil erosion. These factors collectively make the region highly susceptible to landslides and other natural disasters.

8 FOREST FIRES

Forest fires have become a recurring and serious environmental challenge in Uttarakhand. The state, known for its rich and diverse forest ecosystems, faces significant ecological and economic losses due to the increasing frequency and intensity of the forest fires. Forest fires lead to the large-scale destruction of vegetation, which in turn results in substantial habitat loss for numerous wildlife species. Many of these species are either endemic to the region or classified as endangered. This loss of habitat contributes to a decline in biodiversity, pushing several species toward local extinction and disrupting the ecological balance of forest ecosystems. In addition to the destruction of plant life, forest fires severely degrade soil quality. The combustion of organic matter and leaf litter, which are crucial for maintaining soil fertility, leaves the soil exposed and vulnerable. Without this protective cover, the soil is easily eroded by rainfall, leading to further land degradation and the silting of nearby rivers and streams. The economic impact of forest fires is equally significant. Fires result in the loss of valuable timber and Non-Wood Forest Products, including medicinal plants, resin and fodder. This affects the livelihoods of local communities dependent on forest resources and undermines the forest-based economy of the state. Number of Forest Fire detected in Uttarakhand during the year 2022-23 and 2023-24 is given in Table 8.

Table 8: Number of Forest Fire detected in Uttarakhand during the year 2022-23 and 2023-24

S. No.	District	SNPP-VIIRS Detection during 2022 -23	SNPP-VIIRS Detection during 2023 -24
1.	Almora	786	2810
2.	Bageshwar	321	805
3.	Chamoli	330	1,331
4.	Champawat	470	1,782
5.	Dehradun	230	705
6.	Pauri Garhwal	928	3,193
7.	Haridwar	99	59
8.	Nainital	570	3,320
9.	Pithoragarh	785	1,204
10.	Rudraprayag	70	489
11	Tehri Garhwal	310	2,589
12.	Udham Singh Nagar	128	289
13.	Uttarkashi	324	2457
	Total	**5,351**	**21,033**

Source: FSI, 2024

9 PROGRAMMES/ PROJECTS ADDRESSING THE FOREST DEGRADATION

Uttarakhand faces the challenge of forest degradation due to various factors such as landslides, forest fires and other anthropogenic pressures. Van Panchayat, a unique community-based forest governance model that has existed in Uttarakhand for decades. Van Panchayats are local forest councils of the villagers that manage forest lands collectively. They regulate the use of forest produce, prevent over-exploitation and undertake reforestation activities. This system has been particularly effective in mountainous regions where community ownership fosters a deep sense of responsibility towards forest conservation. To restore degraded forest areas, the state also actively implements the Compensatory Afforestation Programme, which mandates afforestation activities to offset the loss of forest land due to developmental projects like roads and dams. Alongside this, the National Afforestation Programme aims to improve forest ecosystems while also supporting the livelihoods of forest-dependent communities by involving them in afforestation and forest management activities.

Uttarakhand's fragile mountain ecosystem is highly susceptible to soil erosion, which accelerates forest degradation. To address this, the state has invested in extensive soil and water conservation projects. These include constructing check dams, contour trenches and gully plugs to reduce runoff and increase water retention. Such measures are not only preventing soil loss but also promote better growth conditions for plants. The state also recognizes the threat posed by frequent forest fires, which can rapidly degrade large forest areas. To counter this, forest fire management programmes have been introduced that include creating fire lines, deploying early warning systems and training community fire-watch groups. These efforts have helped mitigate the incidence and impact of forest fires in vulnerable regions.

In Uttarakhand, key projects and programs aimed at addressing forest land degradation are Uttarakhand Forest Resource Management Project, Green India Mission, Swajal Project and initiatives focused on plantation drives through the Eco-task Force, all working to restore degraded forest areas, improve livelihoods, and promote ecological restoration through afforestation and soil conservation measures. Furthermore, under the national framework, Uttarakhand participates in the Green India Mission, a large-scale initiative aimed at enhancing forest and tree cover to improve ecosystem services, biodiversity and carbon sequestration. The mission promotes eco-restoration of degraded forests and sustainable forest management practices, thereby contributing to climate change mitigation. Van Panchayat system empowers local communities to become custodians of their forests, while afforestation, soil conservation and fire management initiatives restore and protect the forests. Together, these efforts not only safeguard Uttarakhand's precious forests but also ensure the well-being of the communities that depend on them, securing ecological and economic benefits for future generations.

10 DEMOGRAPHIC PROFILE

According to the Census of 2011, Uttarakhand had a total population of 10,086,292 with males comprising approximately 51% and females 49%. The state had an average population density of 189 persons per sq km (Table 9). Out of total population of Uttarakhand, 30.23% people live in urban regions. The urban population of Uttarakhand grew by 39.94% between 2001 and 2011 and is projected to continue rising. Despite this growth, approximately 69.77% of the state's total population still resides in rural villages. The overall population growth rate in the state during the decade of 2001–2011 was 18.81%. Population density varied significantly from a high of 817 persons per sq km in Haridwar to a low of 41 persons per sq km in Uttarkashi. Notably, eight districts of the state reported high sex ratios, ranging from 1,021 to 1,147 females per 1,000 males. The literacy rate in Uttarakhand has shown a consistent upward trend, reaching 78.82% according to the 2011 census. Male literacy stood at 87.40%, while female literacy was recorded at 70.01% (Census, 2011).

Table 9: Demographic profile of Uttarakhand

Description	2011
Total Population	10,086,292
Male	5,137,773
Female	4,948,519
Population Growth (decadal)	18.81%
Density/sq km	189

Source: Census, 2011

Migration from the rural regions of Uttarakhand has emerged as a significant and multifaceted challenge. It is primarily driven by economic disparities, declining agricultural productivity and persistently low rural incomes. This ongoing trend of out-migration has wide-ranging implications, not only for the communities directly affected but also for policy making and development interventions across the hill regions of the state. Migration is increasingly recognized as one of the most pressing policy concerns in the state. In several remote areas, entire villages have reportedly been abandoned within short

periods due to mass migration. Beyond employment opportunities, income levels, and access to basic amenities, villagers frequently cite additional concerns such as threats from wild animals, inadequate irrigation and drinking water, poor healthcare and education infrastructure and aspirations for a better lifestyle (Negi, 2018).

The State Government has taken steps to address this challenge through initiatives like the *Veer Chandra Singh Garhwali Swarojgar Yojana*, which promotes self-employment by improving credit access. Other efforts include encouraging sustainable employment in tourism and supporting women entrepreneurs through Self-Help Groups. While these initiatives have created valuable platforms for self-employment, their impact remains constrained by the limited scale of operations and low returns, which affect their long-term sustainability and economic viability.

11 OVERVIEW OF THE STAKEHOLDERS FOR FOREST LANDSCAPE RESTORATION

Forest Landscape Restoration in Uttarakhand involves multiple stakeholders working together to restore degraded forest landscape. The Uttarakhand State Forest Department leads implementation of restoration programmes/ projects and responsible for overall management and conservation of forests. Other State Government Departments of Uttarakhand such as Rural Development, Agriculture, Horticulture, Soil and Water Conservation and Watershed Management are integrating the restoration activities with livelihood schemes. Local communities especially Van Panchayats, Gram Panchayats and indigenous groups play a vital role in managing forests and applying traditional knowledge. Their active participation and application of traditional knowledge ensure that restoration efforts are both community-driven and sustainable, fostering long-term stewardship of forest landscapes.

Non-Governmental Organizations/ civil society organizations play a vital role in facilitating community engagement, capacity building, and on-ground implementation of restoration activities. Research institutions such as the ICFRE-Forest Research Institute, Wildlife Institute of India, and GB Pant National Institute of Himalayan Environment contribute scientific expertise, ecological monitoring and technical guidance to support the restoration of degraded forest landscapes. The private sector, through Corporate Social Responsibility (CSR) initiatives, provides funding and promotes sustainable practices, particularly in eco-tourism and the herbal industry. Additionally, international organizations such as the World Bank, UNDP and JICA offer financial and technical assistance, as well as global partnerships, to scale up FLR efforts in the state of Uttarakhand.

11.1. State Forest Department: The State Forest Department serves as the principal agency for the administration and management of the forest resources including wildlife and biodiversity of the state. It acts as the custodian of all government notified forest areas, ensuring the preservation, development and scientific management of the forest resources of the state. In addition to its core responsibilities, the department functions as the nodal agency for the implementation of forestry and environmental policies, laws and regulations at state level. It is responsible for the planning, promotion, coordination and execution of various projects, programs, and schemes aimed at forest conservation & protection, afforestation, biodiversity conservation and sustainable use of natural resources. The department provides expert technical advice to the State Government on scientific forest management, wildlife conservation and environmental protection. It also plays a key role in facilitating developmental initiatives across the state by guiding the legal allocation and use of forest land for public infrastructure and welfare projects while ensuring environmental compliance.

Forestry has undergone significant transformation globally, necessitating that personnel at all levels particularly the frontline staff of State Forest Departments are adequately equipped to adapt to evolving management practices. There is a pressing need to build capacity in emerging and critical areas such as Forest Landscape Restoration, Forest Carbon Stock Assessment, Spring-shed Management and Climate Change Adaptation and mitigation. To effectively address the capacity gaps, it is essential to identify the specific training areas and the target personnel. This underscores the importance of conducting a comprehensive Training Needs Assessment for frontline forestry staff.

11.2. Other Line Departments: The Uttarakhand State Forest Department is the primary agency directly responsible for implementing Forest Landscape Restoration (FLR) activities in the state. FLR is a complex, multi-sectoral effort that involves several government departments beyond the State Forest Department. The Rural Development Department is another key player in FLR, especially through the implementation of programs like MGNREGA which funds activities such as watershed development, soil conservation and plantation drive on community and private lands. These programs contribute directly to improving ecosystem services and restoring degraded landscapes. Similarly, the Agriculture and Horticulture Departments are indirectly involved by promoting agroforestry, crop diversification and plantation of fruit-bearing species, which help reduce the dependency on forests and contribute to restoration through sustainable land management.

Water availability and soil conservation are central to FLR, bringing in the role of the Water Resources and Irrigation Department, which undertakes watershed management, catchment treatment and small-scale irrigation projects. Their work supports the hydrological restoration of landscapes and is crucial for the success of plantations and agroforestry models. The Panchayati Raj Department supports decentralized governance and local participation in restoration activities. Gram Panchayats are key institutions in implementing and monitoring community-based restoration under schemes like MGNREGA.

The Disaster Management Department is increasingly important in FLR due to Uttarakhand's vulnerability to landslides, floods, and forest fires. By promoting ecosystem-based disaster risk reduction, Uttarakhand State Disaster Management Authority aligns its goals with FLR principles. Other departments, such as Animal Husbandry, affect FLR through livestock management and grazing regulation, while the Revenue Department plays a foundational role by maintaining land records and facilitating land tenure clarity, both of which are essential for planning and implementing restoration projects.

Uttarakhand is richly endowed with a diverse range of natural resources, among which water stands out as a vital asset. The development and effective management of water resources play a crucial role in boosting agricultural productivity, supporting rural livelihoods and driving sustainable economic growth. Integrated water resource management is essential for reducing poverty, preserving the environment and ensuring long-term development. The mission of the Irrigation Department of Uttarakhand is to provide efficient and equitable irrigation facilities throughout the state.

11.3. Role of Local Communities in Forest Landscape Restoration: The state of Uttarakhand is blessed with rich forest resources that are crucial for maintaining ecological balance, conserving biodiversity and supporting the livelihoods of the local communities. While State Forest Department play a key role in managing forest resources while the true custodians of the forests are the local communities. For generations, they have protected and conserved the forests, guided by a deep-rooted relationship with nature shaped by tradition, culture and necessity. This enduring connection has made community participation a cornerstone of forest conservation efforts in the state of Uttarakhand. One of the most significant examples of community-led forest conservation in Uttarakhand is the Van Panchayat system. Van Panchayat is a unique system of community forest governance exists only in the state of Uttarakhand. The scientific management of forests in the region began in 1815, following the establishment of British rule over much of Uttarakhand. In 1823, British administrator Mr. G.N. Traill and Mr. George William demarcated village boundaries within which villagers were allowed to exercise customary forest rights, such as grazing, lopping, and collecting firewood. This arrangement is known as the 'Saal Assi Settlement' *i.e.* settlement of 1880 Vikram Samvat. Recognizing the significance of community involvement in forest management, the British administration enacted the Van Panchayat Act in 1931 under Section 28(2) of the Indian Forest Act, 1927. This legislation empowered villages to form Van Panchayats with the authority to regulate access to forest resources, distribute those resources equitably, monitor forest use, penalize violations and manage income for forest welfare. The Van Panchayat system was created to reduce villagers' dependency on reserved forests and to mitigate environmental and ecological risks. By involving local communities in sustainable forest management, the system aims to meet daily needs, promote community forestry, and address both current and future environmental challenges. The initiative also seeks to strengthen and conserve Panchayati forests, thereby enhancing the livelihoods and self-reliance of rural populations. Table 10 gives the details of Van Panchayats in Uttarakhand.

Given the critical importance of forests and forest wealth to the development of Uttarakhand, the state government, through its Forest Department, continues to support Van Panchayats. Van Panchayats have been playing vital roles in afforestation, controlling forest fires, preventing encroachment and poaching.

Table 10: Details of Van Panchayats

S. No.	Name of Forest Division	No. of Van Panchayat	Total are a under Van Panchayat (ha)
1	Narendra Nagar Forest Division	482	5734.36
2	Soil Conservation Forest Division, Uttarkashi	93	648.24
3	Tehri Forest Division, New Tehri	237	1922.53
4	Tehri Dam I, Forest Division, New Tehri	388	3106.55
5	Tehri Dam II, Fore st Division Uttarkashi	117	973.67
6	Uttarkashi Forest Division, Uttarkashi	123	1098.57
7	Alaknanda Soil Conservation Division, Gopeshwar	448	106810.8
8	Kedernath Wildlife Division	153	13957.43
9	Badrinath Forest Division, Gopeshwar	156	22419.96
10	Civil Soyam Forest Division, Pauri	1033	13830.32
11	Garhwal Forest Division, Pauri	189	5056.59
12	Rudraprayag Forest Division	505	19106.32
13	Almora Forest Division	592	13135.9
14	Bageshwar Forest Division	825	39348.28
15	Champawat Forest Division	568	22527.36
16	Civil Soyam Forest Division, Almora	609	16869.05
17	Pithoragarh Forest Division	1566	57082.3
18	Dehradun Forest Division	8	188.19
19	Soil Conservation Forest Division, Lansdowne	624	10349.19
20	Soil Conservation Forest Division, Ranikhet	694	15989.16
21	Soil Conservation Forest Division, Nainital	343	21446.94
22	Nainital Forest Division	104	2458.24
23	Soil Conservation Forest Division, Ramnagar	543	15585.09
24	Haldwani Forest Division	12	1770.18
25	Ramnagar Forest Division	34	1480.52
26	Chakrata Forest Division, Kalsi	182	8221.68
27	Mussoorie Forest Division	182	3735.23
28	Tons Forest Division, Purola	119	564.27
29	Upper Yamuna Forest Division, Badkot	184	2554.93
30	Nanda Devi National Park, Joshimath	65	24405.88
31	Govind Pashu Vihar National Park, Purola	39	266.56
	Total	**11217**	**452644.3**

Source: UKSFD, 2023

A landmark movement that brought global attention to the role of local communities mainly women led by Late Smt. Gaura Devi in forest conservation is the *Chipko Andolan* of the 1970s. This movement highlighted the ecological and social consequences of deforestation in Garhwal Himalaya. It underscored the fact that forests are not merely timber resources but are central to the lives, culture, and survival of mountain communities. In addition to organized movements, traditional ecological knowledge has played a significant role in forest conservation. Communities in Uttarakhand have long practiced

sustainable harvesting of forest products, rotational grazing, and selective cutting. Certain forest patches are preserved as sacred groves, protected due to religious beliefs and taboos, which serve as natural sanctuaries for flora and fauna. Women play a crucial role in forest conservation. Being the primary collectors of firewood, fodder, and water, they are directly affected by the health of the forest. Women's groups such as Mahila Mangal Dals actively engage in patrolling forests, organizing awareness campaigns, and participating in afforestation drives. Their involvement ensures that forest policies address the practical needs of the community and promote long-term sustainability. Strengthening and supporting these community-driven efforts is not only essential for ecological preservation but also for sustaining the social and economic fabric of the region.

12 BACKGROUND OF RECAP4NDC PROJECT

'Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) Project' contributes to the Joint Declaration of Intent on FLR between the Indian and the German Governments. RECAP4NDC, an Indo-German project is funded by the International Climate Initiative (IKI) of the German Federal Government, with direct commissioning by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection.

To reduce the pressure on existing forests, to meet the increasing demand of forest produces and to achieve national targets and international commitments, some transformative actions need to be taken for restoration of degraded forest landscape. Forest and tree cover can be increased significantly by taking up plantation and afforestation outside the forests, and restoration of degraded forests and scrub forests. Agroforestry, farm forestry and urban forestry can help in increasing tree cover of the country.

Implementation challenges, access of funds, monitoring, reporting and verification, and knowledge sharing are some of the gaps that exist in restoration of degraded forest landscape and which can be addressed by building the capacities, sharing of knowledge and leveraging stakeholder interest which translates policy goals into action.

The project is being implemented in the selected landscapes in the states of Delhi and National Capital Region, Uttarakhand, Maharashtra and Gujarat. RECAP4NDC project empowering the stakeholders to effectively plan, finance, implement and monitor initiatives related to forest landscape restoration in project area.

Consortium Partners: The project is being implemented by six consortium partners comprising of GIZ (as the consortium lead), International Union for the Conservation of Nature (IUCN), Forest Survey of India (FSI), The Energy and Resources Institute (TERI), Indian Council for Forestry Research and Education (ICFRE) and International Centre for Integrated Mountain Development (ICIMOD).

Project Goal: To contribute to India's forestry NDC target, National Forest Policy 1988 target, Bonn Challenge target and the National Action Plan for Climate Change by improving degraded forest landscapes, livelihoods and ecosystem services.

Project Outcome: Stakeholders at national, regional and local levels benefit from forest landscape restoration through improved ecological integrity, enhanced socio-economic opportunities, strengthened governance systems and increased resilience to climate change. Project outcome will be achieved through the following five outputs:

I. FLR Model Implementation: This output aim to provide technical assistance to implement different FLR approaches in selected model sites.

II. Monitoring, Evaluation and Reporting: Integrated systems for monitoring, evaluation and reporting of ecological and socio-economic benefits of FLR aims at establishing and using integrated systems for monitoring, evaluation and reporting of climate, ecological and socio-economic benefits.

III. Financing FLR: Models and tools for financing FLR from private, public and international sources for piloting and upscaling.

IV. Policies and guidelines for FLR are anchored in existing policy and planning processes: It aims to anchor FLR in existing policy and planning processes.

V. Capacities, Knowledge and Communication: It aims to transfer knowledge and capacitate national and international stakeholder groups. Capacity development includes trainings, induction courses/curricula development on FLR for public staff across different sectors and levels. ICFRE is mainly responsible for execution of the activities pertaining to Output V of the project along with ICIMOD and GIZ.

Objectives of Output V:

- To build the capacities of the local, national and international stakeholders on FLR through conducting trainings, induction courses, curricula development on gender responsive FLR for public staff across different sectors and levels.
- To develop suitable mechanism for sharing of knowledge on FLR and its topics.
- To develop suitable mechanism for communicating the messages on FLR and its topics.
- Efforts are being made to work extensively with premier forestry institutions such as Indira Gandhi National Forest Academy, Central Academy for State Forest Services, Centre of Excellence on Sustainable Land Management, Forest Research Institute (Deemed to be University) etc. on FLR and its topics.

Capacity building of the state of Delhi and National Capital Region, Uttarakhand, Maharashtra and Gujarat actors is being undertaken based on training need assessment. Capacity building and knowledge sharing provide an excellent opportunity to all the stakeholders for enhancing their knowledge base and upgrading their skills on various aspects of FLR for climate change mitigation and adaptation. Development of capacities, knowledge sharing and communication mechanisms is one of the key outputs for successful implementation of the RECAP4NDC project. This output includes community empowerment and concrete community action for on-ground activities pursued in cooperation with Gram Panchayats, Van Panchayats, Forest Development Committees, Biodiversity Management Committee, Resident Welfare Associations and CSOs/ NGOs.

13 LANDSCAPES SELECTED FOR IMPLEMENTATION OF INTERVENTIONS OF RECAP4NDC PROJECT

Since the formation of Uttarakhand in 2000, significant changes in land use and land cover driven primarily by urbanization and agricultural expansion have contributed to land degradation. Soil erosion mapping has been instrumental in identifying areas vulnerable to erosion, enabling a better understanding of the underlying causes and informing the implementation of effective soil conservation measures. Forest fires also play a major role in land degradation by destroying vegetation cover, increasing soil erosion, and reducing biodiversity. In addition, topographic factors such as slope, aspect, and elevation significantly influence erosion processes, water runoff, and vegetation distribution. Steeper slopes are especially prone to erosion, while aspect affects local microclimates and plant growth. Socio-economic factors further exacerbate land degradation. High population density can lead to overexploitation of land resources, while poverty often compels communities to engage in unsustainable land use practices.

The RECAP4NDC project has employed advanced geospatial techniques and multi-criteria decision analysis, complemented by extensive field validation and stakeholder engagement, to identify and prioritize over 30,000 hectares of potential restoration areas. This comprehensive approach serves as a model for addressing land degradation at scale, aligning restoration efforts with both ecological priorities and community resilience. The two landscapes that have been selected for intervention are:

- **Landscape: 1**: 15,131 hectares across Almora, Bageshwar and Pithoragarh District in the Kumaon region (Table 11 & 12).
- **Landscape: 2**: 15,115 hectares in Pauri Garhwal and Tehri Garhwal District in Garhwal region (Table 13 and 14).

Table 11: Details of intervention areas in Landscape-1

District	Forest Division	Forest Range	Intervention Area (in ha.)
Almora	Almora	Almora	9269
		Jageshwar	6
		North Gola	9
		Ranikhet	720
		Someshwar	1892
	Civil & Soyam Almora	Almora	483
		Jageshwar	544
		Kanarichina	86
		Kosi	112
Bageshwar	Bageshwar	Bageshwar	1002
		Baijnath	59
		Garhkhet	41
Pithoragarh	Pithoragarh	Gangolihat	908
		Total	**15131**

Source: IORA, 2024

Table 12: District and Tehsil-wise intervention areas and number of villages in Landscape-1

District (Intervention Area)	Tehsil	Number of Villages	Intervention Area (ha.)
Almora (13121ha)	Almora	284	10623
	Bhanauli	35	1192
	Ranikhet	6	157
	Someshwar	62	1149
Bageshwar (1102ha)	Bageshwar	30	339
	Kaligari	24	763
Pithoragarh (908 ha)	Gangolihat	48	908
	Total	**496**	**15131**

Source: IORA, 2024

Table 13: Details of intervention areas in Landscape-2

District	Forest Division	Forest Range	Intervention Area (ha)
Pauri Garhwal	Lansdowne	Dugadda	2690.00
		Kotdwar	2923.00
		Laldhang	3874.00
		Lansdowne	3548.00
Tehri Garhwal	Narendranagar	Maniknath Dangchura	668.00
		Saklana Chamba	104.00
		Shivpuri	615.00
	Tehri	Tehri	693.00
		Total	**15115.00**

Source: IORA, 2024

Table 14: District and Tehsil-wise intervention areas and number of villages in Landscape-2

District (Intervention Area)	Tehsil	Number of Villages	Intervention Area (ha)
Pauri Garhwal (13035 ha)	Kotdwar	167	7984.00
	Lansdowne	35	663.00
	Yamkeshwar	156	4364.00
	Satpuli	4	24.00
Tehri Garhwal (2080 ha)	Devprayag	31	477.00
	Narendranagar	87	1603.00
Total		**454**	**15115.00**

14 TRAINING NEEDS ASSESSMENT AND ITS OBJECTIVES

Forest Landscape Restoration (FLR) is a holistic, long-term strategy focused on restoring ecological functionality and improving human well-being across degraded and deforested landscapes. To support the Uttarakhand State Forest Department and other stakeholders in effectively implementing FLR initiatives, it is essential to conduct a comprehensive training need assessment (TNA). The TNA identifies knowledge and capacity gaps among officers and staff at various levels and local community members involved in planning, implementing and monitoring FLR interventions. TNA informs the development of targeted training programs tailored to address capacity gaps, local challenges and align with national priorities and international commitments related to forest, climate change, biodiversity conservation, land restoration and the Sustainable Development Goals.

Given that FLR requires cross-sectoral coordination—spanning Agriculture, Water Management, Rural Development, Irrigation and Soil and Water conservation—the Forest Department staff must be skilled in policy integration and collaborative planning. A well-executed TNA supports the creation of focused, need-driven training modules that build the capacities of all stakeholders, ultimately fostering more resilient and sustainable forest landscapes.

The implementation of FLR interventions requires effective cross-sectoral coordination among key departments and stakeholders to ensure policy integration and collaborative planning. Conducting a thorough TNA facilitates the creation of targeted, need-based training modules that strengthen the capacities of all involved stakeholders, thereby fostering more resilient and sustainable forest landscapes. The primary objective of TNA is to pinpoint specific knowledge and capacity gaps related to FLR among all relevant stakeholders. These insights will guide the design of targeted training modules to strengthen the capacities of the relevant stakeholders for the successful implementation of FLR programs and projects, contributing to national targets and international commitments related to forests and environment. Based on the findings of the TNA, customized training modules on FLR and related topics to be developed under the RECAP4NDC Project. These modules are designed to enhance the capacity of the Uttarakhand State Forest Department, allied line departments and local communities.

15 METHODOLOGY OF TRAINING NEEDS ASSESSMENT

15.1. Training Needs Assessment for State Forest Department and Other Line Departments:

Primary data for the study was collected through field surveys employing a structured questionnaire. The questionnaire included a limited number of close-ended questions and was administered to a targeted group of respondents comprising officers and staff of the State Forest Department and Other Line Departments of Uttarakhand. To ensure representative coverage and to effectively assess training and capacity-building needs, one territorial Forest Division was selected at

random from each Forest Circle within the state of Uttarakhand. This approach allowed for the collection of diverse inputs across different Forest Divisions of the state. The Forest Divisions selected randomly for conducting training need assessment surveys are listed in the Table 15.

Table 15: Forest Divisions selected for Training Need Assessment surveys

S. No.	Forest Circle	Number of Forest Divisions	Forest Division Selected for TNA	Minimum Number of Samples Surveyed
1.	Bhagirathi	06	Narendra Nagar	20
2.	Yamuna	04	Upper Yamuna Barkot	20
3.	Garhwal	05	Garhwal	20
4.	Shivalik	05	Soil Conservation Division, Lansdowne	20
5.	North Kumaon	05	Almora	20
6.	Western	05	Ramnagar	20
7.	South Kumaon	04	Nainital	20
	Total	**34**	**Total**	**140**

A structured and systematic approach was undertaken to conduct the Training Needs Assessment in the State of Uttarakhand. As a key preparatory step, separate and customized questionnaires were developed for three major stakeholder groups: Officers (Forest Range Officer and above) of the State Forest Department, Frontline Staff (Forest Guard to Dy. Rangers) of the State Forest Department and Officers and Staff of Other Line Departments. These tailored questionnaires were designed to ensure contextual relevance for each group and to facilitate meaningful comparisons of training needs across categories. To ensure representativeness, respondents from each stakeholder group were selected through a random sampling process. This method was employed to minimize selection bias and to ensure that the survey findings reflected a diverse and balanced range of perspectives across departments and functional levels.

The questionnaire designed for Officers of the State Forest Department aimed to collect comprehensive information on their understanding of FLR topics. It sought details on the types of FLR-related trainings they had previously attended, as well as the current schemes or projects being implemented in the State. Additionally, the questionnaire explored the restoration practices currently in use for degraded forest landscapes, the most effective knowledge products for knowledge sharing on FLR information and their preferences pertaining to modes of training, timing and duration of capacity-building initiatives (Annexure 1). The questionnaire for the frontline staff of the State Forest Department was designed to gather information on their familiarity with Forest Landscape Restoration (FLR) topics, participation in relevant trainings, current restoration practices, and the knowledge products they found most effective for learning and knowledge sharing. It also explored their preferred training methods, as well as suitable timings and durations for such sessions (Annexure 2). The questionnaire for officers and staff of Other Line Departments was designed to assess their awareness and understanding of FLR, assess their department's involvement in FLR-related activities and document the restoration practices currently being followed. It also explored their preferred training methods, as well as suitable timings and durations for such sessions (Annexure 3).

Primary data from the selected Forest Divisions and Districts of the state were collected during June and July 2024. Data on training needs assessment were also collected from officers at the headquarters of the Uttarakhand State Forest Department. To validate and enrich the survey findings, follow-up discussions were conducted with selected respondents. These consultations served to clarify responses, elicit deeper insights and facilitate qualitative interpretation. This comprehensive approach enhanced the overall analysis, ensuring that the identified training needs accurately reflected on-the-ground realities. The details of respondents of TNA surveys are given in Table 16.

Table 16: Details of respondents of State Forest Department and Other Line Departments

Name of Division/ Office	Number of Respondents							
	State Forest Department					Other Line Departments		
	Officers	Frontline Staff	Male	Female	Total	Male	Female	Total
Ramnagar	06	37	32	11	43	10	-	10
Almora	05	23	17	11	28	08	05	13
Nainital	02	22	15	09	24	07	-	07
Garhwal	04	17	15	06	21	06	01	07
Narendra Nagar	03	28	27	04	31	09	03	12
Lansdowne Soil Conservation	02	-	01	01	02	-	-	-
Upper Yamuna Barkot	03	24	23	04	27	03	03	06
Forest Department Head Quarters	04	-	03	01	04			
Total	**29**	**151**	**133**	**47**	**180**	**55**	**43**	**12**

15.2. Training Needs Assessment for Local Communities:

Local communities in Uttarakhand constitute a critical stakeholder group in the implementation and long-term success of forest landscape restoration initiatives. Given their continuous interaction with the landscape, community members possess context-specific knowledge of environmental conditions, livelihood challenges and resource management practices. Engaging these communities is therefore essential for the co-development of effective, locally grounded capacity-building strategies. To systematically capture community perspectives, a mixed-methods approach was employed, incorporating Focus Group Discussions and structured questionnaire-based surveys across selected FLR landscapes in Uttarakhand. These participatory tools facilitated the collection of both qualitative and quantitative data, enabling community members to articulate their lived experiences, express their training needs, and outline their aspirations related to skill enhancement. The survey instrument (Annexure 4) was designed to evaluate both existing knowledge and practical competencies, while also identifying areas where targeted training is required. The assessment focused on key thematic areas including sustainable farming practices, animal husbandry, soil and water conservation, and environmental awareness. Respondents were asked to rate their self-perceived proficiency in each area and to specify any recurrent challenges they face in applying these skills within their local context.

Forest landscape restoration intervention areas have been delineated across two primary landscapes in Uttarakhand. Landscape 1 comprises 496 villages located in the districts of Almora, Bageshwar and Pithoragarh, while Landscape 2 includes 454 villages from the districts of Pauri Garhwal and Tehri Garhwal. This brings the total number of intervention villages to 950. To determine an appropriate sample size for field-based assessments and stakeholder consultations, Cochran's sample size formula (Cochran, 1963; 1977) was applied. Using a 90% confidence level and a 15% margin of error, the minimum required sample size was calculated to be 29 villages. This sample size ensures statistically reliable representation of the total village population across both landscapes within the specified confidence parameters. Number of villages selected for TNA surveys in the selected Landscapes are given in Table 17.

Table 17: Distribution of villages in the Intervention Landscape

S. No.	Intervention Landscape	District	Area (ha)	Number of Villages	Number of Sample Villages
1.	Landscape -1	Almora, Bageshwar, Pithoragarh	15131.00	496	14
2.	Landscape -2	Pauri Garhwal, Tehri Garhwal	15115.00	454	15
		Total		**950**	**29**

Administrative details of the villages selected for conducting TNA in both Landscapes are given in the Table 18. Demographic details of the villages selected are given in the Table 19.

Table 18: List of villages surveyed for TNA

S. No.	District	Sub District/ Tehsil	Village	Block	Gram Panchayat
1	Almora	Almora	Chhana	Hawal Bagh	Bangsar
2	Almora	Almora	Dhamas	Hawal Bagh	Dhamas
3	Almora	Almora	Dotiyal Gaon	Takula	Dotiyal Gaon
4	Almora	Almora	Hawal Bagh	Hawal Bagh	Hawalbag Bajar
5	Almora	Almora	Kandey	Takula	Kandey
6	Almora	Almora	Katarmal	Hawal Bagh	Katarmal gunth
7	Almora	Bhanauli	Budhmanya	Dhaula Devi	Nathal
8	Almora	Bhikiyasain	Sunoli	Syaldey	Sunoli
9	Almora	Ranikhet	Vabur Khola	Dwarahat	Vabur Khola
10	Almora	Someshwar	Bhaisargaon	Takula	Bhaisargaon
11	Almora	Someshwar	Darim Khola	Hawal Bagh	Darim Khola
12	Bageshwar	Bageshwar	Bohala	Bageshwar	Bohala
13	Bageshwar	Bageshwar	Raikholi	Bageshwar	Raikholi
14	Pithoragarh	Gangolihat	Pasdeo	Gangolihat	Pasdeo
15	Pauri Garhwal	Lansdowne	Khendori	Dwarikhal	Khendori
16	Pauri Garhwal	Satpuli	Kotal Manda	Dwarikhal	Kotal Manda
17	Pauri Garhwal	Kotdwara	Balli	Dwarikhal	Balli
18	Pauri Garhwal	Kotdwara	Boantha	Dwarikhal	Boantha
19	Pauri Garhwal	Kotdwara	Mohani Rawat	Dugadda	Mohani Rawat
20	Pauri Garhwal	Kotdwara	Kafaldi	Dugadda	Ladokhi
21	Pauri Garhwal	Kotdwara	Balli	Dugadda	Balli
22	Pauri Garhwal	Yamkeshwar	Maral/ Malli Talai	Yamkeshwar	Maral
23	Pauri Garhwal	Yamkeshwar	Amari Malli	Yamkeshwar	Amari
24	Pauri Garhwal	Yamkeshwar	Bastola	Yamkeshwar	Diyuli
25	Pauri Garhwal	Yamkeshwar	Jogiyana	Yamkeshwar	Jogiyana
26	Pauri Garhwal	Yamkeshwar	Khera Talla	Yamkeshwar	Khera talla
27	Tehri Garhwal	Devprayag	Bachheli Khal	Devprayag	Bachheli Khal
28	Tehri Garhwal	Narendranagar	Neer	Narendranagar	Neer
29	Tehri Garhwal	Narendranagar	Bawani	Narendranagar	Bawani

The spatial distribution of the villages selected for conducting TNA surveys for the local communities of Uttarakhand is given in Fig. 3.

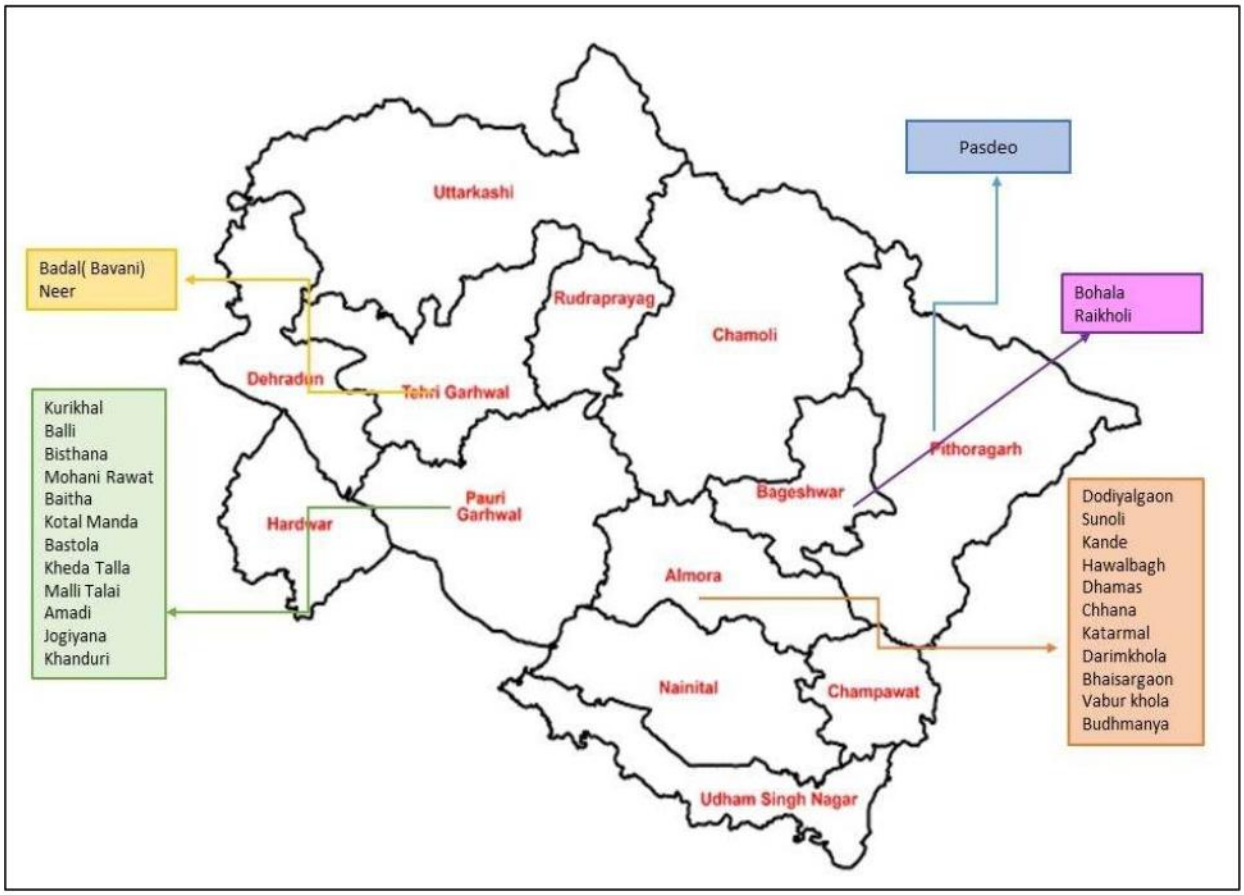


Fig. 3: Spatial distribution of villages selected for TNA

Table 19: Demographic details of the villages selected for TNA

S. No.	District	Tehsil	Village	TGA (in ha)	Total Households	Total Population
1	Almora	Almora	Chhana	40.93	15	74
2	Almora	Almora	Dhamas	327.93	279	1249
3	Almora	Almora	Dotiyal Gaon	394.53	205	860
4	Almora	Almora	Hawal Bagh	1.46	21	95
5	Almora	Almora	Kandey	195.85	198	930
6	Almora	Almora	Katarmal	326.34	157	633
7	Almora	Bhanauli	Budhmanya	69.01	23	92
8	Almora	Bhikiyasain	Sunoli	193.13	50	203
9	Almora	Ranikhet	Vabur Khola	142.96	94	422
10	Almora	Someshwar	Bhaisargaon	100.06	105	454
11	Almora	Someshwar	Darim Khola	75.78	83	338
12	Bageshwar	Bageshwar	Bohala	479.73	181	784
13	Bageshwar	Bageshwar	Raikholi	91.35	95	396

14	Pithoragarh	Gangolihat	Pasdeo	54.26	33	115
15	Pauri Garhwal	Lansdowne	Khendori	191.58	53	212
16	Pauri Garhwal	Satpuli	Kotal Manda	60.4	61	306
17	Pauri Garhwal	Kotdwara	Balli	60.79	43	172
18	Pauri Garhwal	Kotdwara	Boantha	34.3	89	338
19	Pauri Garhwal	Kotdwara	Mohani Rawat	90.37	47	186
20	Pauri Garhwal	Kotdwara	Kafaldi	350.35	27	109
21	Pauri Garhwal	Kotdwara	Balli	215.25	150	590
22	Pauri Garhwal	Yamkeshwar	Maral	347.89	272	1380
23	Pauri Garhwal	Yamkeshwar	Amari Malli	55.75	27	97
24	Pauri Garhwal	Yamkeshwar	Bastola	27.02	13	73
25	Pauri Garhwal	Yamkeshwar	Jogiyana	448.87	95	383
26	Pauri Garhwal	Yamkeshwar	Khera Talla	289.05	51	195
27	Tehri Garhwal	Devprayag	Bachheli Khal	88.94	53	223
28	Tehri Garhwal	Narendranagar	Neer	202.48	96	478
29	Tehri Garhwal	Narendranagar	Bawani	264.07	216	1093
			Total	**5220.43**	**2832**	**12480**

Field surveys of the selected villages under the Landscape-1 and Landscape-2 were conducted in the months of February and March 2025 for collection of the data on Training Need Assessment. The details of the respondents surveyed for TNA are given in the Table 20 and 21.

Table 20: Details of the respondents surveyed for TNA in the selected villages of Landscape-1

S. No.	Village	Tehsil	District	Respondents		
				Male	Female	Total
1	Dodiyalgaon	Almora	Almora	10	6	16
2	Sunoli	Almora	Almora	12	10	22
3	Kandey	Almora	Almora	15	-	15
4	Hawalbagh	Almora	Almora	16	17	33
5	Dhamas	Almora	Almora	20	1	21
6	Chhana	Almora	Almora	4	8	12
7	Katarmal	Almora	Almora	7	18	25
8	Darimkhola	Someshwar	Almora	14	11	25
9	Bhaisargaon	Someshwar	Almora	16	12	28
10	Vabur khola	Ranikhet	Almora	8	12	20
11	Budhmanya	Bhanauli	Almora	20	3	23
12	Bohala	Kafligar	Bageshwar	7	5	12
13	Raikholi	Bageshwar	Bageshwar	12	6	18
14	Pasdeo	Ganai	Pithoragarh	14	17	31
			Total	**175**	**126**	**301**

Table 21: Details of the respondents surveyed for TNA in the selected villages of Landscape-2

S. No.	Village	Tehsil	District	Respondents		
				Male	Female	Total
1	Kurikhal	Kotdwar	Pauri Garhwal	17	8	25
2	Balli	Kotdwar	Pauri Garhwal	13	5	18
3	Bisthana	Kotdwar	Pauri Garhwal	12	4	16
4	Mohani Rawat	Kotdwar	Pauri Garhwal	5	5	10
5	Baitha (Dadamandi)	Kotdwar	Pauri Garhwal	18	-	18
6	KotalManda	Satpuli	Pauri Garhwal	4	12	16
7	Bastola	Yamkeshwar	Pauri Garhwal	8	8	16
8	Kheda Talla	Yamkeshwar	Pauri Garhwal	6	18	24
9	Malli Tallai (Maral)	Yamkeshwar	Pauri Garhwal	12	-	12
10	Amadi	Yamkeshwar	Pauri Garhwal	7	6	13
11	Jogiyana	Yamkeshwar	Pauri Garhwal	1	16	17
12	Khanduri	Lansdowne	Pauri Garhwal	3	14	17
13	Bachheli	Devprayag	Tehri Garhwal	20	7	27
14	Badal (Bawani)	Narendranagar	Tehri Garhwal	14	3	17
15	Neer	Narendranagar	Tehri Garhwal	15	5	20
			Total	**155**	**111**	**266**

The representation of male and female respondents in the Focus Group Discussions for conducting TNA in the villages under the Landscape-1 and Landscape-2 are summarised in Table 22.

Table 22: Representation of male and female respondents in the Focus Group Discussions

S. No.	Landscape/ District	No. of Villages	Total Respondents	Average size of FGD	No. of Male Respondents (%)	No. of Female Respondents (%)
1	Landscape 1: Almora, Bageshwar, Pithoragarh	14	301	21	175	126
2	Landscape 2: Pauri Garhwal, Tehri Garhwal	15	266	18	155	111
	Total	**29**	**567**	**20**	**330 (58.20 %)**	**237 (41.80%)**

16 FINDINGS OF THE TRAINING NEEDS ASSESSMENT

16.1. Familiarity with Forest Landscape Restoration and Related Topics: State Forest Department and Other Line Departments

16.1.1. Officers of State Forest Department

The data analysis revealed significant knowledge gaps among respondents regarding key topics related to Forest Landscape Restoration (Table 23). Nearly 80% of respondents were unfamiliar with Forest Carbon Stock measurement, while 76%

lacked awareness of carbon market mechanisms and funding sources (domestic and international) for forest landscape restoration. Between 64% and 72% of respondents reported limited understanding of the value chain for non-wood forest products, forest certification, REDD+ and Green Credit Programme. Furthermore, approximately 50% of respondents were unaware of critical topics such as Climate Change Mitigation and adaptation, international conventions and agreements related to forests and the environment, India's environmental commitments, Ecosystem Services and their valuation and Gender mainstreaming in Forest management/ Forest Landscape Restoration.

Table 23: Percentage of respondents unfamiliar with topics related to FLR

S. No.	Topics Related to FLR	Unfamiliar (Response s in %)
1	Forest carbon stocks m easurement	80
2	Carbon Market mechanism	76
3	Domestic and International Funding for FLR	76
4	Forest Certification	72
5	Value chain for Non-Wood Forest Products	72
6	REDD+	68
7	Green Credit Programme	64
8	Climate change mitigation and adaptation in forest sector	56
9	International Conventions and Agreement related to Forest and India's commitment	52
10	Valuation of Ecosystem services	52
11	Gender mainstreaming in forest management	52
12	Nature based Solutions/ecosystem-based approaches	48
13	Climate change impact and vulnerability in forest sector	40
14	Springshed management	32
15	Life: Lifestyle for Environment	32
16	Forest Landscape Restoration	20
17	Restoration of degraded forests/landscapes	20
18	Sustainable harvesting of NTFP and their role in livelihood generation	16
19	Sustainable Development Goals	16
20	Legal Framework (Policies, Laws, Regulations) for conservation and protection of forests	08
21	Community Forest Management	08
22	Sustainable Forest Management	04
23	Soil and Water Conservation measures	04
24	Invasive species and their Management	04
25	Forest fire and its management	04
26	Nursery and plantation techniques of forestry species	00
27	Ecotourism	00

As evident from Table 23, the topics related to forest landscape restoration as listed below have been identified and prioritized based on the responses of 40% or more of the respondents, for the purpose of capacity building of the officers of State Forest Department:

- ❖ Forest carbon stocks measurement
- ❖ Climate change mitigation & adaptation in forest sector including climate change impact & vulnerabilities
- ❖ REDD+
- ❖ International Conventions and Agreements related to forest and environment and India's commitments
- ❖ Carbon market for forestry projects
- ❖ Gender mainstreaming in FLR
- ❖ Forest Certification
- ❖ Valuation of ecosystem services
- ❖ Green Credit Programme
- ❖ Nature-based solutions/ ecosystem-based approaches
- ❖ Domestic and international funding for FLR
- ❖ Value chain for Non - Wood Forest Products

16.1.2. Frontline Staff of State Forest Department

The data analysis reveals a significant knowledge gap among respondents regarding key environmental and forestry topics (Table 24). Notably, 95% of respondents are unfamiliar with the mechanisms for measuring forest carbon stocks and India's Nationally Determined Contribution (NDC) targets under the Paris Agreement. Additionally, 75% to 80% lack awareness of foundational topics such as forest landscape restoration (FLR) approaches, the legal and policy frameworks for forest and environmental conservation, Spring-shed management, and Nature-based Solutions. About 50% to 60% are not well-versed in Sustainable Forest Management, Restoration of degraded forests, Biodiversity conservation, Eco-tourism, and Sustainable harvesting of Non-Wood Forest Products and their role in supporting livelihoods. Furthermore, 40% to 50% of respondents lack understanding of Invasive species management and Gender mainstreaming in forest management.

Table 24: Percentage of respondents unfamiliar with topics related to FLR

S. No.	Topics related to FLR	Unfamiliar (Responses in %)
1	Forest carbon stocks measurement	99
2	India's Nationally Determined Contribution Targets under the Paris Agreement	95
3	Forest landscape restoration concept/ approach	81
4	Policies, laws and regulations for conservation of forest biodiversity in India	77
5	Springshed management	76
6	legal framework for conservation and protection of forest and environment in India	75
7	Nature based solutions/ approaches	74
8	Sustainable harvesting of NTFP and their role in livelihood generation	61
9	Restoration of degraded forests	59
10	Village ecotourism	57
11	Sustainable forest management	50
12	Biodiversity conservation	50
13	Invasive species and their management	48
14	Gender mainstreaming in forest management / FLR	48
15	Community forest management (JFMC/ van panc hayat/ BMC/ SHG)	32
16	Soil and water conservation measures	21
17	Nursery and plantation techniques of forestry species	19
18	Forest fire and its management	06

As evident from Table 24, the topics related to FLR as listed below have been identified and prioritized based on the responses of 40% or more of the respondents, for the purpose of capacity building of the Frontline Staff of State Forest Department:

- Forest carbon stocks measurement
- India's Nationally Determined Contribution Targets under Paris Agreement
- Forest landscape restoration concept/ approaches
- Policies, laws and regulations for conservation of forest biodiversity
- Springshed management
- Legal framework for conservation and protection of forest and environment
- Nature-based solutions/ approaches
- Sustainable harvesting of NTFP and their role in livelihood generation
- Restoration of degraded forests
- Village ecotourism
- Sustainable forest management
- Biodiversity conservation
- Invasive species and their management
- Gender mainstreaming in forest management

16.1.3. Officers and Staff of Other Line Departments

Approximately 55 officers and staff from the Departments of Agriculture, Animal Husbandry, Horticulture and Watershed Management representing various districts of Uttarakhand, participated in the Training Needs Assessment surveys. The analysis of the collected data revealed that officers and staff of other line departments are unfamiliar with international agreements and conventions related to the environment, the legal framework for environmental conservation and protection in India, management of invasive species, climate change mitigation and adaptation, Springshed management, and nature-based solution /ecosystem-based approaches for their capacity building (Table 25).

Table 25: Percentage of respondents unfamiliar with topics related to FLR

S. No.	Topics related to FLR	Unfamiliar (Responses in %)
1	International Agreement/ Conventions related to environment	82
2	Legal framework for conservation and protection of Environment in India	77
3	Invasive species and their management	73
4	Climate change mitigation and adaptation	73
5	Springshed management	73
6	Nature-based solution/ ecosystem-based approaches	64
7	Restoration of degraded areas	55
8	Climate change impacts and vulnerability	50
9	Life style for environment	48
10	Eco-tourism	48

11	Sustainable development goals	45
12	Gender mainstreaming in natural resource management	43
13	Disaster management / disaster risk reduction	41
14	Participatory natural resource management	41
15	Sustainable land management	39
16	Sustainable livelihood generation	39
17	Natural resource management	30
18	Agroforestry/ farm forestry/ urban forestry	23
19	Soil and water conservation	05

As evident from Table 25, the topics related to FLR as listed below have been identified and prioritized based on the responses of 40% or more of the respondents, for the purpose of capacity building of the officers and staff of Other Line Department:

- International Agreement/ Conventions related to environment
- Legal framework for conservation and protection of environment
- Invasive Species and their Management
- Climate change mitigation and adaptation
- Springshed management
- Nature-based solution/ecosystem-based approaches
- Restoration of degraded areas
- Climate change impacts and vulnerability
- Mission LiFE (Life Style for Environment)
- Eco-tourism
- Sustainable Development Goals
- Gender mainstreaming in natural resource management
- Disaster management/disaster risk reduction
- Participatory natural resource management

16.1.4. Practices being followed by the State Forest Department for Restoration of Degraded Forests

An analysis of data on the restoration practices employed by the State Forest Department reveals a strong emphasis on several key interventions. These include assisted natural regeneration, enrichment plantations, fencing, construction of check dams, Forest Fire Management, Rainwater harvesting, digging cattle-proof trenches and the control of Invasive species. Similarly, frontline staff highlight assisted natural regeneration, enrichment plantations, fencing, forest fire management, check dams and rainwater harvesting as critical Sustainable Land management practices for restoring degraded forest landscapes. The practices being followed by the State Forest Department for restoration of degraded forest landscape are listed below.

- Assisted natural regeneration practices/ enrichment plantations
- Fencing
- Check dam construction
- Forest fire management
- Rain water harvesting
- Invasive species management

However, following practices are being followed by the by the Other Line Departments for restoration of degraded lands:

- Improved variety of seed distribution
- Organic farming
- Rain water harvesting
- Quality planting materials
- Micro-irrigation
- Agroforestry

16.1.5. Type of Knowledge Products

The analysis of data on preferred knowledge products for disseminating information about the restoration of degraded forest landscapes reveals a clear and consistent preference for video-based materials across all stakeholder groups. Among State Forest Department Officers, approximately 88% identified videos as the most effective format for knowledge sharing. In addition to videos, 60% to 72% of officers also considered e-books/e-manuals, posters, brochures and manuals to be effective tools. Traditional formats such as books, infographics and pamphlets were ranked lower in terms of both preference and perceived effectiveness. A similar pattern is observed among the Frontline Staff of the State Forest Department, with 80% of respondents indicating a preference for videos as the most impactful knowledge product. Additionally, 60% to 67% of Frontline Staff found flyers, pamphlets, manuals and posters to be effective mediums for disseminating information on forest landscape restoration. These preferences highlight a strong inclination toward practical and visually engaging formats among personnel directly involved in field operations. Respondents from other line departments also demonstrated a strong preference for video-based content, with 80% identifying videos as their preferred knowledge product. Furthermore, 60% to 75% of these respondents rated brochures, pamphlets and posters as effective formats for knowledge sharing related to the restoration of degraded landscapes. The results of the analysis of data are given in Table 26.

Overall, the findings clearly indicate that videos are the most widely preferred and potentially effective knowledge product across all key stakeholder groups. While formats such as e-manuals, posters and brochures also hold significant value, more traditional formats like books and infographics are perceived as less effective. These insights suggest the need to prioritize engaging, visual and easily accessible content when designing knowledge dissemination strategies for forest landscape restoration.

Table 26: Preference of knowledge products for knowledge sharing on FLR

S. No.	Type of Knowledge Product	Preference (in %)		
		Officers SFD	Frontline Staff SFD	Other Line Departments
1	Flyer	56	60	45
2	Book	40	39	36
3	Manual	60	62	45
4	Brochure	64	48	60
5	Pamphlets	56	61	71
6	Infographics	48	23	18
7	Videos	88	80	80
8	Posters	68	67	75
9	e-book/e -booklet/e -manual	72	28	40

16.1.6. Modes of Training

The Training Needs Assessment survey also assessed preferred methods for capacity building within the State Forest Department and other Line Departments. The findings revealed a strong preference for in-person training, especially interactive formats such as expert lectures, audio-visual presentations, hands-on exercises, case studies and group activities. These methods were consistently rated as high priorities by officers and frontline staff of State Forest Department and Other Line Departments. In contrast, e-learning was uniformly ranked as a low priority by State Forest Department and Other Line Departments (Fig. 4).

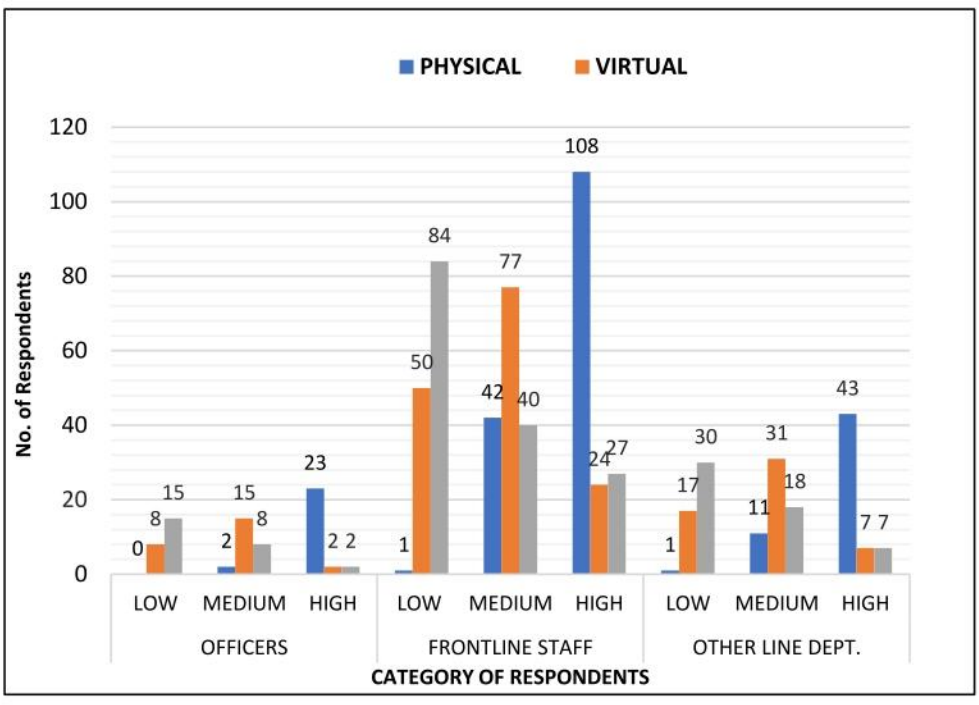


Fig. 4: Preference for mode of training

16.1.7. Suitable Months and Duration for Conducting Training Sessions

Based on the Training Needs Assessment data and subsequent analysis, approximately 60% to 75% of respondents including officers and frontline staff from the State Forest Department, as well as representatives from other line departments expressed a preference for training sessions to be conducted during the months of September, October and

November (Fig. 5). This seasonal trend underscores the importance of aligning capacity-building initiatives on forest landscape restoration and related topics with this preferred timeframe to maximize participation and overall impact.

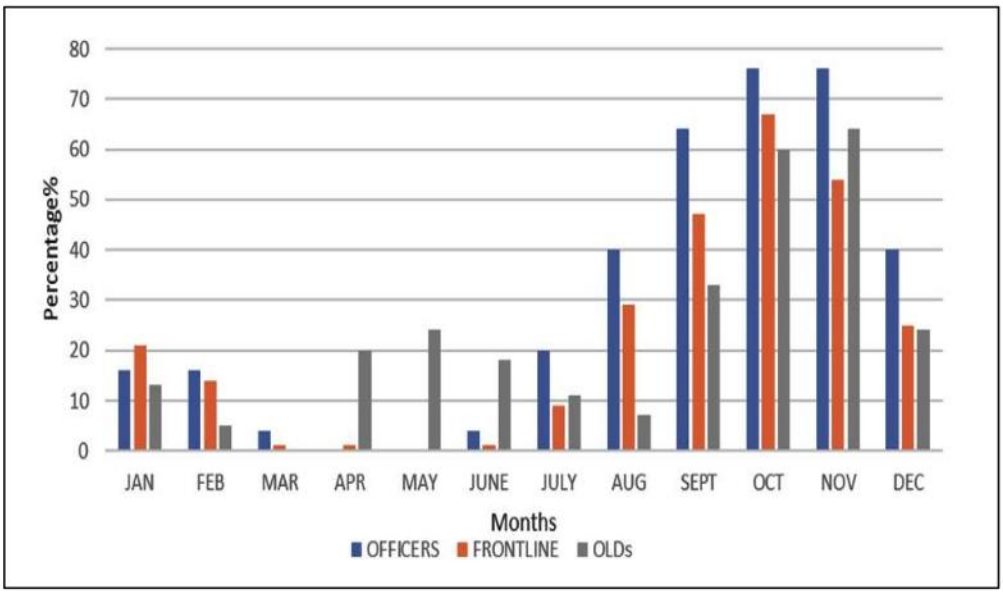


Fig. 5: Preference for suitable month for conducting training sessions

Similarly, with regard to the preferred duration of training, 40% to 48% of respondents from the State Forest Department indicated a preference for either three days or five days duration of training programs. Respondents from other line departments also showed similar inclinations, with approximately 33% to 35% opting for training durations of 3 or 5 days (Fig. 6).

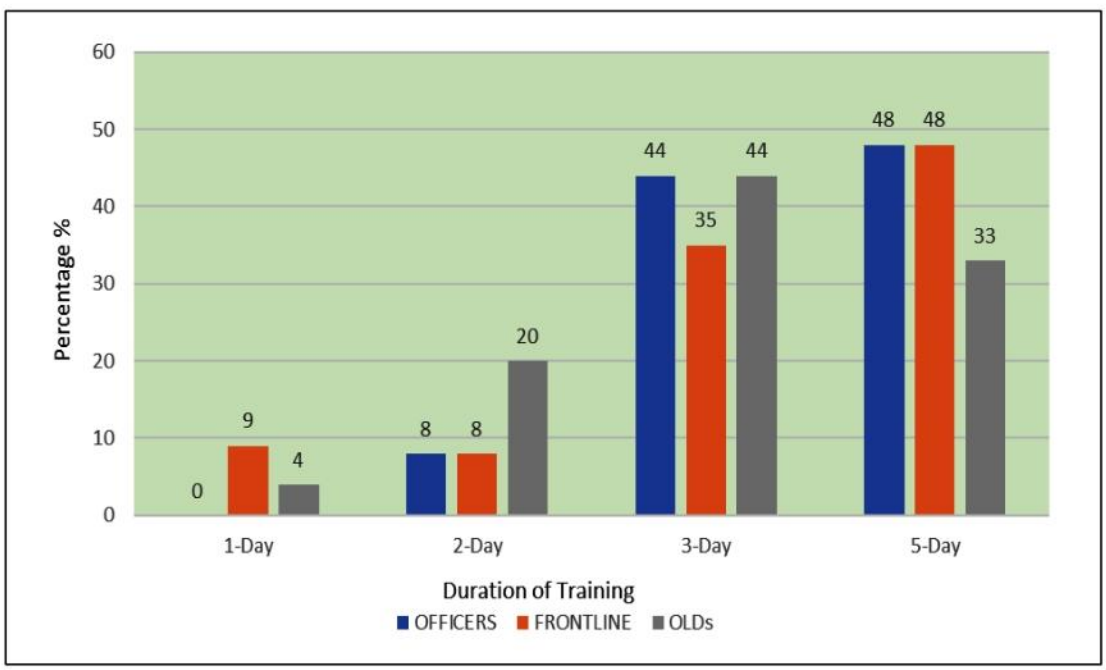


Fig. 6: Preference for duration of training

16.2. Familiarity with Forest Landscape Restoration and Related Topics: Local Communities

The Training Needs Assessment conducted in local communities across the identified landscapes of Uttarakhand highlights significant gaps in awareness and understanding of key topics related to forest landscape restoration. A particularly concerning finding is that nearly 90% of respondents have neither participated in nor are aware of any springshed management initiatives. Springshed management is vital for maintaining water security and ecological balance and this lack of awareness suggests an urgent need for community engagement in watershed conservation efforts. Similarly, 89% of respondents reported unfamiliarity with ecotourism practices. Ecotourism plays a crucial role in promoting sustainable natural resource use while offering alternative livelihood opportunities through community-based tourism. The lack of exposure to such practices indicates missed opportunities for sustainable development that leverages the state's rich ecological and cultural heritage.

Awareness of FLR and its associated practices is also notably low. Between 80% and 85% of respondents lacked knowledge about key components of FLR, such as the value addition of non-wood forest products, biodiversity conservation, value addition of agricultural products, disaster risk management and the impacts of climate change. These are critical areas for building resilience and improving livelihoods in forest-dependent communities and the absence of basic understanding poses a significant obstacle to implementing effective restoration strategies. Furthermore, there is a widespread lack of understanding regarding sustainable land-use and livelihood practices. Between 64% and 77% of respondents demonstrated limited awareness of practices such as farm forestry, sustainable land management, agroforestry and livelihood generation through non-wood forest products. These practices are essential for reducing pressure on natural forests while improving local income sources and the knowledge gap in this area hinders progress toward sustainable land stewardship. Most concerning is the finding that 70% of community members are unaware of the mechanisms available for restoring degraded forest lands (Table 27). Forest degradation is a pressing issue in Uttarakhand and community involvement is critical to reversing this trend.

The lack of awareness limits the region's capacity to rehabilitate ecosystems and secure long-term environmental and economic benefits. The data underscores an urgent need for targeted training and capacity-building programs for the local communities on FLR and its related topics. Bridging these knowledge gaps is essential to equip communities with the skills and awareness needed for effective natural resource management, climate change mitigation and adaptation and livelihood enhancement.

Table 27: Response percentage of awareness for topics related to FLR

S. No.	Topics of Awareness Programmes	Unfamiliar (Responses in %)
1	Springshed management	90
2	Eco-tourism	89
3	Value addition of non-wood forest products	85
4	Biodiversity Conservation	83
5	Value addition of agricultural products	83
6	Disaster Risk management	82
7	Climate change and its impacts	80
8	Livelihood generation through non-wood forest products	77
9	Restoration of degraded forest land	70
10	Agroforestry	69
11	Sustainable land management practices	67
12	Horticulture	66
13	Farm forestry practices	64
14	Agriculture practices	58
15	Community forest management	52
16	Forest fire management	44

16.2.1. Awareness on Soil and Water Conservation Measures and Practices

Data on soil and water conservation practices within the community reveals that 86% of residents engage in terrace farming, indicating a strong reliance on this traditional method for erosion control and land management. Additionally, 71% of the community practices organic farming, reflecting a significant commitment to environmentally friendly agriculture. However, only 52% of respondents implement crop rotation, and just 38% practice mixed cropping both essential techniques for maintaining soil fertility and reducing pest attack. Only 38% of the population has adopted rainwater harvesting, revealing a significant gap in awareness and implementation of sustainable water conservation practices. Even fewer just 14% have constructed contour or staggered trenches and bunds for water retention (Table 28). Notably, modern irrigation techniques such as drip and sprinkler systems are almost entirely absent. These figures highlight the urgent need for increased education, outreach and support to encourage the adoption of more effective and sustainable soil and water conservation methods.

Table 28: Responses of the communities for soil and water conservation measures/ practices

S. No.	Soil and Water Conservation Measures / Practices	Response (in %)
1	Terrace farming	86
2	Organic farming	71
3	Crop rotation	52
4	Mixed cropping	38
5	Rain water harvesting	28
6	Contour/ staggered trenches	14
7	Farm bunding	14
8	Mulching	8
9	Drip irrigation	0
10	Sprinkler irrigation	0

16.2.2. Awareness on Changes in Climate Patterns

Respondents were also asked to describe changes in climate patterns across the landscape, specifically in relation to the frequency of floods, the occurrence of droughts and the incidence of cloudbursts. Additionally, they provided insights on how rainfall and snowfall patterns have changed over the past decade (Table 29).

Table 29: Response regarding changes in climate patterns

S. No.	Changes in Climate Patterns	Yes (%)	No (%)
1	(a) Floods: increased (frequency)	14	86
	(b) Floods: decreased (frequency)	44	56
2	(a) Drought : increased (frequency)	89	11
	(b) Drought : decreased (frequency)	12	88
3	(a) Cloud burst : increased (frequency)	43	57
	(b) Cloud burst : decreased (frequency)	22	78
4	(a) Change in rainfall pattern (Increase)	15	85
	(b) Change in rainfall pattern (Decrease)	80	20
5	(a) Change in snowfall pattern (Increase)	1	98
	(b) Change in snowfall pattern (Decrease)	83	17
6	(a) Change in temperature pattern (Increase)	94	6
	(b) Change in temperature pattern (Decrease)	3	97

The data offers valuable insights into public perceptions of changing climate patterns, revealing several notable trends. Floods are not widely seen as a growing concern and 86% of respondents reported that flood frequency has not increased. This suggests that flooding is not perceived as a worsening issue in the surveyed region. In contrast, there is strong agreement on the rise in drought frequency as 89% of respondents report an increase. This reflects widespread concern about increasing aridity and water scarcity. Perceptions of cloudburst events are more divided. While 43% believe cloudbursts have become more frequent and 57% perceive no change. This split likely indicates uncertainty or regional variability in experiencing intense and short-duration rainfall. A clear majority (80%) report a decline in rainfall, with only 15% observing an increase. This points to growing concern over reduced precipitation and shifting seasonal patterns, which could affect water resources and agriculture. Regarding snowfall, perceptions are even more unified. A vast majority say snowfall has declined. These views align with concerns about increasing temperatures and their effects on snow-dependent areas. Temperature increases are the most widely acknowledged. This consensus reflects a broad recognition of changing climate at the local level. Overall, the data highlights a strong perception of more frequent droughts, rising temperatures, and decreasing rainfall and snowfall. These trends indicate a shifting climate with serious implications for water availability, agriculture and disaster preparedness.

16.2.3. Awareness on Changes in Quality of Forests

The data analysis reveals a concerning trend in forest quality. While there are some signs of improvement, several critical indicators point to significant degradation. Forest degradation levels are alarmingly high (96%), signalling a substantial decline in overall forest health. The spread of weeds and invasive species is particularly severe (98%), posing a serious threat to native ecosystems. Biodiversity is under considerable pressure, with marked declines in plant species and natural regeneration (92%), indicating reduced forest resilience and sustainability. Additionally, the availability of non-wood forest products such as wild fruits has dropped significantly (92%), adversely affecting both ecological balance and local livelihoods. Interestingly, tree felling remains relatively low (5%), suggesting that tree felling is not the primary driver of degradation. However, the minimal decrease in invasive species (2%) confirms their continued and unchecked expansion. Collectively, the high prevalence of invasive species, declining biodiversity, poor natural regeneration and reduced availability of NWFPs highlight severe ecological stress. Targeted management interventions focusing on controlling invasive species, enhancing natural regeneration and conserving biodiversity are urgently needed to reverse this trend and restore forest health.

Some key approaches that can help in improving forest quality require comprehensive and sustainable management strategies that focus on FLR are listed below:

- **Controlling Invasive Species:** Implement targeted removal programs for invasive species. Encourage the use of biological control methods and promote native species to suppress invasive growth.
- **Enhancing Natural Regeneration:** Reduce disturbances like overgrazing and uncontrolled fires.
- **Restoring Biodiversity:** Conduct afforestation and reforestation using native plant species. Establish seed banks for endangered plants. Monitor species diversity regularly.
- **Sustainable Use of Non-Wood Forest Products:** Implement ethical harvesting practices for NWFPs. Train local communities in sustainable harvesting techniques. Encourage agroforestry to supplement forest-based livelihoods.
- **Reducing Forest Degradation:** Promote soil conservation techniques. Improve watershed management to prevent erosion.
- **Community Involvement and Policy Support:** Engage traditional knowledge in conservation efforts. Develop ecotourism initiatives that support conservation. Strengthen legal frameworks for forest protection.

16.2.4. Awareness on Occurrence of Forest Fire

Forest fires occur with increasing frequency and have diverse impacts on affected communities. A significant number of respondents report high incidence rates, highlighting the urgent need for targeted, evidence-based intervention strategies to mitigate the adverse effects of these events (Table 30).

Table 30: Response regarding occurrence of forest fires

Forest Fire Response	Response (in%)
Occurrence	92
Annual Frequency	
Once	28
Twice	32
Thrice	25
More than three times	16

Overall, the data underscores the urgent need to raise awareness and build the capacity of local communities to prevent and respond to forest fires more effectively across the state.

16.2.5. Awareness on Agroforestry Practices

To promote sustainable agriculture and environmental conservation in hills, agroforestry has emerged as a vital land-use strategy. Nestled in the lap of the Himalayas, Uttarakhand is renowned for its breath-taking landscapes and rich biodiversity. In this region, agroforestry, offers numerous ecological and economic benefits, including enhanced agricultural productivity, soil conservation and carbon sequestration. Traditional farming practices in Uttarakhand reflect a deep-rooted harmony between people and nature. Local communities have long embraced mixed farming systems, growing crops alongside trees that provide essential resources such as fodder and fuelwood.

Economically, agroforestry creates diversified income opportunities by supporting the cultivation of timber, fruits, medicinal plants and fodder. This system offers small and marginal farmers a more stable and sustainable livelihood. In Uttarakhand, fruit-bearing trees are often intercropped with vegetables or cereals, resulting in highly productive and profitable farm systems that blend ecological resilience with economic viability.

16.2.6. Topics Suggested for Capacity Building of Local Communities on FLR and related Topics

During the Focus Group Discussions with local communities, respondents were asked to rank topics necessary for capacity building and training on forest landscape restoration. The results show a distinct hierarchy of priorities, with some topics rated significantly higher than others. The top-rated topics were soil and water conservation (90%), disaster risk management (82%) and climate change (80%) highlight strong community awareness of immediate challenges related to natural resource sustainability and risk reduction (Table 31). These areas are vital to local livelihoods as they focus on protecting the land, mitigating disasters and adapting to climate variability. Soil and water conservation scored the highest, reflecting local concerns about land degradation, water scarcity and farmland health. Disaster risk management and climate change also received high ratings, demonstrating the community's recognition of increasing extreme weather events and climate-related risks. Building resilience to such disruptions is seen as crucial for protecting lives and economic stability. The topic of livelihood generation through non-wood forest products was rated nearly as high (79%), suggesting that communities value income diversification through sustainable forest resource use. Similarly, management of invasive species and Human-Wildlife Conflict both received moderate but significant ratings (75%), indicating an understanding of the indirect ecological and agricultural challenges these issues present. These topics point to a need for specialized training that addresses both ecosystem health and human safety. Restoration of degraded forest landscape (70%) and sustainable land management practices (67%) were rated moderately high concerns. Likewise, Agroforestry/ Farm Forestry (63%) and Horticulture/Agricultural practices (59%) are important but perceived as overlapping with other topics or already covered by existing agricultural services. Still, these practices are essential for fostering a resilient and diverse local economy. Community forest management received a lower priority (52%), possibly because communities see it as less immediately actionable or believe current systems are adequate. Nonetheless, when effectively integrated with local governance and participatory decision-making, community forest management can provide sustainable benefits. Forest fire management, rated lowest at 44%, however, it should not be overlooked as fires may be infrequent, their potential for catastrophic

damage is significant. The low prioritization may stem from recent low fire incidents or limited awareness of prevention and control methods, underscoring the need for targeted education.

Overall, the data suggests that capacity-building efforts should focus first on topics offering immediate and tangible benefits, such as protecting natural resources and enhancing disaster resilience. At the same time, medium and long-term strategies like restoration of degraded forest landscape and sustainable land management should be supported to ensure lasting landscape recovery and community well-being.

Table 31: Topics suggested for capacity building on FLR and related topics

S. No.	Suggested Topics for Capacity Building	Response (in %)
1	Soil and water conservation	90
2	Disaster risk management	82
3	Climate change and its impacts, climate change mitigation and adaptation	80
4	Livelihood generation through non-wood forest products	79
5	Management of Invasive species	75
6	Human wildlife conflict	75
7	Restoration of degraded forest land	70
8	Sustainable land management practices	67
9	Agroforestry/ farm forestry practices	63
10	Horticulture/agriculture practices	59
11	Community forest management	52
12	Forest fire management	44

16.2.7. Choice of Mode of Training

During the Focus Group Discussion, local communities shared their preferences regarding training methods. The data indicates a strong inclination toward interactive, hands-on learning approaches over traditional classroom-based lectures. While 62% of respondents favoured classroom lectures when supplemented with audio-visual aids (Table 32), these sessions were often described as more passive in nature. Although they provide essential foundational knowledge and structure, many participants found them less engaging and struggled to fully connect with the material.

In contrast, demonstrations and exposure visits received significantly higher preference ratings each cited by 81% of respondents. These methods were valued for their practical, immersive nature. Demonstrations allow learners to observe processes in action, clearly illustrating how concepts are applied in real-world settings. Similarly, exposure visits offer direct, contextual experiences that bridge the gap between theory and practice.

Table 32: Preferences for Mode of Training

Mode of Training	Choice response (%)
Classroom lectures followed by audio-visual	62
Demonstrations	81
Exposure visits	81

16.2.8. Suitable Months for Conducting Training

During the focus group discussions, local communities identified their preferred months for participating in training sessions. The data shows the highest preferences for the months from November to March may be due to reduced agricultural workloads (Fig. 7).

Fig. 7: Choice of a suitable month for conducting training

17 DEVELOPMENT OF TRAINING MODULES ON FOREST LANDSCAPE RESTORATION FOR STATE FOREST DEPARTMENT, OTHER LINE DEPARTMENTS, VAN PANCHAYATS AND LOCAL COMMUNITIES

Based on the findings of the Training Needs Assessment, targeted training modules on Forest Landscape Restoration and related topics have been developed to strengthen the capacity of State Forest Departments, Other Line Departments and local communities of Uttarakhand, as outlined below:

17.1. Training Module on Forest Landscape Restoration (FLR) for Forest Officers (Forest Range Officers and above) of State Forest Department

Session 1: Introduction to Forest Landscape Restoration (FLR)

- Principles and pillars of FLR
- FLR in the Indian context (NDCs, LDN and Bonn Challenge)

Session 2: Measurement of Forest Carbon Stocks

- Forest carbon stocks and carbon pools
- Methods, tools and techniques for measurement of forest carbon stocks
- Application of GIS and remote sensing in measurement of forest carbon stocks
- Hands-on exercise on measurement of forest carbon stocks

Session 3: Climate Change in Forest Sector

- Impacts and vulnerabilities of forests to climate change
- Climate change mitigation and adaptation in forests

Session 4: REDD+ Mechanism

- REDD+ mechanism under UNFCCC
- National REDD+ Strategy
- REDD+ Safeguards

- Forest Reference Level
- National Forest Monitoring System
- Case study of REDD+ pilot project

Session 5: International Conventions and India's Commitments

- UNFCCC, UNCCD, CBD, UNFF, SDGs
- India: Nationally Determined Contributions, Land Degradation Neutrality targets, National Biodiversity Strategy and Action Plan

Session 6: Carbon Markets for Forestry Projects

- Carbon markets (compliance and voluntary markets)
- Carbon registries and carbon trading
- Indian Carbon Market
- Carbon offset project development

Session 7: Gender Mainstreaming in FLR

- Role of gender in FLR
- Gender-responsive planning and monitoring

Session 8: Forest Certification

- Principles and certification mechanism for sustainable forest management

Session 9: Valuation of Ecosystem Services

- Concept of ecosystem services
- Valuation methods for ecosystem services

Session 10: Green Credit Programme (GCP)

- Overview of India's GCP framework
- Eligible activities and implementation modalities

Session 11: Funding Mechanisms for FLR

- CAMPA, GIM, NABARD, CSR, GCF, GEF, UNDP, JICA etc.
- Project proposal designing and preparation

Session 12: Nature-based Solutions/ Approaches and NWFPs Value Chains

- Nature-based solutions/ approaches for FLR
- Sustainable harvesting, processing, and marketing of NWFPs
- Promoting community enterprise and value addition

17.2. Training Module on Forest Landscape Restoration for Frontline Forest Staff (Forest Guards up to Dy. Rangers) of State Forest Department

Session 1: Forest Landscape Restoration (FLR) – Concept and Approach

- Definition and principles of FLR
- Restoration vs afforestation
- Importance of multi-stakeholder and participatory approaches in FLR
- Integrated FLR planning, tools and techniques
- Cross-sectoral coordination
- Monitoring and evaluation indicators

Session 2: India's Nationally Determined Contributions (NDCs) under the Paris Agreement

- Paris Agreement
- Overview of India's NDCs
- NDC forest sector target

Session 3: Policies, Laws and Regulations for Conservation of Forests (in brief)

- Indian Forest Act, 1927
- Forest (Conservation) Act, 1980

- Wildlife (Protection) Act, 1972
- Environment (Protection) Act, 1986
- National Forest Policy (1988)
- Biological Diversity Act, 2002
- Green Credits Rules 2023

Session 4: Forest Fire Management

- An overview of forest Fire
- Drivers/ causes of forest fire
- Forest fire detection, monitoring and reporting
- Forest fire management (prevention, preparedness and suppression strategies/ practices/ measures)
- Post fire management and ecological restoration of the burnt forest areas

Session 5: Springshed Management

- Importance of Springsheds
- Mapping of Springsheds
- Recharge techniques and catchment protection

Session 6: Sustainable Harvesting of NWFPs and Livelihoods

- NWFPs and value chains
- Guidelines for sustainable harvesting of NWFPs
- Market linkages and community enterprises
- Linking to rural livelihoods

Session 7: Village Ecotourism and Nature-based Solutions/ Approaches

- Community-based ecotourism models
- Nature-based solutions/ approaches

Session 8: Sustainable Management of Forest

- Criteria and indicators of sustainable management of forest
- Monitoring tools

Session 9: Measurement of Forest Carbon Stocks and Carbon Markets

- Forest carbon stocks and carbon pools
- Methods, tools and techniques for measurement of forest carbon stocks
- Hands-on exercise on measurement of forest carbon stocks
- Carbon markets

Session 10: Invasive Species and their Management

- Major invasive species
- Ecological impacts and mechanical/ biological control

Session 11: Biodiversity Conservation

- *In-situ* and *ex-situ* conservation
- Rate, endangered and threatened species
- Protected area networks

Session 12: Gender Mainstreaming in Forest Landscape Restoration (FLR)

- Role of gender in FLR
- Gender-responsive FLR planning
- Van Panchayat and best practices from Van Panchayats

Session 13: FLR Action Plan Preparation

- Preparation of site-specific FLR action plan
- Group presentations

17.3. Training Module on Forest Landscape Restoration for Officers and Staff of Other Line Department

Session 1: International Agreements and Conventions on Environment

- International Convention and agreements (UNFCCC, CBD, UNCCD, Paris Agreement)
- Bonn Challenge and New York Declaration on Forests

Session 2: Legal Framework for Environmental Protection in India

- Forest (Conservation) Act, 1980
- Environment (Protection) Act, 1986
- Biological Diversity Act, 2002

Session 3: Climate Change Impacts and Vulnerability

- Climate change impacts on water, agriculture, forests
- Climate change vulnerability

Session 4: Invasive Species and Their Management

- Major invasive species
- Ecological impacts of invasive species
- Mechanical and biological control measures of invasive species

Session 5: Restoration of Degraded Areas

- Principles of forest landscape restoration
- Agroforestry, afforestation and silvipasture

Session 6: Climate Change Mitigation and Adaptation

- Climate change mitigation and adaptation and strategies
- Climate-resilient species

Session 7: Nature-based Solutions/ Approaches

- Nature-based solution/ approaches
- REDD+ framework
- Cost-benefit examples

Session 8: Springshed Management

- Hydrogeology basics
- Community-based springshed management

Session 9: SDGs and Forest Landscape Restoration

- SDGs and their targets related to forest landscape restoration

Session 10: Gender Mainstreaming in Forest Landscape Restoration

- Gender-differentiated roles in FLR
- Gender-responsive planning and monitoring

Session 13: Disaster Risk Reduction and FLR

- FLR Linkages with floods, droughts, landslides
- Integration with disaster risk reduction plans

Session 14: Mission LiFE (Lifestyle for Environment)

- Sustainable life style
- Climate friendly sustainable practices

17.4. Capacity Building of Van Panchayats on Sustainable Forest Management and Forest Landscape Restoration

Van Panchayats are a unique form of community forest governance, managing a significant portion of the forest area of the state. These institutions empower local communities to protect, regenerate and sustainably use forest resources. However, Van Panchayats face multiple challenges including forest degradation, overexploitation, weak institutional capacity, limited technical knowledge and impacts of climate change. There is an urgent need to strengthen the capacity

of the Van Panchayats to ensure the sustainable management of forests and to implement Forest Landscape Restoration approaches effectively.

Through a structured capacity-building initiative, Van Panchayats can be equipped with the necessary knowledge, tools and institutional support to manage their forest resources more effectively. This includes strengthening local governance, improving technical know-how, and promoting participatory forest planning and restoration practices. It also ensures the integration of biodiversity conservation, climate change mitigation and adaptation and livelihood development into forest management.

Van Panchayat members would be trained in sustainable management practices of forests such as silviculture, assisted natural regeneration, fuelwood and fodder management and fire prevention. Restoration of degraded lands through native species plantations, soil and water conservation and community nursery development would be key components of the program. Climate change mitigation and adaptation strategies like spring revival, ecosystem-based adaptation and invasive species control would also be incorporated. Furthermore, the program would support value addition and sustainable marketing of non-wood forest products and explore opportunities in eco-tourism, agroforestry and nature-based enterprises.

A cadre of trained local resource persons would be created through a Training-of-Trainers (ToT) model, ensuring sustainability and scalability.

Training Module: Sustainable Management of Forests of Van Panchayats of Uttarakhand

Session 1: Introduction to Van Panchayats

- History and legal status of Van Panchayats in Uttarakhand
- Forests and Community Rights
- Role of Van Panchayats in conservation, protection and management of Van Panchayat forests
- Success stories of Van Panchayats
- Synergy between Van Panchayats, Forest Department and community

Session 2: Forests and Biodiversity of Van Panchayat forests

- Forests and biodiversity in Uttarakhand and its importance
- Other Effective Area-based Conservation Measures (OECM) and its scope in Van Panchayat forests
- Conservation of biodiversity
- Human-wildlife conflict: Causes and mitigation measures

Session 3: Policy, laws and regulation for forests and biodiversity

- National Forest Policy
- Indian Forest Act, 1927
- Forest Conservation Act, 1980
- Environment Protection Act, 1986
- Wildlife Protection Act, 1972
- Biodiversity Act, 2002 (amended in 2024)
- Forest Right Act, 2006
- International Conventions and Agreement (UNFCCC, UNCCD, CBD, UNFF, SDGs)

Session 4: Principles of Sustainable Management of Forests

- Sustainable management of forests
- Benefits of sustainable management of forest
- Natural regeneration and assisted natural regeneration
- Invasive species management
- Native species plantation and mixed-species strategies
- Preparation of micro plan for sustainable management of forests of Van Panchayat

Session 5: Tools for Sustainable Management of Forests

- Nursery and quality planting stocks
- Forest inventory and resource assessment
- Measurement of forest carbon stocks
- Forest resource mapping
- Silvicultural practices of dominant tree species
- Fire prevention and control measures

Session 6: Forest Landscape Restoration (FLR)

- Definition and Principles of FLR
- FLR and Sustainable Development Goals
- Climate smart farming practices for sustainable productivity
- Agroforestry and silvipasture
- Soil and water conservation measures
- Springshed management

Session 7: Livelihoods from Forests

- Non-Wood Forest Products: Harvesting, vale addition and marketing
- Ecotourism and forest-based microenterprises
- Integrated farm development and alternate income generation activities
- Role of women in forest-based livelihoods

Session 8: Climate Change and Forests

- Climate change and its impact on forests
- Role of forests in climate mitigation and adaptation
- REDD+ and carbon market/ climate finance/ biodiversity credits
- Climate change mitigation and adaptation strategies for forests
- Green Credit Programme
- Mission LiFE (Lifestyle for Environment)

Session 9: Good Governance and Community Monitoring

- Transparency in decision-making and inclusive participation
- Strengthening of Van Panchayats
- Monitoring and evaluation tools for forest health and community action
- Conflict resolution and collective decision-making

Session 10: Practical exercises

- Preparation of forest inventory
- Biodiversity assessment techniques
- Measurement of forest carbon stocks
- Assessment of forest resources
- Preparation of micro-plan/ FLR action plan

17.5. Awareness and Training Module on Forest Landscape Restoration and Related Topics for Local Communities

Session 1: Introduction to Forest Landscape Restoration

- Forest landscape
- Causes of forest landscape degradation
- Forest Landscape Restoration (definition, goals)
- Importance of Forest Landscape Restoration

Session 2: Soil and Water Conservation

- Soil erosion causes and impact

- Soil and water conservation measures
- Rainwater harvesting, trenching

Session 3: Climate Change

- Observed changes/ impacts (rainfall, temperature, phenology)
- Local impacts on crops, water, health
- Mitigation (tree planting, carbon sinks)
- Adaptation: Drought-resistant crops, mulching, rainwater use

Session 4: Livelihood Generation through NWFPs

- Non-wood forest products (NWFPs)
- Harvesting of NWFPs
- Value addition and market access

Session 5: Agroforestry and Horticulture Practices

- Intercropping with fruit and timber trees/ agroforestry practices
- Benefits of agroforestry
- Community nursery development and quality planting stocks

Session 6: Forest Degradation, Invasive Species and Forest Fire Management

- Forest degradation
- Common invasive species
- Control measures of invasive species
- Forest fire causes and prevention measures
- Restoration methods

Session 7: Mitigating Human-Wildlife Conflicts: Tools and Techniques

- Understanding human-wildlife conflict
- Wildlife behavior and identification
- Non-lethal conflict mitigation techniques
- Emergency response and safety protocols
- Compensation mechanisms and reporting
- Community-based conflict management

18 CONCLUSION

The findings of training needs assessment (TNA) have yielded valuable insights into the existing knowledge and skill gaps, as well as the capacity development requirements of key stakeholders involved in the restoration of degraded forest landscapes in Uttarakhand. The assessment reveals a broad awareness of the importance of Forest Landscape Restoration among all the key stakeholders. However, it also underscores the need to strengthen understanding of core FLR principles, landscape-level planning, restoration monitoring, climate resilience strategies and community engagement.

Other Line Departments, while playing a complementary and critical role in FLR, often lack coordination and a shared vision of restoration objectives. The TNA findings identify a clear need to foster inter-departmental collaboration through capacity-building efforts that emphasize cross-sectoral coordination, policy coherence and integrated landscape management approaches.

At the community level, particularly among Van Panchayats, there is a strong willingness to engage in restoration initiatives. Nevertheless, significant technical knowledge gaps remain, particularly in practical restoration techniques, sustainable resource management and institutional procedures. Capacity development for these stakeholders should focus on raising awareness, building practical skills and promoting inclusive governance models to enable their meaningful and sustained participation.

Overall, the TNA highlights the urgent need for capacity building of the key stakeholders as per the stakeholder specific targeted training modules on FLR. Building the capacities of the stakeholders is essential not only for the effective implementation of FLR initiatives but also for enhancing ecosystem services, strengthening climate resilience and supporting sustainable livelihoods across the state of Uttarakhand.

19 WAY FORWARD

Training modules on Forest Landscape Restoration have been developed as part of the Training Needs Assessment (TNA) for the capacity building of State Forest Department, Other Line Departments and local communities of the Uttarakhand. The next step is effective implementation of the training modules, institutional uptake and long-term integration into the capacity-building programmes of the stakeholders. The focus must now shift from planning to action, emphasizing the rollout of trainings across multiple stakeholder levels and selected landscapes under the RECAP4NDC Project within the state of Uttarakhand.

To begin with, a phased training implementation plan needs to be developed. Special attention needs to be given for building the capacities of front-line forest staff, community members, Van Panchayats and Panchayati Raj Institution. These actors play a pivotal role in on-ground FLR interventions and need to be empowered not only with technical knowledge but also with participatory and governance skills to foster community-led restoration efforts. To ensure sustainability and scalability, a training of trainers' approach can be operationalized using the developed training modules. By building a pool of master trainers at the Forest Division levels of Uttarakhand state can create a self-sustaining model where capacity building becomes an ongoing, process. Additionally, integrating the FLR training modules into the regular induction and in-service trainings of the State Forest Department and other line departments will help institutionalize the learning. It is also critical to utilize technology enabled platforms to extend the reach and accessibility of the training. Digital learning tools, mobile-based content and community radio can help engage participants in remote areas and promote continued learning beyond the classroom setting.

REFERENCES

Census (2011). Census of India – 2011. Office of the Registrar General and Census Commissioner, Ministry of Home Affairs, Government of India.

Champion, H.G. and Seth, S.K. (1968). A Revised Forest Types of India. Manager of Publications, Government of India, Delhi.

Cochran, W.G. (1977). Sampling Techniques (3rd Edition). New York: John Wiley & Sons.

FSI (2024). India State of Forest Report 2023. Forest Survey of India, Dehradun.

ICFRE (2010). Forest Sector Report India 2010. Indian Council of Forestry Research and Education, Dehradun.

Hennink, M.M. (2014). Understanding Focus Group Discussions. Oxford University Press. Weekes, A.J.

IORA (2024). Technical Report. Selection of Intervention Landscapes in Uttarakhand under RECAP4NDC, GIZ State Forest Department, Government of Uttarakhand.

Mani, A., Bansal, D., Kumari, M. and Kumar, D. (2023). Land Use Land Cover Changes and Climate Change Impact on the Water Resources: A Study of Uttarakhand State. In: Rai, P.K. (eds) River Conservation and Water Resource Management. Advances in Geographical and Environmental Sciences. Springer, Singapore. https://doi.org/10.1007/978-981-99-2605-3_1.

MoAFW (2023). Land Use Statistics at a Glance: 2022-23 Ministry Of Agriculture & Farmers Welfare Department of Agriculture & Farmers Welfare Economics, Statistics and Evaluation Division, New Delhi.

Negi, S.S. (2018). Interim report on the Status of migration in the Gram Panchayats of Uttarakhand, Rural Development and Migration Commission, Uttarakhand, Pauri Garhwal.

SAC (2021). Desertification and Land Degradation Atlas of India (Assessment and analysis of changes over 15 years based on remote sensing). Space Applications Centre, ISRO. Ahmedabad, India. 282 pages.

UKFD (2023). Van Panchayat Nirdeshika, Uttarakhand Forest Department, Dehradun.

GLIMPSES OF THE TNA SURVEYS - SFD AND OTHER LINE DEPARTMENTS








GLIMPSES OF THE TNA SURVEYS - LOCAL COMMUNITIES








ANNEXURE 1

QUESTIONNAIRE FOR TRAINING NEED ASSESSMENT FOR CAPACITY BUILDING OF THE OFFICERS OF STATE FOREST DEPARTMENT ON FOREST LANDSCAPE RESTORATION UNDER RECAP4NDC PROJECT

No: TNA-Q1/ICFRE/ **Date:**

Name of the Project: Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC Project)

Project Output V: Development of Capacities, Knowledge and Communication Mechanisms for Forest Landscape Restoration

Implementing Agency: Indian Council of Forestry Research and Education (ICFRE), Dehradun

Brief About the Project: German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection has commissioned a project titled Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) under International Climate Initiative. The project is being implemented as part of the Indo-German Partnership for Green and Sustainable Development by a six-member consortium (GIZ, IUCN, FSI, TERI, ICFRE and the ICIMOD). This project aims to enable actors to effectively plan, finance, implement and monitor forest landscape restoration (FLR) and trees outside forests measures. Thereby, it aims to contribute to the achievement of India's NDC forestry target, enhance biodiversity conservation and sustainably improve rural livelihoods through increased forest and tree cover. Output V aims to transfer knowledge and capacitate stakeholders. Capacity development includes trainings, induction courses/curricula development on Forest Landscape Restoration for public staff across different sectors and levels.

Informed Consent: You are requested to participate in the survey being conducted by ICFRE, Dehradun to determine the need of the training required for the capacity building of State Forest Department on various aspects of Forest Landscape Restoration under the RECAP4NDC Project.

Your contribution will help in identification and prioritization of training needs, preparation of training modules, manuals, knowledge products and building capacity of State Forest Departments on various aspects of Forest Landscape Restoration under the project.

There are no foreseeable risks for participating in this survey. You may withdraw your consent or stop participating in the survey at any time. We will make every effort to maintain the confidentiality of your responses. Only the team of the project will have access to the data and information about participation and will not be shared with others.

Details of Respondent:

Name: .....

Designation:.....

Age:..... **Gender**.....

Address:.....

.....

.....

Mobile No..... **Email** .....

1. How familiar are you with the following topics related to Forest landscape restoration?

Kindly tick the appropriate option (Yes/ No) against each of the following:

S. No.	Topics related to forest landscape restoration	Yes	No
1	Forest landscape restoration		
2	Sustainable forest management		
3	Restoration of degraded forests/ landscapes		
4	Nursery and plantation techniques of forestry species		
5	Soil and water conservation measures		
6	Invasive species and their management		
7	Forest fire and its management		
8	Nature-based Solutions/ Ecosystem based Approaches		
9	Climate change impact and vulnerability in forest sector		
10	Climate change mitigation and adaptation in forest sector		
11	REDD+(Reducing emissions from deforestation and forest degradation) & Forest carbon projects		
12	Forest carbon stocks measurement		
13	Carbon Market Mechanism-Finance and Carbon Credit		
14	Forest certification		
15	International Agreement/ Conventions related to forest and environment & India's Commitment		
16	Sustainable harvesting of NTFP and their role in livelihood generation		
17	Ecosystem services and its Valuation		
18	Legal framework (Policies, laws and regulations) for conservation and protection of forest and environment		
19	Sustainable development goals		
20	Gender mainstreaming in forest management		
21	Community forest management (Van Panchayat/JFMCs/BMCs etc.)		
22	Springshed Management		
23	Eco-tourism		
24	Value Chain		
25	Green Credit Programme		
26	Domestic and International funding for FLR		
27	Life: Life style for Environment		

2. Trainings related to Forest Landscape Restoration attended by you:

S. No.	Name of training attended	Organizing Institution/ Department
1		
2		
3		
4		

3. Which schemes/projects/programs are being implemented in the state for restoration of degraded forest landscapes? What type of trainings are being provided to the staff under the scheme/project/program?

S. No.	Name of the scheme/project/program	Type of training provided to staff
1		
2		
3		
4		

4. Which types of practices are being followed in the department for restoration of degraded forest landscapes? Kindly tick (√) relevant option/options.

S. No.	Practices	Tick (√) relevant option/options
1	ANR– Enrichment plantation	
2	Soil & Moisture Conservation	
	a) Rain Water Harvesting	
	b) Contour trench	
	c) Cattle proof trench/wall	
	d) Check dams	
3	Fencing	
4	Invasive Species management	
5	Rotation grazing	
6	Forest Fire Management	
7	Others, if any, please specify	

5. **Which type of knowledge products would be more effective for sharing of knowledge on restoration of degraded forest landscape? Kindly tick (√) relevant option/options.**

S. No.	Type of knowledge products	Tick (√) relevant option/options
1	Flyer	
2	Book	
3	Manual	
4	Brochure	
5	Pamphlets	
6	Infographics	
7	Videos	
8	Posters	
9	e-book/ e-booklet/ e-manual	
10	Others, if any, please specify	

6. **Which modes of training would be more effective for capacity building of the Department? Please suggest:**

S. No.	Modes of training	Priority		
		Low	Medium	High
1	Physical mode - Interactive sessions (Expert lectures, audio-visual, hands on exercise, case studies, group exercises)			
2	Virtual mode- Interactive sessions (Expert lectures, audio-visual, case studies, group exercises)			
3	e-Learning			
4	Others, if any, please specify			

7. **Please suggest best suitable time of the year for conducting trainings for the Department and appropriate duration of training:**

Months:_____

Duration: (a) 1 day_____ (b) 2 days_____

(c) 3 days_____ (d) 5 days _____

8. **Please provide other comments/suggestions related to training needs for capacity building of the Department on FLR related aspects:**

_____

_____

Signature of the respondent

Signature .....

Data collected by: .....

Designation: .....

ANNEXURE 2

QUESTIONNAIRE FOR TRAINING NEED ASSESSMENT FOR CAPACITY BUILDING OF THE FRONTLINE STAFF OF STATE FOREST DEPARTMENT ON FOREST LANDSCAPE RESTORATION UNDER RECAP4NDC PROJECT

No: TNA-Q4/ICFRE/ Date:

Name of the Project: Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC Project)

Project Output V: Development of Capacities, Knowledge and Communication Mechanisms for Forest Landscape Restoration

Implementing Agency: Indian Council of Forestry Research and Education (ICFRE), Dehradun

Brief About the Project: German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection has commissioned a project titled Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) under International Climate Initiative. The project is being implemented as part of the Indo-German Partnership for Green and Sustainable Development by a six-member consortium (GIZ, IUCN, FSI, TERI, ICFRE and the ICIMOD). This project aims to enable actors to effectively plan, finance, implement and monitor forest landscape restoration (FLR) and trees outside forests measures. Thereby, it aims to contribute to the achievement of India's NDC forestry target, enhance biodiversity conservation and sustainably improve rural livelihoods through increased forest and tree cover. Output V aims to transfer knowledge and capacitate stakeholders. Capacity development includes trainings, induction courses/curricula development on Forest Landscape Restoration for public staff across different sectors and levels.

Informed Consent: You are requested to participate in the survey being conducted by ICFRE, Dehradun to determine the need of the training required for the capacity building of State Forest Department on various aspects of Forest Landscape Restoration under the RECAP4NDC Project.

Your contribution will help in identification and prioritization of training needs, preparation of training modules, manuals, knowledge products and building capacity of State Forest Departments on various aspects of Forest Landscape Restoration under the project.

There are no foreseeable risks for participating in this survey. You may withdraw your consent or stop participating in the survey at any time. We will make every effort to maintain the confidentiality of your responses. Only the team of the project will have access to the data and information about participation and will not be shared with others.

Details of Respondent:

Name: .....

Designation: .....

Gender ..... Age .....

Qualification
a) 10th
b) 12th
c) Graduation
d) Post-graduation
e) Others (specify)

Address:

Forest Division:.....

Forest Range: .....

Mobile No..... Email .....

1. How familiar are you with the following topics related to Forest landscape restoration? Kindly tick the appropriate option (*Yes/ No) against* each of the following:

S. No.	Topics related to forest landscape restoration	Yes	No
1	Forest Landscape Restoration concept/Approach		
2	Sustainable forest management		
3	Restoration of degraded forests		
4	Nursery and plantation techniques of forestry species		
5	Soil and water conservation measures		
6	Invasive species and their management		
7	Forest fire and its management		
8	Nature-based Solutions/Approaches		
9	Forest carbon stocks measurement		
10	India's Nationally Determined Contribution targets under the Paris Agreement		
11	Policies, laws and regulations for conservation of forest biodiversity in India		
12	Sustainable harvesting of NTFP and their role in livelihood generation		
13	Legal framework for conservat ion and protection of forest and environment in India		
14	Gender mainstreaming in forest management		
15	Community forest management (Van Panchayat/JFMC/BMC/SHG)		
16	Spring shed Management		
17	Village eco-tourism		
18	Biodiversity Conservation		

2. Trainings related to Forest Landscape Restoration attended by you:

S. No.	Name of training	Organizing Agency/ Department
1		
2		
3		
4		

3. Which types of practices are being followed by your department for restoration of degraded forest landscapes? (Please tick (√) relevant option/options)

S. No.	Practices	Tick (√) relevant option/options
1	ANR– Enrichment plantation, adoption etc.	
2	Soil & Moisture Conservation	
	a) Rain Water Harvesting	
	b) Contour trench	
	c) Cattle proof trench/wall	
	d) Check dams	
3	Fencing	
4	Invasive Species management	
5	Rotation grazing	
6	Forest Fire Management	
7	Others, if any, please specify	

4. Which type of knowledge products would be more effective for sharing of knowledge on restoration of degraded forest landscape? (Please tick (√) relevant option/options)

S. No.	Type of knowledge products	Tick (√) relevant option/options
1	Flyer	
2	Book	
3	Manual	
4	Brochure	
5	Pamphlets	
6	Infographics	
7	Videos	
8	Posters	
9	e-book/ e-booklet/ e-manual	
10	Others, if any, please specify	

5. **Which modes of training would be more effective for capacity building for Frontlines Staff of State Forest Department? Please suggest:**

S. No.	Modes of training	Priority		
		Low	Medium	High
1	Physical mode- Interactive sessions (Expert lectures, audio-visual, hands on exercise, case studies, group exercises)			
2	Virtual mode-Interactive sessions (Expert lectures, audio-visual, case studies, group exercises)			
3	e-Learning			
4	Others, please specify.....			

6. **Please suggest best suitable time of the year for conducting trainings for the Department:**

Months:_____

Duration: (a) 1 day_____ (b) 2 days_____

(c) 3 days_____ (d) 5 days _____

7. **Please provide other comments/suggestions related to training needs for capacity building of the Department:**

_____

_____

_____

Signature of the respondent

Signature .....

Data collected by: .....

Designation: .....

ANNEXURE 3

QUESTIONNAIRE FOR TRAINING NEED ASSESSMENT FOR CAPACITY BUILDING OF THE OFFICERS/ STAFF OF OTHER LINE DEPARTMENT ON FOREST LANDSCAPE RESTORATION UNDER RECAP4NDC PROJECT

No: TNA-Q2/ICFRE/ Date:

Name of the Project: Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC Project)

Project Output V: Development of Capacities, Knowledge and Communication Mechanisms for Forest Landscape Restoration

Implementing Agency: Indian Council of Forestry Research and Education (ICFRE), Dehradun

Brief About the Project: German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection has commissioned a project titled Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) under International Climate Initiative. The project is being implemented as part of the Indo-German Partnership for Green and Sustainable Development by a six-member consortium (GIZ, IUCN, FSI, TERI, ICFRE and the ICIMOD). This project aims to enable actors to effectively plan, finance, implement and monitor forest landscape restoration (FLR) and trees outside forests measures. Thereby, it aims to contribute to the achievement of India's NDC forestry target, enhance biodiversity conservation and sustainably improve rural livelihoods through increased forest and tree cover. Output V aims to transfer knowledge and capacitate stakeholders. Capacity development includes trainings, induction courses/curricula development on Forest Landscape Restoration for public staff across different sectors and levels.

Informed Consent: You are requested to participate in the survey being conducted by ICFRE, Dehradun to determine the need of the training required for the capacity building of other Departments on various aspects of Forest Landscape Restoration under the RECAP4NDC Project.

Your contribution will help in identification and prioritization of training needs, preparation of training modules, manuals, knowledge products and building capacity of your department on various aspects of Forest Landscape Restoration under the project.

There are no foreseeable risks for participating in this survey. You may withdraw your consent or stop participating in the survey at any time. We will make every effort to maintain the confidentiality of your responses. Only the team of the project will have access to the data and information about participation and will not be shared with others.

Details of Respondent:

Name: .....

Designation:.....

Age:..... **Gender**.....

Address:.....

.....

Mobile No..... **Email**.....

1. **How familiar are you with the following topics related to Forest landscape restoration? Kindly tick the appropriate option (Yes/ No) against each of the following:**

S.No.	Topics related to forest landscape restoration	Yes	No
1	Natural resource management (NRM)		
2	Sustainable land management		
3	Restoration of degraded areas		
4	Soil and water conservation		
5	Nature - based Solution/ Ecosystem based Approaches		
6	Invasive species and their management		
7	Disaster management / Disaster risk reduction		
8	Climate change impacts and vulnerability		
9	Climate change mitigation and adaptation		
10	International Agreement/ Conventions related to environment		
11	Legal framework for conservation and protection of environment in India		
12	Sustainable livelihood generation		
13	Agroforestry/ farm forestry/ urban forestry		
14	Participatory natural resource management		
15	LiFE: Life Style for Environment		
16	Sustainable development goals		
17	Gender mainstreaming in NRM		
18	Spring shed management		
19	Eco - tourism		

2. **Contributions of Line Departments towards Forest Landscape Restoration. Please tick (√) relevant option/ options.**

S.No.	Department	Tick √ relevant option/options
1	**Rural Development Department**	
	a Soil Moisture Conservation	
	b Plantation	
	c Others, if any, please specify	
2	**Agriculture Department**	
	a Micro-irrigation	
	b Rashtriya Krishi Vikas Yojana	
	c Improved agricultural practices	

	d Mulching	
	e Organic farming	
	f Rain water harvesting	
	g Percolation tanks	
	h Others, if any, please specify	
3	**Horticulture Department**	
	a Plantation of horticultural crops	
	b Micro-irrigation	
	c Green house development	
	d Percolation tanks	
	e Rain water harvesting	
	f Mulching	
	g Others, if any, please specify	
4	**Watershed Management Department**	
	a Plantation	
	b Check dams	
	c Irrigation	
	d Livelihood	
	e Others, if any, please specify	
5	**Irrigation and Water Resources Department**	
	a Canals	
	b Tube wells	
	c Ponds	
	d Micro-irrigation	
	e Water harvesting	
	f Chauka	
	g Others, if any, please specify	
6	**Animal Husbandry Department**	
	a Grassland development	
	b Plantation of fodder trees/grasses	
	c Controlled grazing	
	d Stall feeding	
	e Others, if any, please specify	

3. Trainings related to NRM attended by you:

S. No.	Name of training attended	Organizing Institution/ Department
1		
2		
3		
4		

4. **Which types of sustainable land management practices are being followed by your department for restoration of degraded landscapes? Please tick (√) relevant option/options**

S.No.	Name of the Practices	Tick (√) relevant
1	Organic farming	
2	Micro-irrigation	
3	Rain Water Harvesting	
4	Improved variety of seed distribution	
5	Quality Planting Materials	
6	Land-levelling	
7	Chaukas practice	
8	Agroforestry	
9	Farm Bunding	
10	Others, if any, please specify	

5. **Which type of knowledge products would be more effective for sharing of knowledge on restoration of degraded landscape? Kindly tick (√) relevant option/options**

S.No.	Type of knowledge products	Tick (√) relevant option/options
1	Flyer	
2	Book	
3	Manual	
4	Brochure	
5	Pamphlets	
6	Infographics	
7	Videos	
8	Posters	
9	e-book/ e-booklet/ e-manual	
10	Others, if any, please specify	

6. Which modes of training would be more effective for capacity building of your department? Please suggest:

S.No.	Modes of training	Priority		
		Low	Medium	High
1	Physical mode - Interactive sessions (Expert lectures, audio - visual, hands on exercise, case studies, group exercises)			
2	Virtual mode - Interactive sessions (Expert lectures, audio - visual, case studies, group exercises)			
3	e - Learning			
4	Others, please specify			

7. Please suggest best suitable time of the year for conducting trainings for your department and appropriate duration of training:

Months:_____

Duration: (a) 1 day_____ (b) 2 days_____

(c) 3 days_____ (d) 5 days _____

8. Please provide other comments/suggestions related to training needs for capacity building of your department:

_____

_____

_____

Signature of the respondent

Signature .....

Data collected by: .....

Designation: .....

ANNEXURE 4

QUESTIONNAIRE FOR TRAINING NEED ASSESSMENT FOR CAPACITY BUILDING OF THE LOCAL COMMUNITIES ON FOREST LANDSCAPE RESTORATION UNDER RECAP4NDC PROJECT

No: TNA-Q3/ICFRE/ Date: / /2025

Name of the Project: Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) Project

Project Output V: Development of Capacities, Knowledge and Communication Mechanisms for Forest Landscape Restoration

Implementing Agency: Indian Council of Forestry Research and Education (ICFRE), Dehradun

Brief About the Project: German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection has commissioned a project titled Restore, Conserve and Protect Forest and Tree Cover for NDC Implementation in India (RECAP4NDC) under International Climate Initiative. The project is being implemented as part of the Indo-German Partnership for Green and Sustainable Development by a six-member consortium (GIZ, IUCN, FSI, TERI, ICFRE and the ICIMOD). This project aims to enable actors to effectively plan, finance, implement and monitor forest landscape restoration and trees outside forests measures. Thereby, it aims to contribute to the achievement of India's NDC forestry target, enhance biodiversity conservation and sustainably improve rural livelihoods through increased forest and tree cover. Output V of the project aims to transfer knowledge and capacitate stakeholders. Capacity development includes trainings on Forest Landscape Restoration.

Informed Consent: You are requested to participate in the survey being conducted by ICFRE, Dehradun to determine the need of the training required for the capacity building of the local communities on various aspects of Forest Landscape Restoration under the RECAP4NDC Project.

Your contribution will help in identification and prioritization of training needs, preparation of training modules, manuals, knowledge products and building capacity of the local communities on various aspects of Forest Landscape Restoration under the project.

There are no foreseeable risks for participating in this survey. You may withdraw your consent or stop participating in the survey at any time. We will make every effort to maintain the confidentiality of your responses. Only the team of the project will have access to the data and information about participation and will not be shared with others.

Details of Village

Name of Village	
Population of Village	
No. of Males ..... **No. of Females.....** Children (below age of 18 years).....	
No. of Household:	
Gram Panchayat	

Tehsil	
Forest Range	
District	
State	
Comfortable in Language	(a) Hindi (b) English (c) Gujarati (d) Marathi

1. Have you attended any awareness programs on following subject? (Please tick (✓)

S. No.	Awareness on the subject	Yes	No
1	Restoration of degraded forest land		
2	Forest fire management		
3	Community forest management		
4	Sustainable land management practices		
6	6 (a). Agroforestry		
	6 (b). Farm forestry practices		
7	7 (a). Horticulture		
	7 (b). Agriculture practices		
8	Livelihood generation through Non-wood Forest Products		
9	Climate Change and its impacts		
10	Disaster risk management		
11	Spring shed management		
12	Eco -tourism		
13	Biodiversity conservation		
14	Value addition of agricultural products		
15	Value addition of Non - Wood Forest Produce		
16	Agriculture Practices		
17	Others, if any, please specify: 1. ..... 2.		

2. Which soil and water conservation measures are being followed by you? (Please tick (✓)

S. No.	Soil and water conservation measure practices	Yes	No
1	Organic Farming		
2	Terrace Farming		
3	Crop Rotation		
4	Mixed Cropping		
5	Rain Water Harvesting		
6	Mulching		
7	Contour/ Staggered Trenches		
8	Farm bunding		
9	Drip Irrigation		
10	Sprinkler Irrigation		
11	Others, if any, please specify: 1. ..... 2.		

3. Have you observed any changes in climate patterns? (Please tick ✓)

S.No.	Changes in climate patterns	Yes	No
1	a) Flood –increased (frequency)		
	b) Flood –decreased (frequency)		
2	a) Drought –increased (frequency)		
	b) Drought –decreased (frequency)		
3	a) Cloud burst–increased (frequency)		
	b) Cloud burst – decreased (frequency)		
4	a) Change in rain fall pattern (Increase)		
	b) Change in rain fall pattern (Decrease)		
5	a) Change in snowfall pattern (Increase)		
	b) Change in snowfall pattern (Decrease)		
6	a) Change in temperature pattern (Increase)		
	b) Change in temperature pattern (Decrease)		
7	Others, if any, please specify: 1. ..... 2.		

4. Have you observed any changes in forest quality in last 20 years in your areas? (Please tick ✓)

S. No.	Changes in forest quality	Yes	No
1	Trees felling		
2	Plant species reduced		
3	Forest Degraded		
4	a) Increase in Weeds/ invasive species in the forest		
	b) Decrease in Weeds/ invasive species in the forest		
5	Natural regeneration reduced		
6	Reducing NWFPs - (fruits, Honey, etc.)		
7	Improving the quality of forests		
8	Others, if any, please specify: 1. ..... 2.		

5. Does forest fire occur in nearby forest areas?

Yes	No

If yes, please mention its frequency per year, Kindly tick ✓

(a) Once (b) Twice (c) Thrice (d) More than thrice

6. What control measures are being followed for controlling forest fire in your area?

1. _____

2. _____

7 Are you member of any of the following committee?

S.No.	Committee/group	Yes	No
i.	Joint Forest Management Committee (JFMC)		
	If yes, your role .... **Role of Women in JFMC**		
ii.	Biodiversity Management Committee (BMC)	Yes	No
	If yes, your role .... **Role of Women in BMC**		

iii.	Self Help Group (SHG)	Yes	No
	If yes, your role .... **Role of Women in SHG**		
iv.	Farmer Producer Organization (FPO)	Yes	No
	If yes, your role .... **Role of Women in FPO**		
v.	Mahila Mangal Dal	Yes	No
	If yes, your role		
vi.	Attended training programmes as member of above mentioned committees	Yes	No
	If yes, your role		
vii.	Details of important tasks performed by the above mentioned committees		
viii.	Others, if any, please specify:		

8. Role of women in above mentioned committees/Group and Gram Panchayat

1. _____
2. _____

9. Livelihood opportunities from forest in your area?

1. _____
2. _____

10. Suggest any measures for improving forest quality in your areas.

1. _____
2. _____

11. Is agroforestry being practiced in your area? If yes, mention the tree species being used for agroforestry in your area.

1. _____
2. _____

12. Kindly tick (✓) topics and suggest additional topics for capacity need on restoration of degraded landscape for local communities:

S. No.	Suggested Topics for capacity building	Tick (✓) your choice
1	Restoration of degraded forest land	
2	Forest fire management	
3	Community forest management	
4	Sustainable land management practices	
5	Agroforestry/ farm forestry practices	
6	Horticulture/agriculture practices	
7	Livelihood generation through Non-wood Forest Products	
8	Climate Change and its impacts, Climate Change Mitigation and Adaptation	
9	Disaster risk management	
10	Soil and water conservation	
11	Others, if any, please specify:	

13. Which mode of training would be more effective for capacity building of local communities of your areas? Please suggest:

S. No.	Modes of training	Tick (✓) your choice
1	Classroom lectures followed by audio-visual	
2	Demonstrations	
3	Exposure visits	
4	Others, if any, please specify:	

14. Please suggest best suitable time of the year for conducting trainings:
Months:_____

15. Please provide other comments/suggestions related to training needs for capacity building of local communities

_____
_____
_____

16 Details of ongoing or completed projects related to management of natural resources, agriculture, horticulture, industry, livelihood, biodiversity, soil and water conservation, animal husbandry etc. in your village

S. No.	Name of the Project	Year	Department/ Organisation
1.			
2.			
3.			

Data collected by: .....

Signature .....

Designation .....

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