RECAP4NDC Project

CAPACITY BUILDING FOR FOREST LANDSCAPE RESTORATION IN DELHI & NATIONAL CAPITAL REGION: A KEY STAKEHOLDER-BASED TRAINING NEEDS ASSESSMENT

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION, DEHRADUN

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ICIMOD

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

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

RECAP4NDC

Capacity Building for
Forest Landscape Restoration in Delhi & National Capital Region:
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 Delhi and National Capital Region 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 Delhi and National Capital Region: 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 Delhi and National Capital Region.

Date: 30 June 2025

(Kanchan Devi)

ACKNOWLEDGEMENT

The Delhi and National Capital Region comprise of rich reservoirs of biodiversity along Aravalli Mountain range and other effective conservation areas. These forested landscape offer nourishment, economic opportunities and vital ecological functions. As custodians of these precious forest landscapes, the Forest Departments, in collaboration with Other Line Departments, holds the essential duty of preserving, rehabilitating and managing these forest landscape sustainably to guarantee the welfare of both current and future generations.

This report titled 'Capacity Building for Forest Landscape Restoration in Delhi and National Capital Region: 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 Delhi and National Capital Region under the RECAP4NDC Project. Through a comprehensive analysis, it identifies key capacity gaps, key knowledge areas and strategic interventions necessary to empower key stakeholders. The findings aim to enhance the ability of relevant actors to restore degraded forest landscapes while balancing ecological integrity with developmental priorities.

I commend the RECAP4NDC team of ICFRE, officers and staff of the State Forest Departments, other line departments and local communities for their valuable contributions to the training needs assessment. Their insights and inputs have been instrumental in shaping this comprehensive report. This report stands not only as a blueprint for action but also as a testament to our shared commitment to the health of forest landscapes and the well-being of the communities who depend on them.

I would like to express my sincere gratitude to Ms. Kanchan Devi, Director General, ICFRE for her invaluable guidance, insightful direction and unwavering support in 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. I extend my sincere thanks to the Nodal Officer of the RECAP4NDC Project from the State Forest Departments of Delhi, Haryana and Rajasthan, as well as to other officers and field staff for their invaluable support in facilitating the field surveys and assisting in data collection. The support and valuable suggestions provided by the State Forest Department of Delhi, Haryana and Rajasthan are gratefully acknowledged.

Valuable inputs provided by Dr. Shilpa Gautam, Co-Principal Investigator, RECAP4NDC Project, ICFRE in shaping this report is thankfully acknowledged. The dedicated efforts of Dr. Arun Kumar Thakur, Consultant of the RECAP4NDC Project at ICFRE, in data collection, analysis and report preparation are thankfully acknowledged and appreciated.

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I am also thankful to Dr. Sunita Chaudhary, Ecosystem Services Specialist, ICIMOD and her team for their valuable suggestions in finalizing this report. I also extend my thanks to Dr. Mohd. Shahid, Consultant, Mr. Monish Mullick, Consultant and Mr. NPS Nain, Consultant for their meaningful discussions and valuable contributions in preparation of this report. I am also thankful to Mr. Umang Thapa, Consultant for providing necessary support in design and typesetting of the report.

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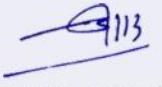
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LIST OF ABBREVIATIONS

BMC	Biodiversity Management Committee
DDA	Delhi Development Authority
DFW	Department of Forests and Wildlife, Delhi
DJB	Delhi Jal Board
DPTA	Delhi Preservation of Trees Act, 1994
FGD	Focus Group Discussion
FLR	Forest Landscape Restoration
FPO	Farmer Producer Organization
GCP	Green Credit Programme
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit
GNCTD	Government of National Capital Territory of Delhi
ha	Hectare
ICFRE	Indian Council of Forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
IKI	International Climate Initiative
IUCN	International Union for Conservation of Nature
JFMC	Joint Forest Management Committee
KVK	Krishi Vigyan Kendra
LDN	Land Degradation Neutrality
LHWRF	Lupin Human Welfare & Research Foundation
MDF	Moderate Dense Forest
mha	Million Hectares
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act.

NCR	National Capital Region
NCT	National Capital Territory
NDC	Nationally Determined Contributions
NGO	Non-Government Organization
NWFPs	Non-Wood Forest Products
OF	Open Forest
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
RWA	Resident Welfare Associations
SDG	Sustainable Development Goals
SFD	State Forest Department
SHG	Self Help Group
SMC	Soil Moisture Conservation
TBS	Tarun Bharat Sangh
TERI	The Energy and Resources Institute
TNA	Training Need Assessment
TOF	Trees Outside Forest
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VDF	Very Dense 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 Delhi and National Capital Region. 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 Delhi and National Capital Region. Officers and frontline staff from State Forest Departments of Delhi and NCR of Haryana and Rajasthan, along with various Other Line Departments were consulted for training needs assessment on FLR. The findings of TNA highlight the significance of focused, practical and interactive trainings to fill in the knowledge gaps with particular reference to the value chain of non-wood forest products, domestic and international funding for FLR, forest carbon stocks measurement, carbon market, forest certification, spring shed management, Green Credit Programme, REDD+, gender mainstreaming in forest management and ecotourism as prioritized by the officers. The frontline staff of State Forest Departments prioritized India's NDC targets under the Paris Agreement, forest carbon stocks measurement, spring shed management, sustainable harvesting of NWFPs and their role in livelihood generation, gender mainstreaming in forest management community forest management, ecotourism, policies, laws and regulations for conservation of forest biodiversity and legal framework for conservation and protection of forest and environment in India. The Other Line Departments determined invasive species and their management, spring shed management, legal framework for

conservation and protection of environment in India, gender mainstreaming in natural resource management, international agreement/ conventions related to environment, ecotourism, disaster management / disaster risk reduction and LiFE style for environment, sustainable development goals for their capacity enhancement.

The communities of the National Capital Region of Haryana and Rajasthan emphasized the need of capacity building on sustainable agriculture practices (improved practices, advance technologies, micro-irrigation techniques), horticulture practices and sustainable land management practices (organic farming, soil and water management) to improve productivity and sustainability. The local communities also recommended that appropriate management techniques for invasive species *'Prosopis juliflora'* should also be given as it has become nuisance in the area. Also, the wildlife conflict issues need to be addressed during the capacity building program so that loss of agricultural crops can be minimized. The local communities were willing to participate in one day training on above mentioned themes.

The development of comprehensive and targeted training modules on FLR is essential for effective capacity building of key stakeholders of Delhi and National Capital Region. 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 and local communities of Delhi and NCR under the RECAP4NDC Project.

1   INTRODUCTION

Forest Landscape Restoration (FLR) is a long-term, integrative process aimed at regaining ecological integrity and enhancing human wellbeing across deforested or degraded forest landscapes. FLR encompasses more than reforestation or afforestation; it seeks to restore the structure, function and composition of entire ecosystems while accommodating a mosaic of land uses. The approach is designed to generate multiple, sustained benefits including biodiversity conservation, carbon sequestration, soil and water protection and socio-economic development within a dynamic and adaptive management framework.

Land resources such as soil, water and forests are under constant pressure due to growing demand of an ever-increasing population and climate change. The total forest and tree cover of India is 82.74 million hectare which is 25.17 % of the geographical area of the country as per latest report (FSI, 2024). As compared to the assessment of 2021, there is an increase of 1445.81 sq km in the total forest and tree cover of the country in 2023. Out of this, the increase in the forest cover has been observed as 156.41 sq km. The total forest cover of the country is 21.76% and the tree cover is 3.41 % of the geographical area (FSI, 2024). As per Land Use Statistics for 2022-23, the reported area of our country is 306650 thousand hectares, of which around 59% is agricultural land and net area sown comprises of 42.8% of the total geographical area (GoI, 2024).

To fully realize the potential of land resources 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. These measures are key for ensuring the resilience and long-term sustainability of India's forest ecosystems.

Assessment of training needs for forest officials and staff of other line departments is crucial to ensure they possess the necessary knowledge, skills, and competencies to effectively manage forests and implement conservation policies. It helps identify gaps in technical expertise, legal awareness, inter-departmental coordination, and emerging areas like climate change, biodiversity, and community participation. A structured needs assessment allows for tailored training programs, leading to better decision-making, efficient resource use and improved service delivery. It also supports capacity building, accountability and alignment with national targets and international commitments, ultimately contributing to more sustainable and resilient forest management practices. Thus, a training need assessment becomes vital for them.

On the same line, capacity building for rural communities in the context of FLR is crucial for achieving sustainable environmental and socio-economic outcomes. Forests play a vital role in maintaining biodiversity, regulating water cycles, and mitigating climate change, making their restoration essential. However, rural communities, often dependent on forests for their livelihoods but lack knowledge and skills needed to restore degraded forest landscapes. Moreover, building governance and leadership skills within these communities is essential for effective decision-making and long-term management of forest landscapes. Equipping rural communities with the necessary tools and knowledge through capacity building ensures that forest landscape restoration (FLR) efforts are not only technically effective but also socially inclusive and sustainable for future generations. Therefore, conducting a training needs assessment on FLR is essential to guide targeted and impactful capacity-building initiatives.

2   OVERVIEW OF DELHI AND NATIONAL CAPITAL REGION

Delhi and NCR are a unique example of inter-state regional planning and development for a region with NCT-Delhi as its core. The Delhi and NCR as notified covers the whole of NCT-Delhi and certain districts of Haryana, Uttar Pradesh and Rajasthan, covering an area of about 55,083 sq km. Delhi and NCR is a large metropolitan area in India that includes the capital city of New Delhi and districts from surrounding states of Haryana, Uttar Pradesh and Rajasthan (Fig. 1). NCR is a unique example of an inter-state regional planning and development for a region with New Delhi Capital Territory (NCT) as its core. The Delhi and NCR covering an area of about 55,083 sq km. The areas under sub-region of Delhi and NCR are given in Table 1.

Table 1. Sub regions of Delhi and National Capital Region

Sub-Region	Name of the Districts	Area (in sq km)
Haryana	Faridabad, Gurugram, Nuh, Rohtak, Sonipat, Rewari, Jhajjhar, Panipat, Palwal, Bhiwani, Charkhi Dadri, Mahendragarh, Jind and Karnal (fourteen districts)	25,327
Uttar Pradesh	Meerut, Ghaziabad, Gautam Budh Nagar, Bulandshahr, Baghpat, Hapur, Shamli and Muzaffarnagar (Eight districts)	14,826
Rajasthan	Alwar and Bharatpur (two districts)	13,447
Delhi	Whole of NCT Delhi	1,483

(Source: https://ncrpb.nic.in/ncrconstituent.html)

Delhi is the National Capital Territory and it is bordered by Haryana on three sides and by Uttar Pradesh in the east. It is located at North Latitude from 28.24° – 28.53° and East Longitude from 76.50° - 77.20°. Delhi covers an area of 1483 sq km of which 369.35 sq km is designated as rural and 1113.65 sq km as urban, which makes it the largest city in terms of area in the country. It has a length of 51.9 km and breadth of 48.48 km. Delhi has 11 districts with 33 Tehsils /Sub-Divisions. Two prominent features of Delhi are Yamuna flood plains and the Ridge. It is in India's seismic zone-iv, an indication of its vulnerability to major earthquakes (GNCTD, 2023).

Source: https://ncrpb.nic.in/ncrconstituent.html

Fig. 1: Administrative map of Delhi and National Capital Region

3 LAND USE PATTERN

The land use pattern in Delhi and NCR is crucial for managing the rapid urbanization, ensuring sustainable development and improving the quality of life. Proper land use planning helps in efficiently allocating spaces for residential, commercial, industrial and green areas. It also supports environmental sustainability by preserving green spaces, managing pollution and addressing water conservation. Additionally, it ensures the region's economic growth by promoting balanced development, affordable housing and effective transportation networks, while mitigating risks like urban sprawl and environmental degradation. Thus, effective land use planning is vital for creating a liveable, resilient and well-organized urban environment. Land use statistics are crucial data indicators for understanding land utilization patterns in planning

and policy formulation. They reveal how land is allocated for various purposes such as forests, agriculture, non-agriculture, irrigation and non-cultivated areas. The land use pattern of Delhi, Rajasthan and Haryana is given in Table 2 while land use pattern of constituent districts of Delhi and NCR is given in Table 3.

Table 2. Land Use Pattern of Delhi, Rajasthan and Haryana

Land Use Types	Delhi		Rajasthan		Haryana	
	Area (in '000 ha)	Percentage	Area (in '000 ha)	Percentage	Area (in '000 ha)	Percentage
Geographical Area	148		34224		4421	
Reporting area for land utilization	165.51	100	34292.67	100	4371.49	100
Forests	19.50	11.78	2777.56	8.10	32.45	0.74
Land not available for cultivation	93.19	56.30	4396.61	12.82	339.19	7.76
Permanent pastures and other grazing lands	0.06	0.04	1653.31	4.83	152.72	3.49
Land under misc. tree crops and groves	1.18	0.71	28.81	0.08	37.37	0.85
Culturable wasteland	9.89	5.98	3680.16	10.73	64.62	1.48
Fallow land other than current fallows	8.07	4.88	2039.70	5.95	49.18	1.13
Current fallows	11.73	7.09	1584.92	4.62	85.23	1.95
Net area sown	21.89	13.22	18129.60	52.87	3610.73	82.60

Source: Land Use Statistics, Ministry of Agriculture, Govt. of India, 2021-22

Table 3. Land Use Pattern (area in ha) of districts of National Capital Region of Haryana, Uttar Pradesh and Rajasthan

Districts of NCR	Reporting Area for LUS	Forests	Not available for Cultivation	Permanent Pasture and other Grazing Land	Land under Misc. Tree Crops and Groves not included in Net Area Sown	Culturable waste Land	Fallow Lands other than current Fallows	Current Fallow	Net Area Sown
Faridabad	73042	323	39695	271	106	-	-	-	32647
Gurugram	120149	159	1504	255	28	28	301	218	117656
Mewat	147650		34717	508		-	-	2148	110277
Rohtak	166847	590	8592		223	16470	-	4130	136842
Sonipat	214809	496	7277	3277	1516	-	-	46148	156095
Rewari	150678	1859	18243	980	-	3312	657	-	125627
Jhajjar	191155		8585		-	-	45835	16813	119922
Panipat	129820	1307	1741	4854	16409	676	4763	3510	96560
Palwal	133157	2843	15232	1415	-	-	-	12525	101142
Bhiwani	328422	1661	11238	21270	-	-	-	-	294253
Mahendragarh	194160	193	4839	23	-	-	-	-	185556
Jind	253411	612	23577	390	517	2778		-	223933
Karnal	246251	1178	29955	14676	-	-	-	-	200442
Alwar	783276	86102	127380	23787	109	6334	29032	16248	494284
Bharatpur	506750	39929	44811	7883	93	1903	10216	9532	392383
Baghpat	130193	1735	18586	99	147	3135	86	1676	104729
Bulandshahr	363698	8448	61492	1017	290	1769	4253	1760	284669
Gautam Buddha Nagar	120185	1869	57103	430	647	594	7909	2570	49063
Ghaziabad	89065	1824	36654	8	181	1233	2922	1711	44532
Meerut	248769	19605	36130	298	94	732	292	898	190720
Muzaffarnagar	262718	24439	34367	81	765	979	121	731	201235

Source: Land Use Statistics, Ministry of Agriculture, GOI, 2022-23

Naikoo *et al.* (2020) on analysis of Landsat datasets concluded that there have been considerable changes in land use and land cover in Delhi and the NCR, characterized by a continuous increase in built-up areas and open/ fallow land, alongside a decrease in agricultural land and vegetation. Built-up area has witnessed a gigantic growth of 114% from 1990 to 2003 and 99.02% from 2003 to 2018, making an overall growth of 326% during 1990-2018 (Table 4). Built-up area has mostly increased at the expense of agricultural land and vegetation cover while vegetation cover has been transformed into built-up area, ridge and agriculture.

Delhi dominates impermeable concrete surfaces in NCR, encompassing residential, industrial, and commercial areas (Hang and Rahman, 2018). This land use practice is rapidly gaining traction (Suzanchi and Kaur, 2011). Delhi's population has grown significantly, from 1.7 million in 1951 to over 16 million in 2011, making it one of the world's high-spread suburbs (Census of India, 2011).

Table 4. Change dynamics of area under each LULC classes during 1990–2018

Land use/ land cover categories	1990		2003		2018		Area Change (%)		
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	1990-2003	2003-2018	1990-2018
Water body	31282.6	0.57	42218.7	0.76	24242.2	0.44	34.96	−42.58	−22.51
Agricultural land	4334310	78.43	4047340	73.24	3795260	68.67	−6.62	−6.23	−12.44
Ridge	351,483	6.36	350,020	6.33	350,002	6.33	−0.42	−0.01	−0.42
Built up	92176.8	1.67	197,607	3.58	393,274	7.12	114.38	99.02	326.65
Vegetation	71101.8	1.29	54590.6	0.99	46330.1	0.84	−23.22	−15.13	−34.84
Open/Fallow land	646,064	11.69	834,642	15.10	917,309	16.60	29.19	9.90	41.98
Total	**5526418**	**100**	**5526418**	**100**	**5526418**	**100**	−	−	−

4 FORESTS AND TREE COVER

As per the India State of Forest Report 2023, recorded forest area of Delhi is 104 sq km which is 7.01% of its total geographical area. 85 sq km falls under Reserve Forest and 13 sq km falls under protected forest. Its forest cover is 195.28 sq km which represents 13.17% of the state's total geographical area. Total forest and tree cover of the state constitutes 371.31 sq km which is 25.04% of total geographical area (1483 sq km). The whole of forest cover of Delhi exists in the altitudinal range of $0-500$ m (FSI, 2024). The forest cover of Delhi and NCR is given in Table 5.

Table 5. Forest Cover in districts of Delhi and NCR (in sq km)

State	Districts	Geographical Area (GA)	Forest Cover Area	% of GA
Delhi	Central Delhi	107	12.17	11.37
	East Delhi	32	1.93	6.03
	New Delhi	156	48.64	31.18
	North Delhi	291	11.72	4.03
	North-East Delhi	35	2.38	6.80
	North-West Delhi	154	5.72	3.71
	Shahdara	34	0.90	2.65
	South-Delhi	159	70.89	44.58
	South-East Delhi	101	19.54	19.35
	South-West Delhi	283	12.65	4.47
	West-Delhi	131	8.74	6.67
	Total	**1483**	**195.28**	**13.17**
Haryana	Faridabad	741	78.43	10.58
	Gurugram	1258	113.11	8.99
	Nuh (Mewat)	1507	108.96	7.23
	Rohtak	1704	14.54	0.85
	Sonepat	2163	22.64	1.05
	Rewari	1594	61.45	3.86

Haryana	Jhajjhar	1834	25.56	1.39
	Panipat	1288	15.97	1.24
	Palwal	1359	13.82	1.02
	Bhiwani	3386	62.61	1.85
	Charkhi Dadri	1382	45.92	3.32
	Mahendragarh	1899	111.31	5.86
	Jind	2701	26.43	0.98
	Karnal	2494	32.95	1.32
Total		**25310**	**733.7**	**2.9**
Rajasthan	Alwar	8383.63	1198.74	14.30
	Bharatpur	5066.97	214.28	4.23
Total		**13450.6**	**1413.02**	**10.51**
Uttar Pradesh	Meerat	2500.86	91.33	3.65
	Ghaziabad	891.61	21.02	2.36
	Hapur	1106.67	27.81	2.51
	Gautam Buddha Nagar	1441.86	22.77	1.58
	Bulandshahar	3431.04	141.53	4.12
	Baghpat	1321.38	15.48	1.17
	Muzaffarnagar	2750.86	54.06	1.97
	Shamli	1257.46	24.39	1.94
Total		**14701.74**	**398.39**	**2.71**
Total of Delhi and NCR		**54945.34**	**2740.39**	**4.99**

Source: FSI, 2024

Forest cover as reported in India State of Forest Report 2023, includes all lands with more than one hectare in area with tree canopy density of more than 10%, irrespective of ownership, legal status of the land and species composition of trees. The very dense forest (VDF) comprises of lands with tree canopy density of 70% and above. The moderate dense forest (MDF) comprises of lands with tree canopy density of 40% and more but less than 70%. The open forest (OF) comprises of lands with tree canopy density of 10% and more but less than 40%. The details of forest cover density in Delhi and NCR are mentioned in Table 6.

Table 6. Forest cover density Delhi and NCR

Delhi and NCR	S. No.	Districts	Geographical Area (GA)	VDF	MDF	OF	Forest Cover Area	% of GA
National Capital Territory (NCT) Delhi	1	Central Delhi	107	0.01	5.11	7.05	12.17	11.37
	2	East Delhi	32	0	0.29	1.64	1.93	6.03
	3	New Delhi	156	2.71	13.84	32.09	48.64	31.18
	4	North Delhi	291	0.02	5.34	6.36	11.72	4.03
	5	North-East Delhi	35	0	0.36	2.02	2.38	6.80
	6	North-West Delhi	154	0.08	2.88	2.76	5.71	3.71
	7	Shahdara	34	0	0.25	0.65	0.90	2.65
	8	South Delhi	159	2.99	13.95	53.95	70.89	44.58
	9	South-East Delhi	101	0.66	4.65	14.23	19.54	19.35
	10	South-West Delhi	283	0	3.24	9.41	12.65	4.47
	11	West Delhi	131	0	3.64	5.10	8.74	6.67
Part of Haryana NCR in	12	Faridabad	741	0	25.98	52.45	78.43	10.58
	13	Gurugram	1258	0	31.85	81.26	113.11	8.99
	14	Mewat (Nuh)	1507	0	13.58	95.38	108.96	7.23
	15	Rohtak	1704	0	1.36	13.18	14.54	0.85
	16	Sonipat	2163	0	2.66	19.98	22.64	1.05
	17	Rewari	1594	0	11.90	49.55	61.45	3.86
	18	Jhajjar	1834	0	0.23	25.33	25.56	1.39
	19	Panipat	1288	0	3.10	12.87	15.97	1.24
	20	Palwal	1359	0	2.43	11.39	13.82	1.02
	21	Bhiwani	3386	0	4.08	58.53	62.61	1.85

	22	Mahendragarh	1899	0	21.74	89.57	111.31	5.86
	23	Jind	2701	0	4.79	21.64	26.43	0.98
	24	Karnal	2494	0	4.16	28.79	32.95	1.32
Part of Rajasthan in NCR	25	Alwar	8,383.63	61.72	335.28	801.74	1198.74	14.30
	26	Bharatpur	5066.97	0	47.11	167.17	214.28	4.23
Part of UP in NCR	27	Baghpat	1321.38	0	3.52	11.96	15.48	1.17
	28	Bulandshahr	3431.04	0	42.61	96.92	141.53	4.12
	29	Gautam Buddha Nagar	1441.86	0	4.45	18.32	22.77	1.58
	30	Ghaziabad	891.61	0	7.90	13.12	21.02	2.36
	31	Meerut	2559	2500.86	0	34.59	56.74	91.33
	32	Muzaffarnagar	2750.86	0	8.43	45.63	54.06	1.97
	33	Hapur	1106.67	0	6.72	21.09	27.81	27.81
	34	Shamli	1257.46	0	3.96	20.43	24.39	1.94

Reported tree cover of Delhi is 176.03 sq km (FSI, 2024), which is 58.03 sq km more than the 118.00 sq km reported in 2013 (FSI, 2021).

5 FOREST CARBON STOCKS

The total forest carbon stock in Delhi is estimated as 1221 thousand tonnes. The forest carbon stock is assessed in five carbon pools: aboveground biomass (AGB), belowground biomass (BGB), deadwood biomass, litter biomass and soil organic matter (SOC). The five pool forest carbon stock for Delhi and adjoining states is given in Table 7.

Table 7. Forest Carbon stocks of Delhi and NCR states (in '000 tonnes)

States	Area (sq km)	Carbon Pools					
		AGB	BGB	Deadwood	Litter	SOC	Total
Delhi	195	277	82	26	11	825	1221
Haryana*	1614	2406	858	189	91	6932	10476
Rajasthan*	16548	26374	10646	1493	930	70728	110171
Uttar Pradesh*	15046	33597	10469	1615	1620	72833	120134

*The total forest carbon stock value is mentioned for Haryana, Rajasthan and Uttar Pradesh.

Source: FSI, 2024

6 FLORAL AND FAUNAL DIVERSITY

The forest type of an area refers to its physiognomy, structure and floristic features which are determined by geography, topography and anthropogenic factors. The forest types of Delhi fall broadly into two groups: (i) Tropical Dry Deciduous Forests (Group 5) and (ii) Tropical Thorn Forests (Group 6). Further, they can be classified into three sub-groups: (i) Northern Dry Mixed Deciduous Forest (Sub-group 5B/C2), (ii)Ravine Thorn Forest (Sub-group 6B/C2) and (iii) Plantation/ Trees outside forests. Floral diversity of Delhi includes 377 genera and 551 species of angiosperms. Faunal diversity of Delhi includes 29 species of mammals, 249 species of avifauna, 5 species of reptiles, 5 species of amphibians, 25 species of arthropods, 3 species of fishes[1]. The forest type present along Aravalli in Gurugram and Faridabad (Haryana) is mainly composed of Ravine Thorn Forest (6B/C2). The forest type located along the Aravalli in Alwar (Rajasthan) is predominantly made up of Northern Dry Mixed Deciduous Forest (5B/C2) (FSI, 2020).

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[1]https://forest.delhi.gov.in/sites/default/files/generic_multiple_files/delhi_s_forest_ at_a_glance.pdf

7   LAND DEGRADATION STATUS

The statistical summary and analysis of the land degradation status of Delhi state reveal that 61.73% (91,543 ha) of the total geographical area is undergoing desertification/ land degradation during timeframe of 2018-19. The area undergoing desertification/ land degradation during timeframe 2011-13 and 2003-05 was observed at 60.60% (89,868 ha) and 49.57% (73,514 ha) respectively. An increase of 1.13% (1,674 ha) in the land area undergoing desertification/ land degradation was observed from timeframe 2011-13 to 2018-19. Whereas, from timeframe 2003-05 to 2011-13, the area undergoing desertification/ land degradation has increased by 11.03% (16,354 ha). Almost 54.76% area of the state was occupied by settlement in 2018-19, which was 53.64% and 42.61 % during timeframe of 2011-13 and 2003-05 respectively. Significant process of desertification/ land degradation was vegetation degradation (6.73% in 2018-19, 2011-13 and 2003-05). The increase in area undergoing land degradation is primarily due to increase in urbanization (SAC, 2021). Land degraded in various parts of Delhi and NCR and their causal agents are given in Table 8 and 9 (SAC, 2021).

Table 8. Total geographic area undergoing desertification/land degradation during the timeframe 2018-19 in Delhi and NCR

States	Delhi	Haryana	Rajasthan	Uttar Pradesh
Desertification/ land degradation	61.73% (91,543 ha)	8.24% (3,64,154 ha)	62.06% (21.23 m ha)	6.43% (1.54 m ha)

Source: SAC, 2021

Table 9. Most significant processes of desertification/land degradation in Delhi and NCR

Delhi	Haryana	Rajasthan	Uttar Pradesh
■ Settlement ■ Vegetation degradation	■ Wind erosion ■ Vegetation degradation	■ Wind erosion ■ Vegetation degradation ■ Water erosion	■ Water erosion ■ Vegetation degradation ■ Salinity

8   PROGRAMMES/ PROJECTS ADDRESSING THE FOREST DEGRADATION

Aravalli Green Wall Project – Haryana: The Aravalli Green Wall Project aims to create green corridors to combat land degradation and desertification in states of Haryana, Rajasthan, Gujarat and Delhi - where the Aravalli hills landscape span over 6 million hectares of land and involves planting of native species on wasteland and degraded forest land, along with rejuvenating and restoring water bodies. The Aravalli Green Wall Project aims to improve ecological health, prevent Thar Desert expansion, reduce land degradation and enhance biodiversity. It involves local communities in sustainable development, afforestation and water conservation. The project involves multiple stakeholders, including governments, research institutes, and communities. In the initial phase, 75 water bodies will be rejuvenated under the project in the state of Haryana. The project will also include large-scale plantation drives and conservation of water resources in the Aravalli region. The project will cover degraded land in Gurgaon, Faridabad, Bhiwani, Mahendergarh and in Rewari districts of Haryana.

Green Uttar Pradesh (Forestry) Mission: Green Uttar Pradesh Mission is one the missions under the Uttar Pradesh State Action Plan on Climate Change 2021-2030. It derives its mandate from National Mission for Green India. The mission covers forest and biodiversity conservation-related aspects along with enhancement of livelihood of forest dependent communities and reducing pressure on forest resources. The objective is to safeguard biological resources and the associated livelihoods within the state from the adverse effects of climate change. It mainly involves the following two strategies:

- Agro-forestry through carbon financing enhancing farmer's income
- Enriching open and medium dense forest and planting trees outside forests to improve ecosystem services and sequester more carbon

Rejuvenation of Yamuna River: Detailed Project Report for Rejuvenation of Yamuna River through Forestry Interventions has already been prepared by Forest Research Institute, Dehradun submitted to Ministry of Environment, Forest and Climate Change, Government of India[2].

9   DEMOGRAPHIC PROFILE

The demographic data for the rural and urban population of various districts of Delhi and NCR is given in Table 10.

Table 10. Rural and urban population of districts of Delhi and NCR

State	Districts of Delhi and NCR	Rural		Urban		Total	
		Households	Population	Households	Population	Households	Population
Haryana	Bhiwani	248136	1313123	63244	321322	311380	1634445
	Faridabad	63366	370878	295553	1438855	358919	1809733
	Gurgaon	88678	472179	237750	1042253	326428	1514432
	Jhajjar	136503	715066	48831	243339	185334	958405
	Jind	190875	1028569	58861	305583	249736	1334152
	Karnal	198594	1050514	93490	454810	292084	1505324
	Mahendragarh	147122	789233	24590	132855	171712	922088
	Mewat	139975	965157	20305	124106	160280	1089263
	Palwal	129696	806164	41461	236544	171157	1042708
	Panipat	121876	650352	113764	555085	235640	1205437
	Rewari	130299	666902	47744	233430	178043	900332
	Rohtak	117450	615040	89538	446164	206988	1061204
	Sonipat	187552	996637	90174	453364	277726	1450001
Delhi	Central	0	0	119639	582320	119639	582320
	East	875	3530	358062	1705816	358937	1709346
	New Delhi	0	0	33208	142004	33208	142004
	North	3312	17746	176732	870232	180044	887978
	North East	3938	21527	402187	2220097	406125	2241624
	North West	40500	213950	695753	3442589	736253	3656539
	South	2457	12193	571676	2719736	574133	2731929
	South West	27322	143676	467117	2149282	494439	2292958
	West	1170	6420	532051	2536823	533221	2543243
Rajasthan	Alwar	511517	3019728	128203	654451	639720	3674179
	Bharatpur	338689	2053363	86725	495099	425414	2548462

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[2] https://fri.icfre.gov.in/wp-content/uploads/2024/07/Preparation-of-Detailed-Project-Report-for-Rejuvenation-of-Yamuna-River-through -Forestry-Interventions. pdf

Uttar Pradesh	Baghpat	164494	1028023	45422	275025	209916	1303048
	Bulandshahr	440668	2631742	146861	867429	587529	3499171
	Gautam Buddha Nagar	111916	673806	215174	974309	327090	1648115
	Ghaziabad	248050	1519098	602626	3162547	850676	4681645
	Meerut	271679	1684507	307431	1759182	579110	3443689
	Muzaffarnagar	475749	2952200	200893	1191312	676642	4143512
	Total	4542458	26421323	6315065	31735963	10857523	58157286

Source: Census of India, 2011

Delhi is one of the fastest growing cities in the country. Due to rapid pace of urbanization, the landscape of Delhi has undergone a change from a rural to urban. The rural to urban area change during the last three censuses in Delhi is given in Table 11.

Table 11. Rural to Urban area changes from 1991 to 2011 in Delhi

S. No.	Area	1991		2001		2011	
		sq km	%	sq km	%	sq km	%
1	Rural	797.66	53.79	558.32	37.65	369.35	24.9
2	Urban	685.34	46.21	924.68	62.35	1113.65	75.1

Source: Census of India, 1991, 2001 and 2011

The growth in the urban area during 2001-2011 was observed at 20.44%. This pace of urbanization has reduced the number of villages in Delhi from 300 in 1961 to 165 in 2001 and 112 in 2011. The number of urbanized villages has increased from 20 in 1961 to 135 in 2011. The number of census towns has increased from 3 in 1971 to 29 in 1991 and 110 in 2011. Thus, more and more rural villages of Delhi are being declared as census towns in each successive Census, resulting in decreasing rural population and rural areas in Government of National Capital Territory of Delhi (GNCTD, 2024).

As per 2011 census, the population of Delhi was 16.78 million as against 13.85 million in 2001. Sex ratio is a very important demographic indicator for analyzing the socio-economic features of a population. As per the Census 2011, the sex ratio of Delhi was 868 (as compared to 821 in 2001); the density of population in Delhi was at 11320 persons per sq km (highest among all states and union territories) as against the national level of 382 persons per sq km. As per Census 2011, there were 33,40,538 households in Delhi. The average size of a household in Delhi was found to be 5.02 and Delhi showed a high level of literacy, i.e., 86.2 % (compared to 81.67 % in 2001), with the literacy rate of 90.9% for males and 80.8% for females. The rural and urban literacy rates of Delhi were 81.9% and 86.3% respectively, in 2011.

10   LIVESTOCK

Animal husbandry plays a vital role in the agricultural landscape of Delhi and NCR, contributing significantly to the region's economy and food security. It supports dairy farming, poultry and livestock rearing; providing a steady supply of milk, eggs, meat and wool to meet the demands of the growing urban population. Additionally, animal husbandry supports livelihoods for rural and peri-urban communities, creating employment opportunities. With the region's expanding demand for animal-based products, advancements in breeding, healthcare and feeding practices are also helping improve productivity and sustainability in the sector. Due to rapid urbanization and limited availability of fodder/pasture land in NCT of Delhi scope of animal husbandry is being reduced continuously. Delhi has become a consumer state wherein livestock and livestock products are being supplied from other states. As per 20th Livestock Census (2019) number of livestock has been reduced to 3,07,267 from 3,66,397 in 19th Livestock Census (2012). The district wise livestock population is given in Table 12.

Table 12. Livestock population of districts Delhi and NCR (Census 2019)

S. No	State	District	Cattle	Buffalo	Sheep	Goat	Horse*	Pony	Mule	Donkey	Camel	Pig	Total poultry
1	Haryana	Bhiwani	105374	277555	34533	32270	584	54	182	80	1001	3517	777234
2		Faridabad	42988	114100	3721	6790	112	4	23	21	5	1562	69867
3		Gurugram	63916	112204	3207	9490	710	99	84	88	25	8880	494424
4		Jhajjar	62574	180459	9396	7837	347	29	330	37	18	11989	403395
5		Jind	116624	393606	22805	11009	555	90	163	14	106	6308	5627554
6		Karnal	155195	200645	10851	9313	677	29	65	21	125	10346	9565575
7		Mahendragarh	51113	187207	22995	45967	412	8	135	19	807	1354	988045
8		Mewat	29810	174347	5522	26522	113	4	29	70	303	761	23989
9		Palwal	49684	199491	7591	13072	320	23	64	89	2	3207	18743
10		Panipat	74761	165167	5008	4595	387	14	22	6	1	4367	5139088
11		Rewari	44310	160423	5384	24127	260	16	248	22	219	7457	441638
12		Rohtak	64075	174156	9981	6660	257	39	132	79	2	8694	364313
13		Sonipat	111458	224980	7103	7332	456	61	31	4	0	12399	955218
14	Rajasthan	Alwar	241856	1144753	60432	403117	1086	66	330	209	4918	11722	433069
15		Bharatpur	205401	760323	76693	168158	700	1	20	203	1747	15148	196778
16	Uttar Pradesh	Baghpat	145930	316815	2178	16948	1262	173	112	112	111	3580	73995
17		Bulandshahr	304321	972027	3793	127975	1807	1549	274	275	1	6332	34890
18		Gautam Buddha Nagar	90867	264982	1220	18114	540	0	52	91	2	3012	91657
19		Ghaziabad	100200	213720	914	17397	577	38	85	142	12	2583	159515
20		Hapur	102115	246786	959	30690	782	5	61	51	0	4686	11239
21		Meerut	244585	515704	3828	43470	1958	10	262	102	5	8276	391369
22		Muzaffarnagar	291224	459747	5664	29793	2182	42	225	185	28	8666	22316
23		Shamli	117891	253286	2842	21559	1310	23	121	36	12	5121	296426
24	Delhi		86433	162142	932	30470	2694		136	1087	157	76346	0

*(Horse in case of Delhi also consist of pony)

Source: https://www.data.gov.in/Catalog/20th-livestock-census

11 OVERVIEW OF THE KEY STAKEHOLDERS FOR FOREST LANDSCAPE RESTORATION

Forest Landscape Restoration (FLR) in Delhi and NCR involves multiple stakeholders working together to restore degraded forest landscape. Key stakeholders for FLR are as under:

Department of Forests and Wildlife, Government of National Capital Territory of Delhi:

The State Forest Department functions as the primary authority responsible for the administration and management of the state's forest resources, which encompass wildlife and biodiversity. It serves as the guardian of all government-designated forest areas, guaranteeing the preservation, development and scientific management of the state's forest resources. The total recorded forest area in Delhi is 85 sq km, i.e., 5.73% of the geographic area of which the Reserved and Protected Forests constitute 91.76% and 8.24% of the total forest area respectively. The map of forest divisions of Delhi is shown below in Fig. 2.


(Source: DFW, Delhi, 2024)
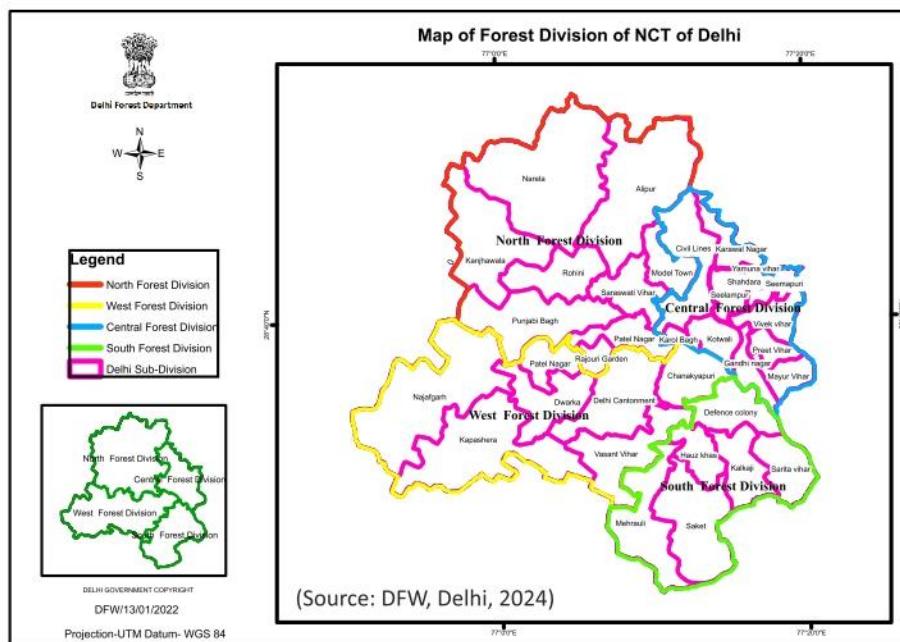
Fig. 2: Map showing sub-divisions of Delhi

Haryana Forest Department: The Haryana Forest Department is responsible for maintaining the state's forested area. Haryana with total geographical area of 44212 sq km has 1614.26 sq km (3.65% of GA) area under forest cover (FSI, 2024). The area in Haryana sub-region of Delhi and NCR is being managed by the South Circle (Gurgaon) by the Forest Divisions of Gurgaon, Faridabad, Rewari, Mahendragarh, Palwal and Mewat; West Circle (Hisar) by Bhiwandi and Jind Forest Divisions; Central Circle (Rohtak) by Rohtak, Panipat, Sonipat and Jhajjar Forest Divisions.

Rajasthan Forest Department: The state of Rajasthan with geographical area of 342239 sq km of which Alwar has 8383.63 sq km area and Bharatpur has 5066.97 sq km. The forest cover of Alwar is 1198.74 sq km (14.30% of GA of Rajasthan) while Bharatpur has 214.28 sq km of forest cover (4.23% of GA of Rajasthan) (FSI, 2024). According to a report from the Rajasthan State Forest Department[3], Bharatpur and Alwar (Fig. 3 & Fig. 4) of Rajasthan are part of the Delhi and NCR. There are seven forest ranges in Alwar Forest Division and six Forest Ranges in Bharatpur Forest Division. The department already runs various forestry initiatives, such as Integrated Afforestation and Eco-development Projects in Sariska Tiger reserve area. In addition, the department has taken certain initiatives like Janta Van Yojna with the goal of including the Village Forest Project maintenance Committee and other institutions in the implementation of works in forest/ plantation areas and facilitation of people with Amrita Devi Vishnoi Smriti Award for protecting trees.

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[3]https://forest.rajasthan.gov.in/content/dam/raj/forest/ ForestDepartment/PDFs/annual-reports/Forest% 20Department%20Annual%20Report_2023-24.pdf
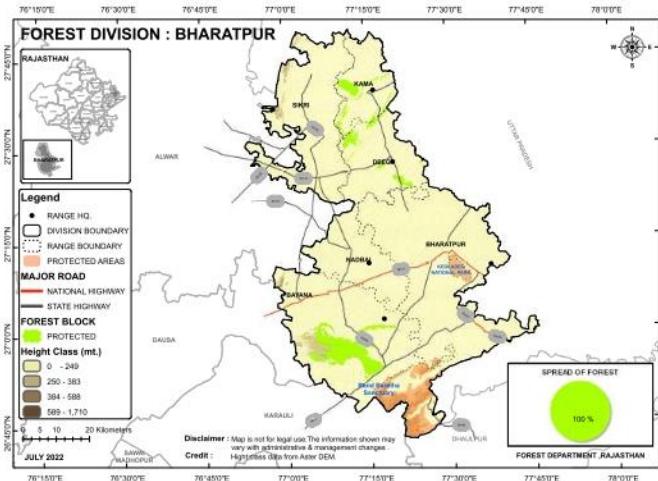
Fig. 3: Map of Bharatpur Forest Division
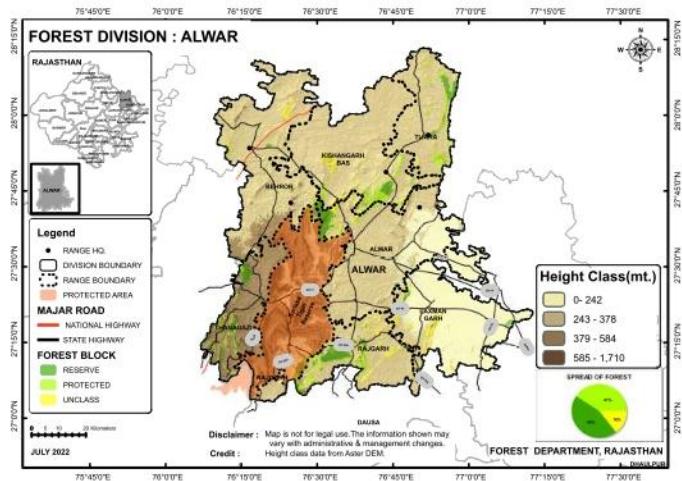
Fig. 4: Map of Alwar Forest Division

Delhi Development Authority: The Delhi Development Authority (DDA) was created in 1957 under the provisions of the Delhi Development Act, 1957 and is responsible for planning, development and construction of housing projects, commercial lands, land management, land disposal, land pooling land costing etc. The Horticulture Department works under the leadership of the Principal Commissioner, supported by the Director (Horticulture) who further looks after 11 Horticulture Divisions, one in each district headed by Deputy Director (Horticulture). It is involved in the development and maintenance of parks, green belts and open spaces in Delhi. It is also responsible for preserving the city's ecological balance, managing water bodies and ensuring green initiatives like planting of trees. The DDA has good number of modern and highly productive nurseries throughout the National Capital Territory which ensures self-sustainability. These nurseries are producing seedlings of various trees, shrubs, hedges, hedges, seasonals, groundcovers, ornamental plants including indoor and outdoor plants, bonsai, etc. DDA has established a network of seven Biodiversity Parks (Yamuna Biodiversity Park, Aravalli Biodiversity Park, Northern Ridge, Tilpath valley Biodiversity Park, Neela Hauz Biodiversity Park, Tughlaqabad Biodiversity Park and Kalindi Biodiversity Park) in Delhi with unique landscapes that harbour diversity of plants, animals and microbes living in ecologically sustainable biotic communities and rendering multiple ecological services (Fig. 5).
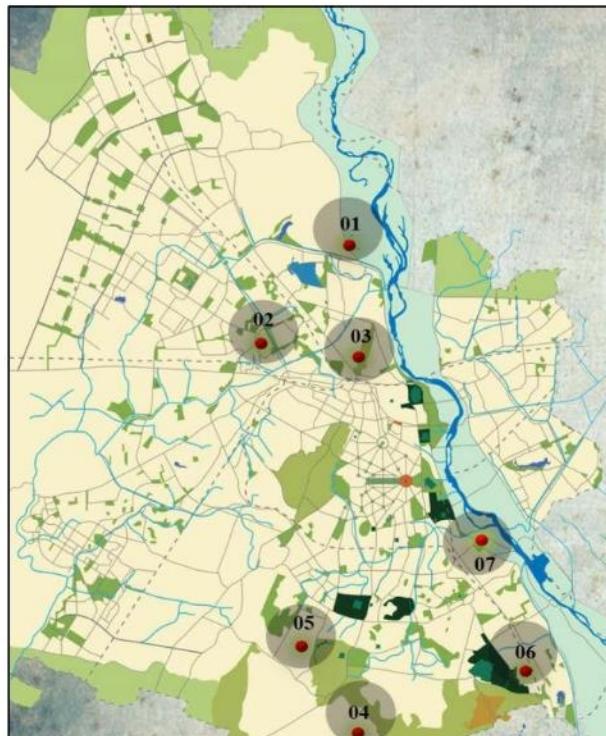
Fig. 5: Locations of Biodiversity parks in Delhi NCR

Delhi Jal Board (DJB): The DJB constituted under the Delhi Jal Board Act, 1998, is responsible for the distribution of drinking water and also for collection, treatment and disposal of domestic sewage in the Capital. The department has Horticulture unit looking after horticulture work in the areas under DJB. The board has regional offices supported by sub-district offices present at district level.

Municipal Corporation of Delhi: The Municipal Corporation of Delhi (MCD) came into existence after the merger of older civic bodies on 22nd May 2022. It provides civic services to approximately 20 million citizens of Delhi. It occupies an area of 1397.3 sq km which is sub- divided into 12 zones. The Horticulture Department of MCD maintain 15229 parks having area of 5233.219 acre under its jurisdiction. Out of these, there are 8853 Developed Park and 6376 Un-developed parks. MCD is managing the gardens, parks, open spaces, playground, stadium, traffic circles, central verges, roadside plantation etc. in area of nearly 1400 sq km under its jurisdiction. The Horticulture Department is also managing and improving horticulture services in the city, old city, trans-Yamuna area and rural area.

Department of Animal Husbandry, Rajasthan: Established in 1958, the Animal Husbandry Department has its office in Bharatpur District of NCR area and is headed by Additional Director supported by subordinate staff. The department aims to increase the productivity of the animals and carries out activities and breed improvement programme[4].

Department of Watershed Development and Soil Conservation, Rajasthan: Founded in 1991, the Department of Watershed Development and Soil Conservation has its field office at Bharatpur district in NCR and works on various schemes implemented through Gram Panchayat/ Panchayati Raj Institutions. The department uses technical approach of *in-situ* moisture conservation using a Ridge to Valley method, lower the velocity of runoff, rainfall water harvesting, alternate land use methods such as forestry plantations, pasture development, horticulture and agroforestry. The social strategy involves community participation, demand driven projects and equity for resource poor and women[5].

Directorate of Horticulture, Rajasthan: The Department of Horticulture has its field office at Alwar and Bharatpur in NCR area. In addition to being a growth engine for the agriculture sector, horticulture is a way to achieve nutritional security in the state. The diverse agroclimatic conditions in Rajasthan facilitate the production of a wide range of horticultural crops. The department is headed by Assistant Director at the district level field office. The department work to increase the horticultural area, production of fruits, vegetables, spices, medicinal and floriculture crops; disease free and true to type varieties of fruits, vegetable and spices crops; linking solar pumps with Hi-tech Horticulture/Agriculture units, development of Greenhouses, Micro irrigation systems (Drip and Sprinkler), Community ponds etc[6].

Agriculture Department, Rajasthan: The Agriculture Department has its office at Alwar and Bharatpur in Delhi and NCR area. The department's mission is to achieve self-sufficiency in food production, increase agricultural production and income of farmers/ farm labours, promote sustainable use of Natural Resources such as Land and Water, promote Soil Health Management and Integrated Nutrient Management and to promote Crop Diversification along with others[7]. The department carries out extension activities through Assistant Agriculture officers and Agriculture supervisors working in Panchayat Samities at the field level.

Rural Development Department, Rajasthan: Evolving since 1971, the Rural Development Department and Panchayati Raj Department were merged for the better coordination. The department work with a view to remove the developmental imbalance and give requisite priority to the rural areas and neglected sections. Every district has Rural Development Cell that works with Zila Parishad to implement various schemes of Rural Development and Panchayati Raj. The department has its cell in Alwar and Bharatpur districts in NCR[8].

Department of Agriculture, Haryana: The Department of Agriculture in Haryana plays a pivotal role in enhancing the state's agricultural productivity and ensuring food security. It focuses on improving farming practices, promoting the use of modern technologies and ensuring sustainable agricultural development. The department runs several schemes for

[4]https://animalhusbandry.rajasthan.gov.in/ah/#/sm/ jankalyan-category-and-entry-type /15632/10/4/18
[5]https://water.rajasthan.gov.in/wdsc/#/sm/jankalyan-category-and-entry-type/141589/ 143/4/2
[6]https://agriculture.rajasthan.gov.in/ horticulture/#/sm/jankalyan-category-and-entry-type/ 54144/81/72/382/31083
[7]https://agriculture.rajasthan.gov.in/agriculture/#/sm/jankalyan-category-and-entry-type/24061 /5/4/1
[8]https://rdprd.rajasthan. gov.in/sm/jankalyan-category-and-entry-type/13554/128/4/1

the welfare of farmers sponsored by the central government like Haryana Pragtisheel Kisan Yojna, National Food Security Mission, dhaincha seed distribution under Community Development Programme, Har Khet Swasth Khet, Applications for Agriculture Machinery and Equipment under Sub-Mission on Agricultural Mechanization[9] and many more.

Directorate of Horticulture, Haryana: The Horticulture Department of Haryana is responsible for promoting the cultivation of horticultural crops like fruits, vegetables, flowers, spices and medicinal plants in the state. Haryana, with its diverse agro-climatic conditions, is an important hub for horticultural production and plays a pivotal role in enhancing productivity, improving quality, and increasing farmers' income. The department's goal is to ensure that everyone has access to nutritious food while also considering the new issues in horticulture. The department works with a vision "to make Haryana modern fruit and vegetable cultivation state with a vision to lead in domestic and export market" has earmarked the objectives - diversification from agriculture to horticulture and doubling of horticulture production[10]. The department has its office at Bhiwani, Charkhi Dadri, Faridabad, Gurgaon, Jhajjar, Jind, Karnal, Mewat, Palwal, Panipat, Rewari, Rohtak and Sonipat in NCR area.

Rural Development Department, Haryana: The Rural Development Department plays a major role in the socio-economic growth of the State by implementing various schemes for the upliftment of the rural people. The Department implement Centrally Sponsored Rural Development Schemes. At the district level, the schemes are coordinated and implemented by the District Rural Development Agencies with the help of Block Agencies and other line departments. The Panchayati Raj Institutions are also fully involved in planning, execution, monitoring of schemes at the field level. At the Block Level, Block Development Officer and other staff help to execute the schemes. The Panchayati Raj Institutions: Gram Panchayats, Panchayat Samiti, Zila Parishad and Gram Sabha have substantial role in formulation and implementation of the wage employment scheme of Mahatma Gandhi National Rural Employment Guarantee Act and self-employment scheme National Rural Livelihoods Mission, area development scheme of Integrated Watershed Management Programme and other schemes[11]. The department operates in various locations in the NCR area, including Bhiwani, Charkhi Dadri, Faridabad, Gurgaon, Jhajjar, Jind, Karnal, Mahendragarh, Mewat, Palwal, Panipat, Rewari, Rohtak, and Sonipat.

12 BACKGROUND OF THE 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 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 NCR, Uttarakhand, Maharashtra and Gujarat. RECAP4NDC project empowering the stakeholders to effectively plan, finance, implement and monitor initiatives related to FLR in project area.

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[9]https://www.agriharyana.gov.in/CenterStateSponsoredSchemes
[10]https://hortharyana.gov.in/en/Horticulture Department
[11]https://haryanarural.gov.in/

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 FLR 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 NCR, 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

The land use pattern of any area is crucial for managing the rapid urbanization, ensuring sustainable development, and improving the quality of life. Proper land use planning helps in efficiently allocating spaces for residential, commercial, industrial and green areas, reducing congestion, and enhancing infrastructure. It also supports environmental

sustainability by preserving green spaces, managing pollution, and addressing water conservation. Thus, effective land use planning is vital for creating a liveable, resilient and well-organized urban environment. Land use statistics are crucial data indicators for understanding land utilization patterns in planning and policy formulation.

The model sites were selected in two landscapes (as shown in the Fig. 6 and Fig. 7) in the Delhi and NCR identified using geospatial analysis involving various GIS layers like degraded land areas, soil, Digital Elevation Model etc.

Legend	Patch	Area (sq. km)
Mod. Dense Forest in Badland Topography	0	0.00
Open Forest	1064	190.21
Open Forest in Badland Topography	34	13.8
Tree Outside Forest (Open)	1	0.10
Forest Blank	0	0.00
Scrub	1013	385.12
Scrub in Badland Topography	48	25.78
Scrub/Grazing Land	396	40.26
Agriculture-Wind Erosion-Severe	0	0.00
Agriculture-Wind Erosion-Moderate	0	0.00
Barren/ Mining	250	11.92
Waterlogged	2	0.18

Total Patches = 2,798
Total Area = 667.37 sq. km

Source: GIZ

Fig. 6: Identified landscape for FLR interventions in Alwar, Rajasthan (part of Delhi NCR)

Legend

Degraded areas identified
Proposed for CA by Forest Dept.
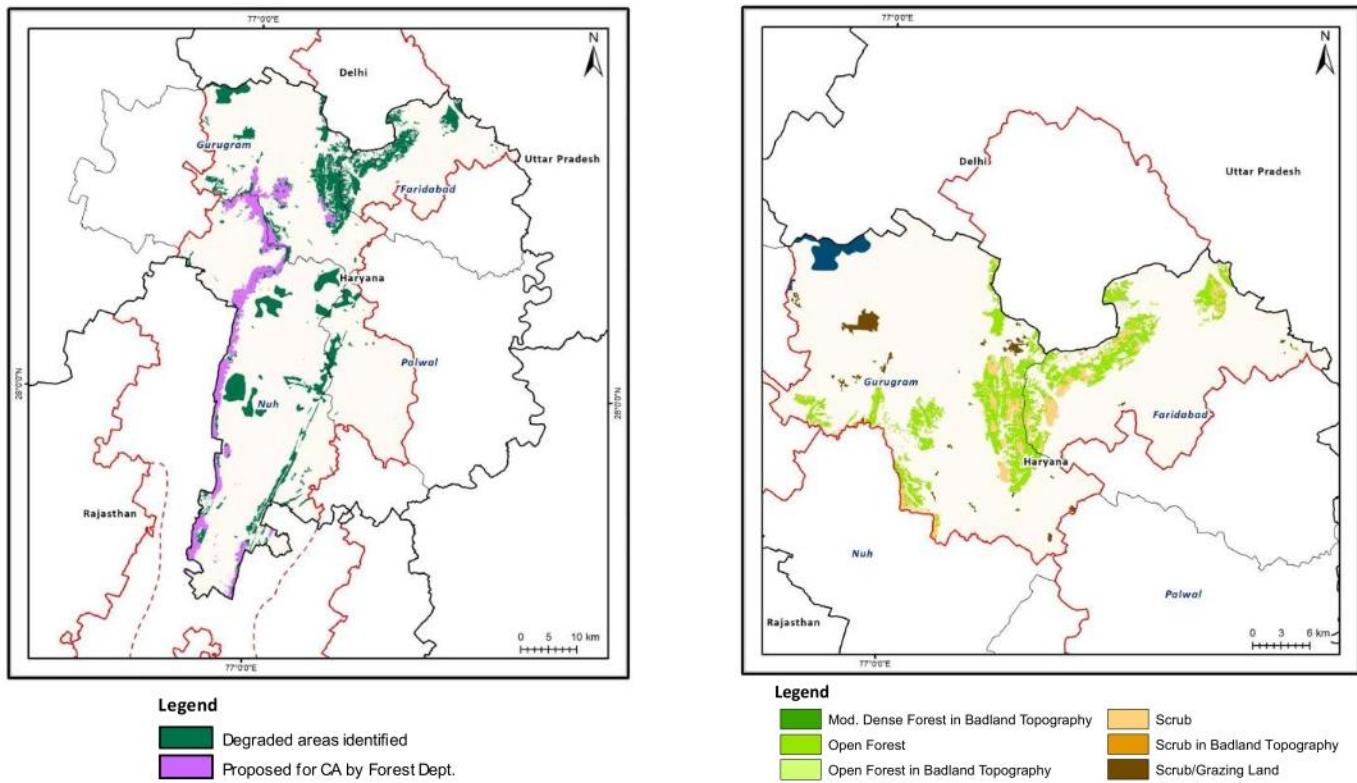
Fig. 7: Haryana landscape is divisible into northern part (green) while southern part (purple) is already undertaken by Forest Dept. under CA Programme

Legend

Mod. Dense Forest in Badland Topography	Scrub
Open Forest	Scrub in Badland Topography
Open Forest in Badland Topography	Scrub/Grazing Land
Forest Blank	Barren/ Mining
Tree Outside Forest (Open)	Waterlogged
Agriculture-Wind Erosion-Severe	Agriculture-Wind Erosion-Moderate

Fig. 8: Northern part of landscape: within the State of Haryana.

The landscape in Rajasthan extends around the Sariska Tiger Reserve (STR) in 11 development blocks (Fig.6), with several patches under degradation around the buffer area of the STR. A total of 10,468.02 ha of degraded patch has been identified with an area of 7034.16 ha inside recorded forest area (RFA) and 3433.86 ha outside RFA. Another landscape (Fig. 7) that extends across the Haryana, from Faridabad to Ferozepur Jhirka. However, the sub-landscape has been divided into 2 parts (North and South) along the boundary of Gurgaon district. The project intends to focus on the Northern part of the landscape (Fig. 8), which includes Faridabad, Gurgaon and Sohna with a total area of 16898 ha with 7668 ha inside RFA and 9230 outside RFA (Table 14). The Southern part of the landscape has a planning document based on the Compensatory Afforestation (CA) project of the Haryana Forest Department (marked in purple in Fig. 7). A total of 2201 ha of degraded patch has been identified with an area of 1978 ha inside recorded forest area and 223 ha outside recorded forest area in Delhi landscape (Fig. 9 and Table 14).

Table 14. Target Landscape Area under RECAP4NDC in Delhi and NCR

Districts of NCR Landscape	Inside RFA (ha)	Outside RFA (ha)	Total (ha)
Alwar	7034	3434	10468
Gurugram and Faridabad	7668	9230	16898
Delhi	1978	223	2201
Total	**16680**	**12887**	**29567**
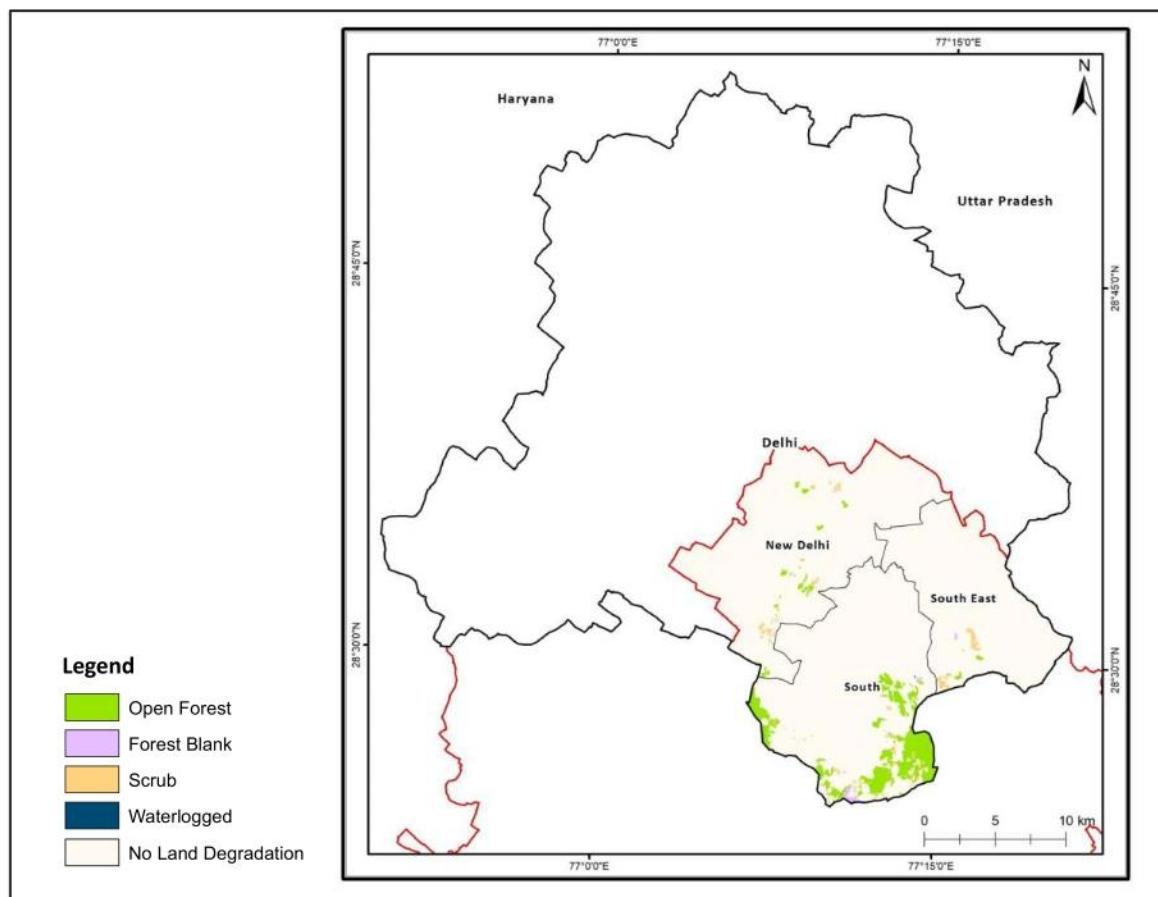
Fig. 9: Landscape of Delhi

The model sites selected for the FLR interventions under RECAP4NDC project in Delhi NCR fall under three districts Alwar, Gurugram and Faridabad. Alwar, located in the northern part of Rajasthan, is a city rich in history and culture and often referred to as the Gateway to the Aravalli. The district is covered by hilly ranges trending northeast to southwest ranging in height from 625 m to 771 m above mean sea level. The district experiences moderate sub-humid climate with hot dry summer and a bracing cold season. Generally, winter season begins from November and lasts up to February while rainy

season spans from July to the first half of September. The mean annual rainfall of the district is 668.6 mm. Alwar is also considered as very high priority districts under rainfed areas based on Natural Resource Index by National Rainfed Area Authority (2022). Sariska Tiger Reserve is also located in Alwar that features diverse landscapes, including dry deciduous forests, grasslands, and rocky hills and various species of flora and fauna, offering eco-tourism opportunities. The other important areas in Alwar are "Bhairodev Dakav Sonchuri" known for community-led conservation efforts. People from five villages in Alwar declared a forest area as "Bhairodev Dakav Sonchuri" to protect wildlife, particularly blackbucks. The city is home to the famous Alwar Fort, Bala Quila and the beautiful Siliserh Lake. Its historical significance and architectural marvels attract tourists year-round. There is no perennial river in the district. The seasonal rivers, which flow through the district and carry the runoff from the hills are Sabi (Sahibi), Ruparail (Barah), Chuhar Sidh and Landoha[12].

Faridabad is a city in Haryana located in south of Delhi. The major physiographic details consist of alluvial plain and Aravalli. The climate of Faridabad district can be classified as tropical steppe, semiarid and hot. The south west monsoon sets in the last week of June and withdraws towards the end of September and contributes about 85% of the annual rainfall. The mean annual rainfall of the district is 542 mm. Faridabad is a hub for manufacturing and has industrial significance with a growing economy. Faridabad has seen rapid urbanization in recent years, with new developments in residential, commercial and educational sectors. It also has notable attractions like Surajkund, famous for the international crafts mela and a mix of modern and traditional architecture. The primary conserved/protected area is the Asola-Bhatti Wildlife Sanctuary, which is located on the Southern Delhi Ridge of the Aravalli hill range, spanning into both Delhi and Haryana. Another significant area for conservation in Faridabad and Gurugram region is Mangar Bani, a forest area with diverse wildlife. Mangar Bani is a forest area with diverse wildlife, including leopards, hyenas, nilgais, langurs and more than two hundred species of birds. The area is considered sacred by local villagers, and this has contributed to its long-term preservation. The district is mainly drained by the river Yamuna[13]. Faridabad is also considered as one of the most vulnerable districts to flood by National Rainfed Area Authority (2022).

Gurugram (formerly known as Gurgaon) is a growing city in Haryana located southwest of Delhi. The physiography consists of alluvial plain, residual hills and linear ridges. The climate of the district can be classified as tropical steppe, semi-arid and hot which is mainly characterized by the extreme dryness of the air except during monsoon, intensely hot summers and cold winters. The mean annual rainfall of the district is 596 mm. Gurugram has several protected areas, including the Sultanpur National Park - a Ramsar site (on the Gurugram-Jhajjar highway), Asola Bhatti Wildlife Sanctuary (located on the Southern Delhi Ridge of the Aravalli hill range is part of the Northern Aravalli leopard wildlife corridor), and the Aravalli Biodiversity Park, which are important for biodiversity conservation and wildlife protection. A Leopard Park Project is also underway in Gurugram to mitigate human-animal conflicts by creating a "Leopard Park". Known for its modern infrastructure and bustling corporate environment, it is a major hub for multinational companies and IT firms. Popular landmarks include Cyber Hub, Kingdom of Dreams and the Sultanpur Bird Sanctuary, making it a thriving metropolitan city. The alluvial plain in Gurgram is formed by the Sahibi river which is a tributary of river Yamuna[14].

Demographic and Socioeconomic Details of Communities of Project Sites: The rural and urban population of district covering model sites is given in Table 15.

Table 15. Rural and urban population of districts under RECAP4NDC project

State	Districts of Delhi NCR	Rural		Urban		Total	
		Households	Population	Households	Population	Households	Population
Haryana	Faridabad	63366	370878	295553	1438855	358919	1809733
	Gurgaon	88678	472179	237750	1042253	326428	1514432
Rajasthan	Alwar	511517	3019728	128203	654451	639720	3674179

Source: Census of India, 2011

[12]https://www.cgwb.gov.in/sites/default/files/2022-11/alwar.pdf

[13]https://www.cgwb.gov.in/old_website/District_Profile/ Haryana/Faridabad.pdf

[14]https://www.cgwb.gov.in/old_website/District_Profile/ Haryana/Gurgaon.pdf

The Delhi and NCR is home to a wide spectrum of local communities, reflecting India's socio-cultural and economic diversity. Urban centers like Delhi and Gurgaon are dominated by middle- and upper-class professionals, while surrounding regions such as parts of Ghaziabad, Noida and Faridabad, include traditional agrarian communities like Jats, Gujjars, and Yadavs. Many rural areas are undergoing rapid urbanization, altering traditional livelihoods and social structures. Migrant communities from across India also contribute to the multicultural landscape, bringing linguistic and cultural plurality. Despite modernization, many local communities maintain distinct customs, social hierarchies and communal governance structures. Informal settlements, slum clusters and unauthorized colonies coexist with planned urban spaces, leading to a complex socio-economic mix. Grassroots organizations and RWA often act as key intermediaries between citizens and local authorities (Centre for Policy Research, 2020).

Village-level data from Census 2011 is crucial for understanding rural demographics, infrastructure gaps, and socio-economic conditions. It guides targeted policy-making, resource allocation, and development planning. This granular data helps in understanding the availability of amenities in villages and supports initiatives in education, healthcare and livelihoods to improve rural living standards. The district wise village description details is mentioned in the Table 16 (Census of India, 2011).

Table 16. District wise demographic and land use details

Particulars	Districts				Total
	Alwar	Gurugram	Faridabad	Palwal	
No. of Villages*	60	31	15	2	108
No. of Gram Panchayats	25	31	15	2	73
No. of Blocks	2	2	1	1	6
Total Geographical Area (in Hectares)	24635	17960	7655	1049	51299
Total Households	18051	12102	4987	712	35852
Total Population of Village	106381	70339	31151	4283	212154
Total Male Population of Village	55990	37552	16637	2290	112469
Total Female Population of Village	50391	32787	14514	1993	99685
Forest Area (in Hectares)	3192	0	0	11	3203
Area under Non-Agricultural Uses (in Hectares)	1999	4839	3754	82	10674
Barren and Un-cultivable Land Area (in Hectares)	1015	568	168	0	1751
Permanent Pastures and Other Grazing Land Area (in Hectares)	688	0	0	0	688
Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	13	36	0	0	49
Culturable Waste Land Area (in Hectares)	290	368	533	81	1272
Fallows Land other than Current Fallows Area (in Hectares)	593	29	0	0	622
Current Fallows Area (in Hectares)	663	723	0	0	1386
Net Area Sown (in Hectares)	16182	11397	3200	875	31654
Total Unirrigated Land Area (in Hectares)	7748.28	1136	88	61	9033.28
Area Irrigated by Source (in Hectares)	8433.72	10261	3112	814	22620.72

Source: Compiled from Census of India, 2011

There are six villages Modiya, Peela Rama, Badla, Bawadi, Bhakri and Beejbad Naruka from Alwar whose data were not found in Census 2011. Similarly, the villages Dhouj, Tilpat CT, Dhauj and Faridabad in Faridabad district and Gurugram, Naya Behram Pur OG, Daultabad OG, Ghata OG; and Saidpur Mohammadpur in Gurugram district; and Sehjawas and Bhondsi CT in Sohna were not found in Census 2011 data. In census data, "OG" following a town's name (e.g., "Town Name (M + OG)") signifies an Outgrowth. "CT" stands for Census Town. It refers to a place that has not been legally declared as a town but has urban characteristics based on population size, density, and the nature of the workforce.

As per Socioeconomic and Caste census (2011), in case of Alwar, about 31.2% landless households derive major part of their income from manual casual labour. 47% of the households own irrigated land while 18% own un-irrigated land. In Gurugram, about 27% landless households derive major part of their income from manual casual labour. 35% of the households own irrigated land while 22% own un-irrigated land. In Faridabad, about 36% landless households derive major part of their income from manual casual labour. 29% of the households have own irrigated land while 16% own un-irrigated land (Socioeconomic and Caste census[15], 2011).

Out of 124 villages considered under RECAP4NDC project, 114 were found in Census of India, 2011. There is a possibility that the other villages have evolved after the 2011 census. These cover 73-gram panchayats spread over 6 blocks and

covering an area of 34635 ha with a total of 18051 households and 106381 persons. The total net sown area in the project villages comes out to be 16182 ha with area irrigated by source of water as 8433.72 ha and un-irrigated land area of 7748.28 ha.

Rural Development Schemes in Project Area

There are many rural development schemes being implemented by the Rural Development Department of Haryana such as Integrated Wasteland Development Projects (IWDP), Watershed Development Projects/ Hariyali Scheme, National Rural Livelihoods Mission etc[16].

Similarly, the major schemes implemented by the Rural Development Department of Rajasthan includes Mewat Area Development Programme, Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Dang Area Development Programme, Magra Area Development Programm, Border Area Development Programme, etc[17].

Although there are many programs being run by government of Rajasthan for the welfare of rural communities, the Mewat Area Development Programme accomplished 37 works during the financial year 2022-23 and spend Rs. 1.72 crore of the total available fund. The Bio-Fuel Authority found Alwar suitable for the plantation of Karanj. The National Rurban Mission, that aims to create 300 such Rurban growth clusters over the across the country, found Alwar as one of the six clusters in 2016-17. The Rural Non-Farm Development Agency organized Shipangan Craft Bazar, Alwar in which 126 artisans were benefited in 2022-23[18].

Renovation of amrit sarovar, stream bank protection works in in Bighota block and development of pasture cum horticulture land in Narayanpur village, Rajgarh Block, Alwar District was undertaken under Watershed Development Component of Pradhan Mantri Krishi Sinchayee Yojana 2.0 in Beeghota village, Alwar district[19].

14 TRAINING NEEDS ASSESSMENT AND ITS OBJECTIVES

Forest landscape restoration (FLR) is a holistic and long-term approach aimed at regaining ecological functionality and improving human well-being across degraded or deforested landscapes. For the State Forest Department and other stakeholders to effectively implement FLR, a training needs assessment (TNA) is essential. TNA helps to identify gaps in knowledge, skills and institutional capacity, ensuring that staff at all levels are well-equipped to plan, execute and monitor FLR interventions. A thorough TNA allows stakeholders to design appropriate training programs that address local challenges while aligning with national targets and international commitments related to climate change, biodiversity, land restoration and sustainable development. Moreover, FLR involves coordination across sectors including agriculture, water, rural development, irrigation and soil and water conservation. This cross-sectoral nature demands that forest department staff be proficient in policy integration and collaborative planning. A well-executed TNA supports the creation of targeted, need-based training interventions that lead to stronger institutional capacity, better project outcomes and more resilient forest landscapes. The primary objectives of a training needs assessment are to identify specific knowledge, skills, and abilities gaps within an organization's workforce, allowing for the targeted development of training programs that directly address performance needs and align with strategic goals; essentially, to pinpoint areas where training is most needed to improve the performance and achieve FLR targets. On the basis of TNA findings, training modules on FLR and related topics for capacity building of the State Forest Department, Other Line Department and local communities of the are being developed under RECAP4NDC Project.

Kumar (2006) stressed upon the need of knowledge transfer on new and innovative domains like nursery techniques, Joint Forest Management and forest products, climate change, legal challenges and methodology in forestry. Therefore, to satisfy the requirement for TNA for front-line staff, it is essential to comprehend the areas where training is to be delivered

[16] https://tcpharyana.gov.in/ncrpb /FINAL%20SRP%20FOR%20WEB-HOSTING/16_Rural %20Development .pdf
[17] https://www.rajras.in/wp-content/uploads /2017 /10 /Important-Government-Schemes-in-Rajasthan.pdf
[18] ttps://jankalyanfile.rajasthan.gov.in/Content/UploadFolder/DepartmentMaster/166/2023/Feb/30409/132 859.pdf
[19] ttps://rural.gov.in/sites/default/files/Annual%20Report% 202024-25 _English.pdf

and the individual to whom instruction is supplied. Kumar and Agrawal (2007) highlighted the non-training interventions through TNA exercise in frontline staff of forest department in India. According to a review conducted by Singh and Jayachandran (2018) through focused group discussions, the availability of superior management tools and techniques, along with current scientific and technological advancements, has made it necessary to reorient and revamp the induction training of Assistant Conservators of Forests in India to instill a comprehensive understanding of forestry and natural ecosystems. Pandey (2013) analyzed the professional training of Indian Forest Service Officers and concluded that physical fitness and overall grooming of trainees depend heavily on exposure visits to silviculture systems in India and excursions and exercise done during the training tenure. Kothari (2013) reviewed the forestry syllabus post 2007 and training of three decades of interaction with communities and forest staff in various parts of India and concluded that syllabus needs revamping to centre around concepts and practices of participation, rights, landscape level conservation and combining traditional and modern knowledge. Paul and Lakra (2013) reviewed the course curriculum of the Indian Forest Service, State Forest Service and Range Officers and found the lack of coordination and synchronization considering the job requirement at three different levels and therefore suggested a unified command for three trainings below the level of Ministry of Environment and Forest and Climate Change. Rishi and Paul (2013) reviewing the training for Indian Forest Officers proposed the need of strengthening the hands-on training for the benefit of forest and wildlife conservation in India. Gera (2013) while going through the essential components of forestry training stressed upon the need of physical training that tends to increase the professional performance. According to Ashraf (2013), the forestry sector requires expertise in technological inputs in order to ensure productive outputs.

A TNA report by Netaji Subhas Administrative Training Institute, West Bengal in 2024 revealed current training provided is inadequate and lacks proper assessment in West Bengal Forest Department. The report recommended the need of essential skills and knowledge in areas of legal procedures, conflict management, leadership and stakeholder engagement. The report also suggested some non-training interventions that can enhance the department's capacity for effective forest conservation[20]. Krishi Avam Paristhitiki Vikas Sansthan conducted a community training program in Alwar, Rajasthan, in the month of September 2023, aiming to equip desert pastoralist communities with knowledge and skills for conserving and protecting Orans, traditional sacred grove of community conserved woodland areas (Singh and Majumdar, 2023).

Society for Public Education Cultural Training and Rural Action in association with Letz Dream Foundation through Sustainable Livelihood development Program and integrated Livelihood Development Program in Alwar District of Rajasthan brought a lot of interventions for SHG and profited 7320 beneficiaries. These SHGs were strengthened through financial programs (savings, inter-loan, and bank linkages), capacity-building sessions and entrepreneurship activities. Savings procured were used for the purchase of utility items, livelihood activities, medical expenses and children's education (SPECTRA, 2022).

Aggarwal (1996) reported an initiative implemented by Tarun Bharat Sangh (TBS) across 36 villages in Alwar district revealed that (i) water-conservation structures built with involvement of TBS at extremely low costs have not only stood the test of time but are, by and large, engineering-wise sound and appropriate. (ii) there has been a rise in ground water table as an impact of the Johad construction effort. (iii) An extremely high correlation (over 90%) shows the immediate and definite impact of investments on water conservation on village incomes. There can be no better rural investment than that on Johads.

15 METHODOLOGY FOR 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

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[20]https://wbft.wbforest.org/admin/pdf_upload_file/61064021_2024-09-23_Training%20Needs%20 Analysis%20Report %202024_ compressed.pdf

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 Departments and Other Line Departments of Delhi and NCR. The State Forest Departments also consist of two groups: Frontline Staff (Forest Guards, Foresters, Deputy Rangers) and Officers (Range Forest Officer and above).

The project area of Delhi and NCR comprises of National Capital Territory of Delhi, fourteen districts of Haryana and two districts of Rajasthan. The Forest Ranges were selected randomly for sampling in the Forest Divisions in Haryana and Rajasthan. Two Forest Ranges were selected randomly for conducting Training Need Assessment.

The Delhi State Forest Department consist of one administrative circle and four Forest Divisions, were considered for conducting training need assessment. Two Forest Divisions Bharatpur and Alwar of Rajasthan were selected for conducting training need assessment. In Haryana, there are five districts covering parts of Aravalli Range. Two Forest Divisions i.e. Gurgaon and Faridabad along the Aravalli Mountain Range were selected for conducting training need assessment. Details of the Forest Divisions of Delhi and NCR selected for training need assessment are given in Table 17.

Table 17. Details of the Forest Divisions of Delhi and NCR selected for training need assessment

S. No.	Forest Divisions	Divisional Offices/ Forest Ranges
1	South Forest Division, Delhi	South Forest Division office
2		Asola Bhatti Forest Range
3		South Forest Range
4		Southeast Forest Range
5		Mehrauli Forest Range
6	Western Forest Division, Delhi	West Forest Division Office
7		Central Forest Range
8		New Delhi Forest Range
9	Northern Forest Division, Delhi	North Forest Division Office
10		Alipur Forest Range
11		Nanglai Forest Range
12		Punjabi Bagh Forest Range
13		West Forest Range
14	Central Forest Division, Delhi	Central Forest Division Office
15		Central Forest Range
16		Eastern Forest Range
17	Bharatpur Forest Division, Rajasthan	Bayana Forest Range
18		Sikri Forest Range
19	Alwar Forest Division, Rajasthan	Kishangadh - Bans Forest Range
20		Behror Forest Range
21	Gurgaon Forest Division, Haryana	Gurugram Forest Range
22		Sohna Forest Range
23	Faridabad Forest Division, Haryana	Faridabad Forest Range
24		Ballabhgarh Forest Range

A structured and systematic approach was undertaken to conduct the Training Needs Assessment in the Delhi and NCR. As a key preparatory step, separate and customized questionnaires were developed for three major stakeholder groups: Officers of the State Forest Department, Frontline Staff 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 are in use for restoration of degraded forest landscapes, the most effective knowledge products for knowledge sharing on FLR, 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 FLR and related topics, participation in relevant trainings, current restoration practices and most effective knowledge products for learning and knowledge sharing. It also explored their preferred training methods as well as suitable timings and durations of trainings (Annexure 2). The questionnaire for officers and staff of other line departments was designed to assess their awareness and understanding of FLR, assess their involvement in FLR related activities and restoration practices currently being followed. It also explored their preferred training methods, as well as suitable timings and durations of trainings (Annexure 3). Primary data from the selected Forest Divisions and Districts of the Delhi and NCR were collected during the months of June and September 2024. 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 18.

Table 18. Details of respondents of TNA surveys conducted in Delhi and NCR

S. No.	Department	No. of respondents	Male respondents	Female respondents
1	Delhi State Forest Department	84	80	4
2	Rajasthan State Forest Department	27	23	4
3	Haryana State Forest Department	26	25	1
4	Agriculture Department	12	12	0
5	Animal Husbandry Department	3	3	0
6	Delhi Development Authority	3	2	1
7	Delhi Jal Board	2	2	0
8	Horticulture Department	6	4	2
9	Municipal Corporation of Delhi	1	1	0
10	Rural Development Department	2	1	1
11	Watershed Development and Soil Conservation	6	5	1
	Total	**172**	**158**	**14**

The percentage representation of State Forest Departments and Other Line Departments in TNA survey is given in Fig. 10.
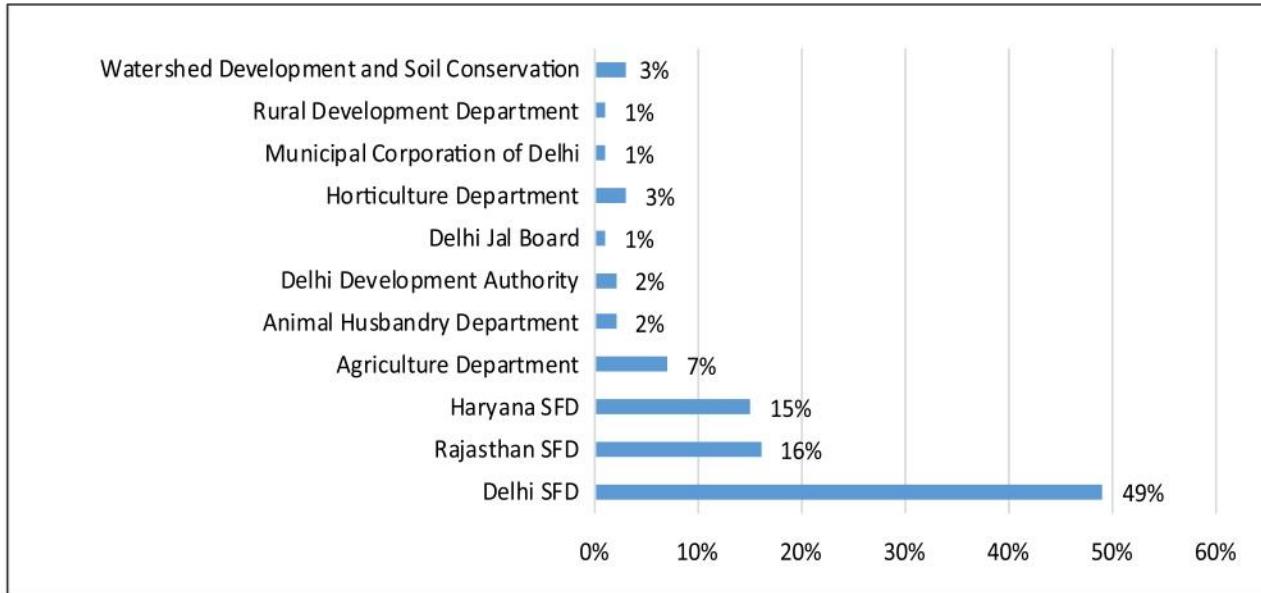
Fig. 10: Representation of Different Departments in TNA

15.2   TRAINING NEEDS ASSESSMENT FOR LOCAL COMMUNITIES

The development of a questionnaire for assessing training needs in FLR is a critical step in designing effective capacity-building programs. A well-structured questionnaire helps to systematically gather information about the existing knowledge, skills and competencies required by local communities for implementation of FLR initiatives. The primary goal is to identify gaps between existing capabilities and those needed for successful planning, implementation and monitoring of FLR activities. Key areas covered may include understanding of FLR concepts, technical skills (such as soil and water conservation, species selection and restoration techniques), institutional roles, policy awareness, community engagement, and monitoring & evaluation practices. The development of a questionnaire for assessing training needs in FLR is a crucial step in designing effective capacity-building programs. A well-structured questionnaire enables the systematic collection of information regarding the current knowledge, skills and competencies of local communities related to FLR initiatives. Its primary objective is to identify gaps between existing capabilities and those required for the successful planning, implementation and monitoring of FLR activities. The questionnaire is designed to cover a range of key areas essential to effective restoration efforts. The questionnaire for assessing the training needs of the local communities was designed to evaluate both their existing knowledge and skills, as well as the areas where capacity enhancement is necessary (Annexure IV).

Focused Group Discussion is one of the data collection methods in the qualitative research approach emerged as an alternative to one-on-one interviews. This method involves an interactive discussion about a specific issue with a group of participants led by a moderator. Focus group discussion brings together people with certain characteristics which is relevant to the topic (Krueger and Casey, 2015). The key element of this method is the interaction among participants which enables researchers to explore different perspectives, thoughts and feelings (Hennink, 2014). To ensure relevance and contextual accuracy, the questionnaire-based survey was conducted through Focus Group Discussions in the villages. This participatory approach allowed for the inclusion of diverse perspectives and facilitated deeper insights into local needs. This ensures that the findings are both meaningful and actionable for informing targeted training interventions in FLR. The model sites selected under the project falls under three districts of Delhi and NCR i.e. Alwar in Rajasthan and Faridabad and Gurugram of Haryana.

As per Cochran's formula (1963, 1977) at confidence interval 90% and standard error of 15%, sample size of 24 from total of 124 villages (66 villages from Alwar and 58 villages from Gurugram and Faridabad in Haryana) in Delhi NCR

was determined. This sample size ensures statistically reliable representation of the total village population across both landscapes within the specified confidence parameters (Table 19). 17 villages from Alwar landscape of Rajasthan and 7 from Haryana landscape) were selected for conducting TNA of communities. 17 villages in Alwar were further distributed at Tehsil level as 8 villages were sampled from Malakheda while 9 villages were considered from Rajgarh Tehsil (Table 20). Details of the local communities participated in the Focus Group Discussion are given in Table 21.

Table 19. Villages selected in Delhi and NCR for conducting TNA surveys

S. No.	Geographic regions	Area# (ha)	Total villages (model sites)	Sampled village
1	Delhi*	40389.55	0	0
2	Haryana	79334.72	58	7
3	Rajasthan	122698.7	66	17
	Total village		124	24

* = Villages in Delhi have not been considered for TNA, # = Gross area of Landscape (Including no-degraded areas)

Table 20. Details of the villages selected in Delhi and NCR for TNA surveys

S. No.	Village name	Population*	No. Household#	Gram panchayat	Tehsil	Forest Range	District	State
1	Ratangarh	3500	300	Pala	Malakheda	-	Alwar	RJ
2	Bhandodi	5000	500	Bhandodi	Malakheda	Sariska	Alwar	RJ
3	Maharajpura	2500	466	Bharkol	Malakheda	-	Alwar	RJ
4	Kali pahadi	900	400	Bilandi	Malakheda	-	Alwar	RJ
5	Satana	1100	600	Jamalpur	Malakheda	-	Alwar	RJ
6	Moonpur	1000	400	Alei	Rajgarh	-	Alwar	RJ
7	Kundroli	1100	300	Srichandpura	Rajgarh	-	Alwar	RJ
8	Iendpura	1200	150	Bhajeda	Rajgarh	-	Alwar	RJ
9	Poonkhar	4500	600	Poonkhar	Malakheda	-	Alwar	RJ
10	Prithivipura	7500	2500	Prithivipura	Malakheda	-	Alwar	RJ
11	Baleta	8500	2000	Baleta	Malakheda	-	Alwar	RJ
12	Bad Dighwada	650	200	Dighwada	Rajgarh	-	Alwar	RJ
13	Bawadi	650	120	Ferozpur	Rajgarh	-	Alwar	RJ
14	Dabla meena	550	150	Palwa	Rajgarh	-	Alwar	RJ
15	Hodahalli	1100	200	Ferozpur	Rajgarh	-	Alwar	RJ
16	Anawara	2700	350	Dubbi	Rajgarh	Sariska	Alwar	RJ
17	Dhamred	4800	1500	Dhamred	Rajgarh	Sariska	Alwar	RJ
18	Damdma	5500	3000	Damdma	Sohna	Sohna	Gurugram	HR
19	Nimot	1100	400	Nimot	Sohna	Sohna	Gurugram	HR
20	Rithoj	4500	1200	Rithoj	Sohna	Sohna	Gurugram	HR
21	Sirohi	5000	518	Sirohi	Ballabhgarh	Ballabhgarh	Faridabad	HR
22	Kot	2000	800	Kot	Ballabhgarh	Ballabhgarh	Faridabad	HR
23	Gothra Mohbtabad	3200	1000	Gothra Mohbtabad	Dhouj	Faridabad	Faridabad	HR
24	Pali	13200	3500	Pali	Dhouj	Faridabad	Faridabad	HR

RJ: Rajasthan; HR: Haryana, Population* = as informed during TNA, No. House hold# = as informed during TNA

Table 21. Number of participants in FGD during TNA conducted in Delhi and NCR

S. No.	Project sites	No. of villages	Total respondents	Average size of FGD	No. of male respondents	No. of female respondents
1	Alwar, Rajasthan	17	301	17.71	180 (59.80%)	121 (40.20%)
2	Gurugram and Faridabad, Haryana	7	155	22.14	104 (67.10%)	51 (32.90%)
	Total	**24**	**456**	**19.92**	**284 (62.28%)**	**172 (37.72%)**

Fourteen villages among seventeen villages considered for TNA in Alwar were not falling under any Forest Range as informed by the respondent whereas three villages, i.e., Bhandodi, Anawara and Dhamred were under Sariska Forest Range. In case of Haryana all three villages were in Sohna Forest Range, two were in Ballabhgarh Forest Range and two in Faridabad Forest Range. The spatial distribution of these villages is shown in Fig. 11 and Fig. 12.
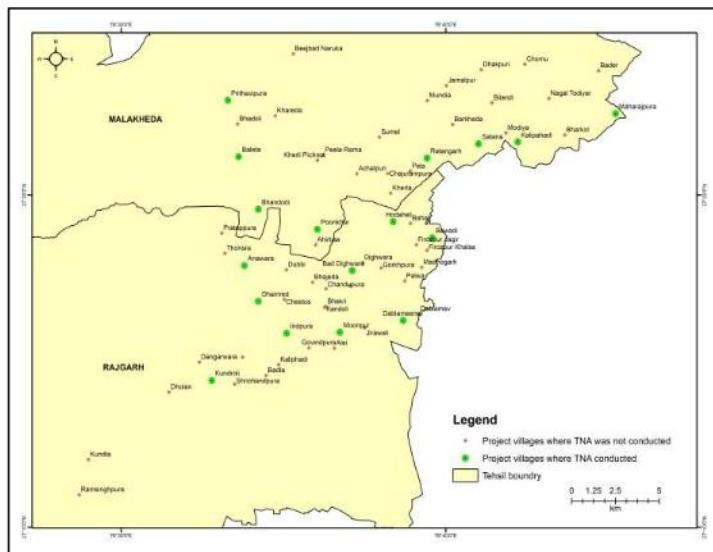
Fig. 11: Spatial distribution of villages in Malakheda and Rajgarh Tehsil in Alwar District, Rajasthan
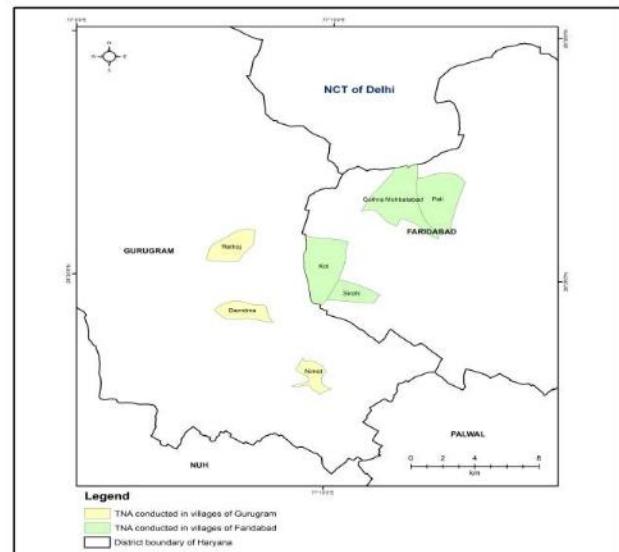
Fig. 12: Spatial distribution of villages selected for TNA in Gurugram and Faridabad Districts, Harayana

Extensive field surveys were done in the project areas of Delhi and NCR for conducting TNA on FLR and related topics. The data collection process took place from January 2025 and was completed by March 2025.

16   FINDINGS OF THE TRAINING NEEDS ASSESSMENT

16.1. FAMILIARITY WITH FOREST LANDSCAPE RESTORATION AND RELATED TOPICS: STATE FOREST DEPARTMENTS AND OTHER LINE DEPARTMENTS

16.1.1. Officers of State Forest Departments

The data analysis identified significant knowledge gaps among respondents concerning key topics related to FLR (Table 22). Approximately 78% of respondents were unfamiliar with the value chain of non-wood forest products (NWFPs) and the availability of domestic and international funding for FLR initiatives. Additionally, 67% lacked awareness of critical subjects such as forest carbon stocks measurement, carbon market mechanisms, forest certification, springshed management and Green Credit Programme. Moreover, 56% of respondents were not familiar with REDD+ and gender mainstreaming in forest management and FLR. The analysis also revealed low levels of interest in learning about the legal and policy framework for forest and environmental conservation, nature-based solution and ecosystem-based approaches, soil and water conservation practices and nursery and plantation techniques of forestry species.

Table 22. Percentage of respondents unfamiliar with topics related to FLR

S. No.	Topics related to FLR	Unfamiliar (Responses in %)
1	Value chain of NWFPs	78
	Domestic and international funding for FLR	
2	Forest carbon stocks measurement	67
	Carbon market mechanism - finance and carbon credit	
	Forest certification	
	Springshed management	
	Green Credit Programme	
3	REDD+ and forest carbon projects	56
	Gender mainstreaming in forest management	
4	Eco-tourism	44
5	Ecosystem services and its valuation	33
6	Forest landscape restoration	22
	Climate change mitigation and adaptation in forest sector	
	International agreement/ conventions related to forest and environment and India's commitment	
	Sustainable development goals	
	LiFE: Lifestyle for environment	
7	Sustainable forest management	11
	Restoration of degraded forests/ landscapes	
	Invasive species and their management	
	Forest fire and its management	
	Climate change impact and vulnerability in forest sector	
	Sustainable harvesting of NWFPs and their role in livelihood generation	
	Community forest management (JFMCs/ BMCs etc.)	
8	Nursery and plantation techniques of forestry species	0
	Soil and water conservation measures	
	Nature-based solutions/ Ecosystem based approaches	
	Legal framework (Policies, laws and regulations) for conservation and protection of forest and environment	

The analysis found that few officials have undertaken trainings in forest fire management, village forest protection management committee, refresher course on forestry, use of differential global positioning system for survey and use of drone for survey. The forest officials have been/ are involved in restoration projects in Delhi and NCR area such as Eco-restoration Project in Delhi, Rajasthan Forestry and Biodiversity Development Project in Rajasthan and Plantation in Rajasthan under different projects like CAMPA.

As evident from Table 22, the concepts 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 of the State Forest Department:

❖ Value chain of non-wood forest products

❖ Domestic and international funding for FLR

❖ Measurement of forest carbon stocks

❖ Carbon market

❖ Forest certification

❖ Springshed management

❖ Green Credit Programme

❖ Reducing emissions from deforestation and forest degradation

❖ Gender mainstreaming in forest management

❖ Ecotourism

16.1.2 Frontline Staff of State Forest Departments

The data analysis reveals a significant knowledge gap among respondents regarding key environmental and forestry topics (Table 23). The data presents a clear picture of knowledge gaps among respondents regarding FLR and related topics. The highest levels of unfamiliarity are associated with issues linked to international climate commitments and forest carbon stocks measurement. Notably, India's Nationally Determined Contribution (NDC) targets under the Paris Agreement emerge as the most unfamiliar topic with 97% of respondents indicating a lack of familiarity. This is followed closely by forest carbon stock measurement (92%) and springshed management (89%), underscoring a significant need for awareness and capacity building in areas related to climate change mitigation and forest carbon stocks measurement. About 70%-80% of respondents reported unfamiliarity, include sustainable harvesting of non-wood forest products and their role in livelihood generation (83%), as well as gender mainstreaming in forest management (81%) and community-based forest management models like joint forest management committees and self-help groups (74%). These are critical socio-economic and governance-related themes that affect forest-dependent communities directly, suggesting that while some awareness exists, deeper understanding and practical training are needed.

On the other hand, topics such as biodiversity conservation (27%), nursery and plantation techniques (25%), forest fire management (24%), soil and water conservation (20%) and sustainable forest management (19%) recorded the lowest levels of unfamiliarity. This implies that respondents are relatively well-acquainted with traditional forestry and ecological conservation practices, possibly due to their inclusion in routine fieldwork or institutional training programs.

Table 23. Percentage of respondents not familiar with the topics of FLR

S. No.	Topics Related to FLR	Unfamiliar (Responses in %)
1	India's Nationally Determined Contribution targets under the Paris Agreement	97
2	Forest carbon stocks measurement	92
3	Springshed management	89
4	Sustainable harvesting of NWFPs and their role in livelihood generation	83
5	Gender mainstreaming in forest management	81
6	Community forest management (JFMC/BMC/ SHG)	74
7	Ecotourism	61
8	Policies, laws and regulations for conservation of forest biodiversity in India	55
9	Legal framework for conservation and protection of forest and environment in India	52
10	Nature-based solutions/approaches	49
11	Invasive species and their management	43
12	Forest landscape restoration concept/approach	35
13	Biodiversity conservation / Restoration of degraded forests	27
14	Nursery and plantation techniques of forestry species	25
15	Forest fire and its management	24
16	Soil and water conservation measures	20
17	Sustainable forest management	19

As evident from Table 23, the concepts 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:

❖ India's NDC targets in the Paris Agreement

❖ Forest carbon stocks

❖ Springshed management

❖ Sustainable harvesting of NWFPs and their role in livelihood generation

❖ Gender mainstreaming in forest management

❖ Community forest management

❖ Ecotourism

❖ Policies, laws and regulations for conservation of forest biodiversity in India

❖ Legal framework for conservation and protection of forest and environment in India

❖ Nature-based solutions/approaches

❖ Invasive species and their management

The TNA exercise revealed that few officials have undergone trainings on Delhi Preservation of Trees Act and Wildlife Protection Act, refresher course on forestry, use of global positioning systems for survey and applications of drone for survey.

16.1.3   Officers and Staff of Other Line Departments

The data reveals significant gaps in awareness and understanding among officers and staff of other line departments in Delhi and NCR regarding FLR and related topics (Table 24). A striking observation is that a vast majority of respondents are unfamiliar with specialized or emerging issues. For instance, 83% are unfamiliar with invasive species and their management, while 80% lack knowledge of spring shed management. Similarly, more than two-thirds of the respondents are unaware of the legal frameworks for environmental protection in India (71%), gender mainstreaming in natural resource management (69%) and international environmental agreements and conventions (66%). These high levels of unfamiliarity point to an urgent need for training on contemporary environmental policy, legislation and global frameworks.

Moderate levels of unfamiliarity were reported in areas like disaster management (57%), sustainable development goals (54%), and sustainable livelihood generation (43%). These figures suggest a partial awareness of development-related topics, which may reflect limited exposure through cross-sectoral programs or insufficient integration of environmental themes into departmental work. Improving engagement with national missions, frameworks like the SDGs and risk reduction strategies could enhance the responsiveness and preparedness of these departments.

Encouragingly, some operational-level and traditional environmental management areas showed relatively lower unfamiliarity. Topics like climate change mitigation and adaptation, participatory natural resource management and nature-based solutions were better understood with unfamiliarity levels around 30 - 37%. Familiarity further improves for subjects such as restoration of degraded areas (29%), agroforestry and urban forestry (26%), sustainable land management (23%) and soil and water conservation (17%). Notably, only 9% of respondents were unfamiliar with general natural resource management, suggesting a stronger grounding in conventional environmental practices, likely due to prior field exposures.

Overall, this analysis highlights the need for a tiered, structured capacity-building program. Bridging these knowledge gaps is essential for enhancing inter-departmental collaboration and effective implementation of FLR initiatives across the Delhi and NCR region.

Table 24. Percentage of respondents not familiar with the topics of FLR

S. No.	Topics related to FLR	Unfamiliar(Responses in %)
1	Invasive species and their management	83
2	Springshed management	80
3	Legal framework for conservation and protection of environment in India	71
4	Gender mainstreaming in natural resource management	69
5	International Agreement/Conventions related to environment	66
6	Ecotourism	60
7	Disaster management/Disaster risk reduction LiFE: Lifestyle for Environment	57
8	Sustainable development goals	54
10	Sustainable livelihood generation	43
11	Climate change mitigation and adaptation	37
12	Participatory natural resource management	37
13	Nature-based Solution/Ecosystem based Approaches	31
14	Restoration of degraded areas Climate change impacts and vulnerability	29
15	Agroforestry/farm forestry/urban forestry	26
16	Sustainable land management	23
17	Soil and water conservation	17
18	Natural resource management	9

As evident from Table 24, the concepts 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:

❖ Invasive species and their management

❖ Springshed management

❖ Legal framework for conservation and protection of environment in India

❖ Gender mainstreaming in natural resource management

❖ International agreement/ Conventions related to environment

❖ Ecotourism

❖ Disaster management / Disaster risk reduction

❖ LiFE Style for Environment

❖ Sustainable development goals

❖ Sustainable livelihood generation

16.1.4. Practices being followed by the State Forest Departments and Other Line Departments for Restoration of Degraded Forest Landscapes

An analysis of data on the restoration practices employed by the State Forest Department reveals a strong emphasis on several key interventions. More than 60% of both the officers and frontline staff have stated the use of assisted natural regeneration practices/ enrichment plantations, soil and moisture conservation - rain water harvesting, contour trench, cattle proof trench/wall and check dams; fencing, invasive species management and forest fire management for restoration of degraded forest landscapes. The rotation grazing is however have been reported only by 11% of respondents among officers and 16% by the frontline staff.

Other practices being followed by the forest departments are eco-restoration, encroachment removal, stop illegal mining, illegal cutting of trees, gap filling, bamboo fencing, gap filling, and bamboo fencing, plant distribution for plantation, pick cows from forest area, rescue wildlife, construction of Anicut and Gabion structures and awareness campaign.

However, the practices being followed by Other Line Departments for restoration of degraded lands are soil moisture conservation, micro-irrigation, improved agricultural & horticultural practices, mulching, organic farming, rain water harvesting, percolation tanks, plantation, stall feeding and control grazing.

16.1.5. Type of Knowledge Products

An analysis of the preferred knowledge products for disseminating information about the forest landscapes restoration reveals a strong and consistent preference for video-based materials across all stakeholder groups. This trend underscores the growing importance of visual and easily digestible formats in effectively communicating technical and environmental information to diverse audiences.

Among officers of the State Forest Department, there is a marked preference for videos and posters, with 89% of respondents indicating these as the most effective formats. Additionally, 67% favoured flyers, books, pamphlets, and e-books or e-manuals, suggesting that while visual content is highly valued, there remains significant interest in traditional and digital print formats. Manuals were selected by 56% of respondents, followed by brochures and infographics, indicating a moderate preference for more detailed or illustrative resources.

Frontline staff of the State Forest Department displayed a slightly different pattern, placing the highest value on flyers (90%), followed by posters (80%) and brochures (66%). Videos, while still important, were preferred by 56% of this group slightly lower than the preference among officers. Manuals (47%), books (41%), and digital publications like e-books and e-manuals (40%) also held relevance, although to a lesser degree. Pamphlets and infographics were the least preferred, selected by 30% and 13% of respondents, respectively, suggesting that this group values straightforward and concise materials that can be easily shared in the field.

Respondents from other line departments also expressed a clear preference for videos (60%), highlighting their cross-sectoral appeal. Books and brochures were selected by 54%, followed closely by posters (49%). Manuals and pamphlets were favoured by 43% of respondents, while 40% found flyers useful. E-books, e-booklets and e-manuals were slightly less preferred (34%) and infographics were the least favoured format (9%). This distribution suggests a balanced demand for both traditional print and digital content, with video emerging as the most universally accessible and engaging medium. Traditional materials like flyers, posters, brochures and manuals continue to play an important role, particularly among frontline workers and officers who value both clarity and practicality in communication tools.

Table 25. Types of knowledge products preferred by the respondents

S. No.	Type of Knowledge Product	Preference (in %)		
		Officers SFD	Frontline Staff SFD	Other Line Departments
1	Flyer	67	90	40
2	Book	67	41	54
3	Manual	56	47	43
4	Brochure	44	66	54
5	Pamphlet	67	30	43
6	Infographics	33	13	09
7	Video	89	56	60
8	Poster	89	80	49
9	e-book/ e-booklet/ e-manual	67	40	34

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. 13).
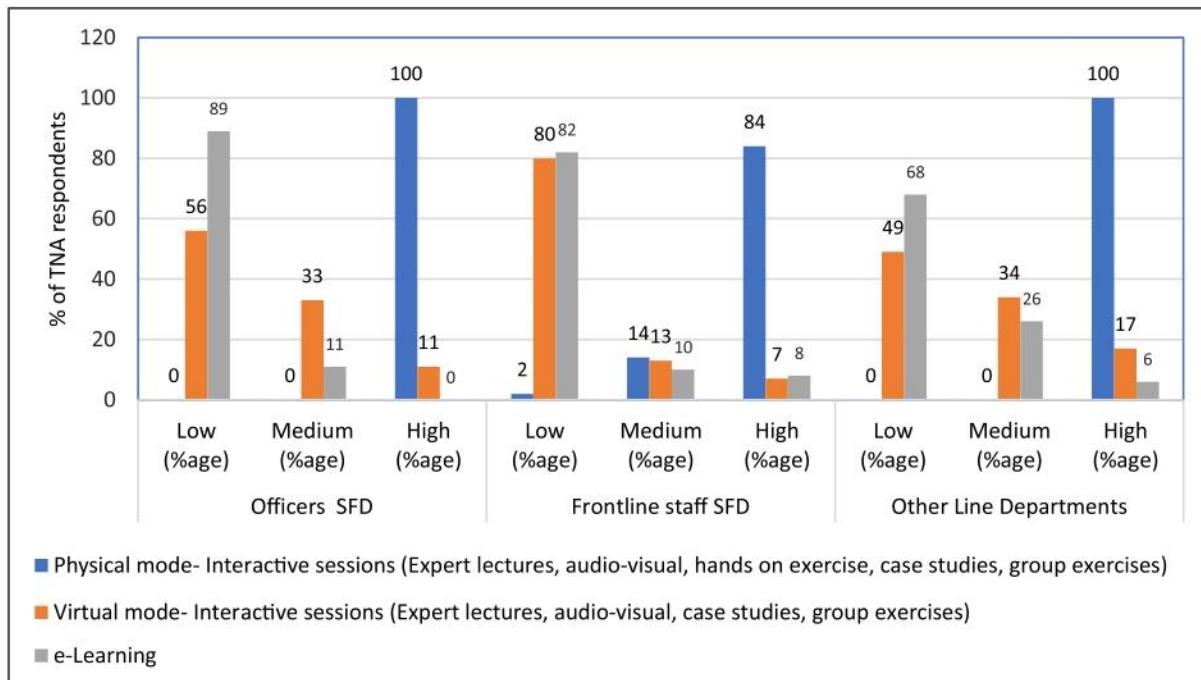
Fig. 13: Modes of trainings suggested by the respondents

16.1.7. Suitable Months and Duration for Conducting Training Sessions

The assessment of stakeholder preferences for training programs revealed that the most suitable time for conducting training, according to officers of the State Forest Department, is from October to February, while frontline staff of State Forest Department suggested September to February and April to June as a suitable month for conducting the trainings (Fig. 14). In terms of duration, State Forest Department frontline staff predominantly preferred 5-day programs (50%), whereas SFD officers favored 3-day sessions (56%). Other Line Departments mostly preferred conducting training between October and December, with 43% favoring 5-day trainings. Shorter formats such as 1 day and 2 days sessions also received moderate support across all groups, indicating some flexibility in training duration (Fig. 15).

16.1.7. Suggestion on Capacity Building on FLR Related Topics

Officers of the State Forest Departments suggested the following topics related to FLR for capacity building:

- Nursery techniques
- Rare, endangered and threatened species in Aravalli
- Human wildlife conflicts with reference to Leopard and Nilgai
- Field visit to eco-restoration sites
- Aravalli conservation efforts and success
- Visit to Sariska Tiger reserve

Frontline staff of the State Forest Departments suggested the following topics related to FLR for capacity building:

- Joint Forest Management and City Forest management
- Information about tree species of Aravalli
- Knowledge on Delhi's forest
- Trainings on Global Positioning System
- Ecotourism
- Exposure visit - Forest Research Institute, Aravalli Biodiversity Park, Sariska Tiger Reserve, Keoladeo National Park, Ranthambore Tiger Reserve, Asola Wildlife Sanctuary, Kaleshar National Park, Sultanpur Bird Sanctuary, Nahar Wildlife Sanctuary and Bhidawas Wildlife Sanctuary
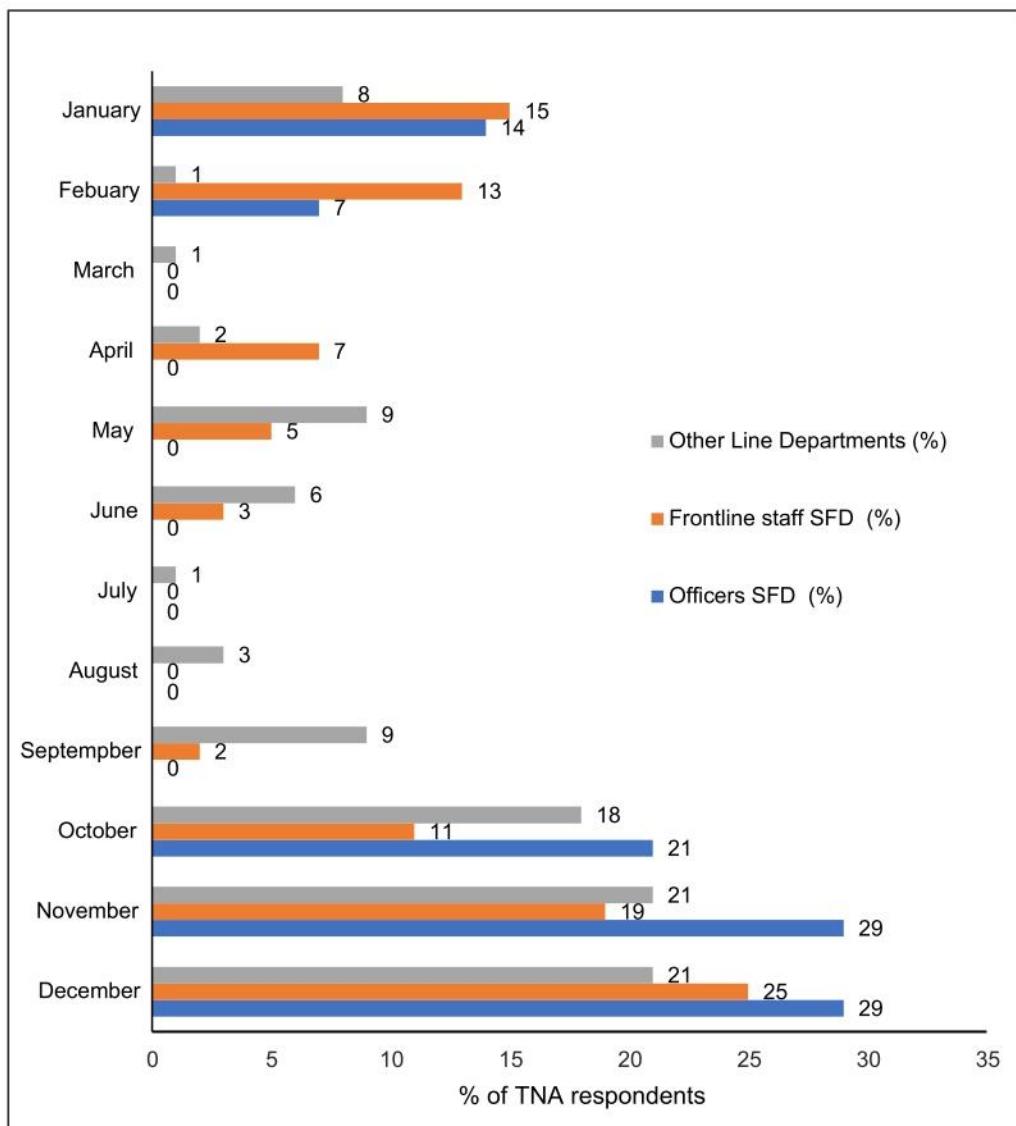
Fig. 14: Suitable month for conducting trainings
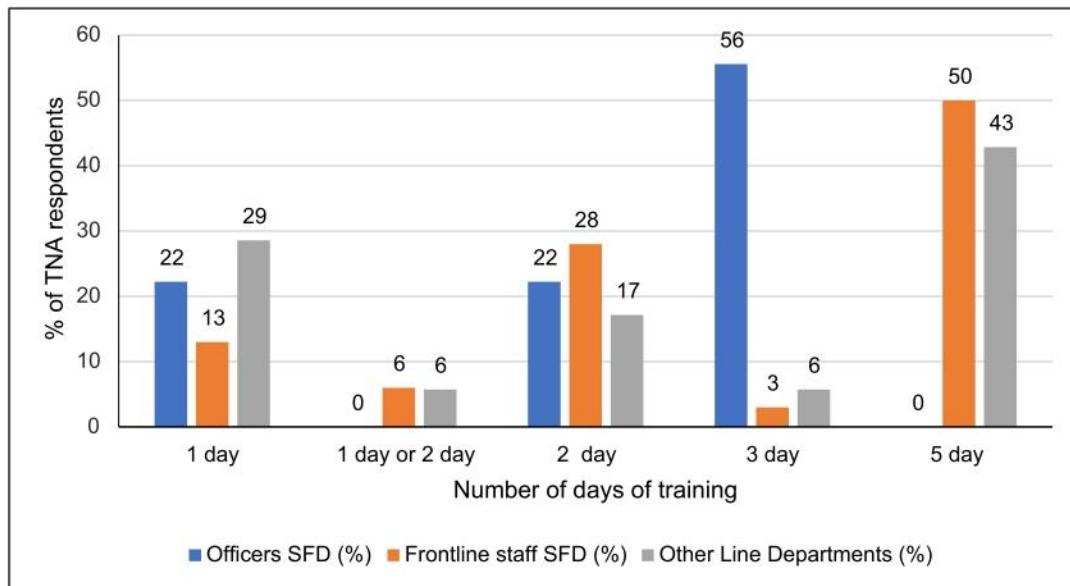
Fig. 15: Suitable duration of trainings

33

Officers and staff of Other Line Departments suggested the following topics related to FLR for capacity building:

- Field visits to restoration sites/ Aravalli Biodiversity Park
- Green waste management, Nursery management, Biofertilizer, Biopesticides

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

The data on awareness levels among local communities in Delhi and the NCR regarding FLR and related topics reveals significant gaps in knowledge and understanding. The highest level of awareness is observed in the area of general agricultural practices with 22% of respondents indicating familiarity. This suggests that traditional farming methods remain the most commonly understood and practiced among local communities. Sustainable land management practices follow at 14%, while horticulture has a 10% awareness level. These figures, though modest, show that a segment of the population is somewhat informed about sustainable and productive land use (Table 26).

Table 26. Percentage of respondents attended awareness program on topic related to FLR

S. No.	Awareness on the subject	Percentage
1	Agriculture practices	22%
2	Sustainable land management practices	14%
3	Horticulture	10%
4	Agroforestry	2%
5	Farm forestry practices	2%
6	Restoration of degraded forest land	-
7	Forest fire management	-
8	Community forest management	-
9	Livelihood generation through Non -Timber Forest Products	-
10	Climate Change and its impacts	-
11	Disaster risk management	-
12	Spring shed management	-
13	Eco-tourism	-
14	Biodiversity conservation	-
15	Value addition of agricultural products	-
16	Value addition of Non-Wood Forest Produce	-
17	Others, if any, please specify:	-

However, awareness drops sharply when it comes to more specialized and integrative practices such as agroforestry and farm forestry, both registering only 2%. This indicates that very few community members are familiar with land use systems that combine agriculture with tree cultivation, which are important for improving biodiversity, soil quality and long-term productivity. Even more concerning is the complete absence of awareness data for several critical areas, including restoration of degraded forest land, forest fire management, community forest management and climate change impacts. These topics are either not addressed at all or reflect poor awareness, highlighting a major disconnect between communities and pressing environmental challenges. Equally striking is the lack of awareness surrounding livelihood opportunities linked to non-timber forest products, eco-tourism and value addition to agricultural and forest produce. These areas hold potential for economic upliftment and sustainable development but appear to be largely unrecognized by local populations. This lack of awareness limits the communities' ability to engage in or benefit from programs that support environmental conservation and climate resilience.

Overall, the data underscores an urgent need for awareness-building initiatives, especially in areas that intersect environmental sustainability with livelihood opportunities. Educational outreach, training programs and policy-driven community engagement are essential to bridge this gap. Empowering communities with knowledge on these topics will not only improve ecological outcomes but also contribute to more resilient and self-sustaining rural economies.

16.2.1. Awareness on Soil and Water Conservation Measures and Practices

The data on community responses to soil and water conservation practices reveals significant variation in the awareness and adoption of different measures. Rainwater harvesting emerges as the most recognized and widely adopted practice, with 28% of respondents indicating its use. This suggests a relatively high level of awareness, likely driven by its visible benefits and possible support from government or non-governmental initiatives. In contrast, practices like farm bunding (5%) and sprinkler irrigation (4%) show moderate levels of adoption, possibly due to their relevance in certain farming contexts or partial access to the required resources. However, the adoption rates for organic farming (3%), drip irrigation (2%) and mulching (1%) are notably low, pointing toward challenges such as higher input costs, lack of technical knowledge or limited market access for organic produce. Strikingly, several proven conservation techniques such as terrace farming, crop rotation, mixed cropping, and contour or staggered trenches received no responses, suggesting a lack of awareness, training or perceived relevance among the communities. Overall, the data indicates a need for enhanced awareness and capacity building to promote a broader range of effective soil and water conservation practices at the community level. Responses of the communities are given in Table 27.

Table 27. Responses of the communities for soil and water conservation measures/ practices

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

16.2.2. Awareness on Changes in Climate Patters

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 28). About 36% of community members

Table 28. Response regarding changes in climate patterns

S. No.	Changes in climate patterns	Percentage (%)
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)	2
	(b) Change in rain fall pattern (Decrease)	36
5	(a) Change in snowfall pattern (Increase)	-
	(b) Change in snowfall pattern (Decrease)	-
6	(a) Change in temperature pattern (Increase)	42
	(b) Change in temperature pattern (Decrease)	-
7	Others, if any, please specify: In Kali Pahadi village, hailstorm occurred which never happened before as informed during the training need assessment.	

reported decrease in rainfall and 42% have claimed the increasing pattern in temperature in recent decade. A small part of community members (2%) people stated increase in rainfall in recent years.

16.2.3. Awareness on Changes in Quality of Forests

The community was consulted to gather insights on perceived changes in forest quality over the past two decades within the designated areas. The findings (Fig. 16) highlight a range of observations from local respondents. Approximately 6% of participants reported instances of tree felling, while 17% believed there has been a decline in the diversity of plant species. Around 11% perceived an overall degradation in forest condition, whereas 14% felt that the quality of the forest has improved. Notably, 33% of respondents observed an increase in weeds or invasive species and 6% indicated a reduction in natural regeneration within the forest in recent years.
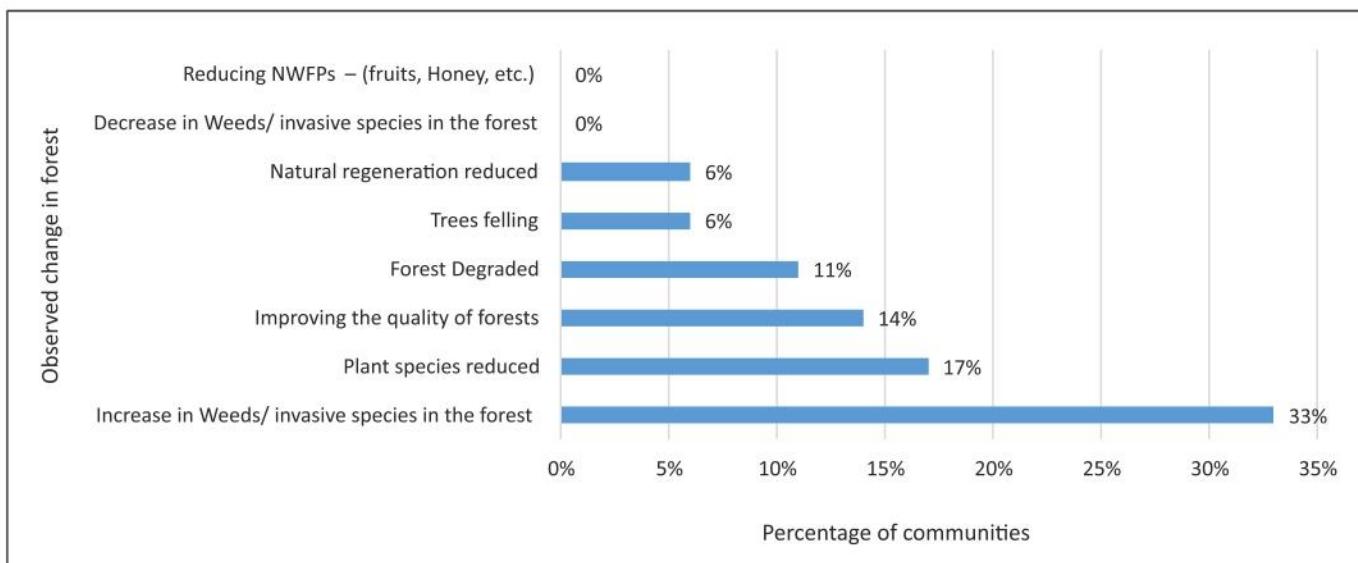
Fig. 16: Changes in forest quality in last 20 years

Suggestions from Local Communities for Forest Quality Improvement: Following measures were suggested by the local communities for the improvement of forest quality:

- **Development of Water Resources:** Villagers highlighted that the area remains predominantly dry throughout the year, except during the monsoon season. They emphasized the need for water conservation structures such as ponds, anicuts, and check dams to support forest regeneration and improve overall forest health.

- **Control of Invasive Species:** There is a strong local concern about the spread of *vilayati kikar* (*Prosopis juliflora*), an invasive species that hampers the growth of native vegetation. Communities strongly recommended the removal of *vilayati kikar* from forested and adjoining areas, and its replacement with indigenous species like *desi babool* (*Acacia nilotica*) to promote ecological balance and restore native biodiversity.

- **Protection of Young Plantations:** The need for proper fencing was also emphasized to safeguard young plantations from grazing and other external threats. This measure is seen as critical for ensuring the survival and growth of newly planted native species.

16.2.4. Awareness on Agroforestry Practices

Agroforestry practices have been observed across several villages in the project area, including Kundroli, Poonkhar, Prithivipura, Baleta, Bad Dighwada, Dabla Meena, Anawara and Sirohi. Local communities in these areas are integrating a variety of tree species with agricultural crops to promote sustainable land use. Commonly adopted species include Papaya, Lemon, Amla, Guava, Jamun, Ber, Jackfruit (Kathal), Mango, Sweet Lime (Mausami), Peepal

and Neem. These agroforestry systems offer multiple benefits such as enhanced livelihoods through fruit production, improved soil health, increased resilience to climate change, and support for biodiversity. Implementation methods include boundary planting for wind protection and soil conservation, intercropping with seasonal crops to maximize land productivity and the development of home gardens for household use and income generation.

16.2.5. Topics Prioritized and Suggested for Capacity Building of Local Communities on FLR and Related Topics

The data on capacity building needs for the restoration of degraded landscapes among local communities reveals clear priorities and some notable gaps. The most urgent area identified by the respondents is agroforestry and farm forestry practices, with 100% indicating this as a needed topic. This unanimous response underscores the community's recognition of agroforestry as a crucial strategy for restoring degraded lands while simultaneously improving livelihoods. Closely following this, horticulture and agriculture practices were identified by 96% of respondents, highlighting the importance of improved farming methods in land restoration and sustainable food production.

Sustainable land management practices also emerged as a significant need, with 83% of respondents showing interest. This suggests that many community members understand the value of managing land resources in ways that prevent further degradation and support long-term productivity. However, when it comes to soil and water conservation, only 29% expressed a need for capacity building. This comparatively lower figure may indicate either limited awareness of these practices or a perception that such conservation methods are already included within other agricultural or land management practices.

Interestingly, very few respondents saw a need for training related directly to the restoration of degraded forest landscape with only 4% responses. Other important topics such as forest fire management, community forest management, livelihood generation through non-wood forest products, climate change impacts and adaptation and disaster risk management did not receive any responses indicating a need. This could reflect a lack of exposure or awareness of these issues among local communities or perhaps these challenges are not yet perceived as immediate threats. It may also suggest that the communities are more focused on agricultural lands than forests.

Overall, the data suggests that capacity-building programs should prioritize agroforestry, horticulture and sustainable land management, as these are the areas where local communities see the maximum benefit. Efforts to raise awareness about the importance of forest-related management, climate change adaptation and disaster preparedness could also be valuable in the long term. Incorporating soil and water conservation practices within broader training modules may increase community engagement in these essential areas. Addressing these priorities strategically will help ensure that restoration efforts are both effective and aligned with the communities' perceived needs. The topics prioritized by the local communities for capacity building that can help in restoration of degraded forest landscape as given in Table 37.

Table 37. Suggested topics for capacity need on restoration of degraded landscape for local communities

S. No.	Prioritized Topics for Capacity Building	Response (in %)
1	Agroforestry/ farm forestry practices	100
2	Horticulture/agriculture practices	96
3	Sustainable land management practices	83
4	Soil and water conservation	29
5	Restoration of degraded forest land	4
6	Forest fire management	-
7	Community forest management	-
8	Livelihood generation through non - wood forest products	-
9	Climate change and its impacts, climate change mitigation and adaptation	-
10	Disaster risk management	-

Following were the topics suggested in particular for which they need training:

- Organic farming
- Improved practices for increased productivity and remedies to deal with the crop diseases of Mustard, Onion, Bajra, Channa, Maize, Tomato, Cotton
- Measures to avoid the agriculture loss due to wildlife - Monkeys, Wild boars, Nilgai
- Government initiatives for horticultural crops
- Management of *Prosopis juliflora* in agri-landscape
- Need awareness about Fasal Bima Yojna
- Knowledge of advance agricultural tools
- Sources for superior seed varieties
- Visit to Krishi Vigyan Kendra with specific focus on cultivation of mustard and onion (since the Alwar belt is particularly well known for these two crops).
- Livelihood generation activities

16.2.6. Choice of Mode of Training

The communities were offered a selection of training modes, including audio-visual sessions, demonstrations and exposure visits. During the Focus Group Discussions, all participants expressed a preference for all three modes, recognizing their complementary value in enhancing learning. However, they particularly emphasized the importance of exposure visits, highlighting these as especially effective in providing practical insights and understanding.

16.2.7. Suitable Months for Conducting Training

Consultations with the communities revealed that the most appropriate period for conducting training sessions is from April to June. This timeframe coincides with a seasonal decline in agricultural activities, allowing community members greater availability and flexibility to attend. All participating villages indicated that they are able to dedicate one full day for training during this period.

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

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

17.1 TRAINING MODULE ON FOREST LANDSCAPE RESTORATION (FLR) FOR FOREST OFFICERS (FOREST RANGE OFFICERS AND ABOVE) OF STATE FOREST DEPARTMENTS

Session 1: Introduction to Forest Landscape Restoration

- 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 using sample data

Session 3: Green Credit Programme (GCP)

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

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: Forest Certification

- Principles and certification mechanism for sustainable forest management

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: Ecotourism

- Introduction to ecotourism
- Ecotourism planning and development
- Ecotourism in conservation of forests and biodiversity
- Community Involvement and livelihoods – Participatory approaches

Session 9: NWFP Value Chain Development

- Major NWFPs and their socio-economic importance
- Value chain analysis and development

Session 10: Funding Mechanisms for FLR

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

Session 11: Springshed management

- Importance of springs for local communities
- Spring inventorying and mapping
- Recharge techniques and catchment protection

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

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 Credit Rules, 2023

Session 5: 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 using sample data

Session 6: Springshed management

- Importance of springs for local communities
- Spring inventorying and mapping
- Recharge techniques and catchment protection

Session 7: 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 8: Nature-Based Solutions/ Approaches

- Definition, principles of nature-based solutions/ approaches
- Designing and Implementing NbS project
- Monitoring, evaluation, and scaling up of nature-based solutions/ approaches
- Financing project on nature-based solutions/ approaches
- Case studies

Session 9: Invasive Species and their Management

- Major invasive species
- Control and eradication methods
- Ecological impacts

Session 10: Gender Mainstreaming in Forest Management/ FLR

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

Session 11: Ecotourism

- Introduction to Ecotourism
- Ecotourism Planning and Development

17.3 TRAINING MODULE ON FOREST LANDSCAPE RESTORATION FOR OFFICERS AND STAFF OF OTHER LINE DEPARTMENTS

Session 1: Introduction to Forest Landscape Restoration

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

Session 2: Invasive Species and their Management

- Major invasive species
- Ecological and economic impacts
- Measures for control of invasive species

Session 3: Springshed Management

- Concept and hydrological importance
- Recharge zone management
- Community-based models

Session 4: Legal Framework for Environmental Protection in India

- Forest (Conservation) Act 1980
- Environment (Protection) Act 1986,

- Biological Diversity Act, 2002
- Wildlife (Protection) Act, 1972

Session 5: Gender Mainstreaming in Forest Landscape Restoration

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

Session 6: International Agreements and Conventions on Environment

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

Session 7: Ecotourism

- Introduction to Ecotourism
- Ecotourism Planning and Development – Site selection, infrastructure planning, and zoning regulations.

Session 8: Disaster Management / Disaster Risk Reduction

- Role of FLR in disaster risk reduction
- Nature-based solutions/approaches for disaster risk reduction

Session 9: Mission LiFE (Lifestyle for Environment)

- Sustainable life style
- Climate friendly sustainable practices

Session 10: Sustainable Development Goals and FLR

- Linkages with FLR activities
- SDG 13 (Climate) and SDG 15 (Life on Land)
- Monitoring and evaluation frameworks

Session 11: Sustainable livelihood generation

- Sustainable harvesting of NWFPs
- Value addition, storage and market linkages

17.4 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: Improved Agriculture Practices

- Organic farming
- Biopesticides
- Crop diversification

Session 3: Sustainable land management practices

- Soil Moisture Conservation - Mulching, bunding, terracing, Chauka System, Taanka System etc.

- Micro-irrigation – Drip and Sprinkler

- Crop residue management

Session 4: Agroforestry, Farm Forestry and Horticulture Practices

- Agroforestry and its benefits

- Agroforestry models

- Sustainable horticulture practices

Session 5: 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

Session 6: Invasive species management

- Major invasive species

- Control and management

18 CONCLUSION

The Training Needs Assessment (TNA) for forest landscape restoration (FLR) in Delhi and NCR of Rajasthan and Haryana underscores the critical importance of structured and stakeholder-specific capacity development to ensure the successful planning and implementation of FLR initiatives. The assessment reveals that while key stakeholders including State Forest Departments, line departments and local communities possess a basic understanding of FLR concepts, there are notable gaps in technical knowledge, inter-agency coordination and on-ground implementation capacity. To address these challenges, it is essential to design and deliver stakeholder-specific training modules that enhance understanding of core FLR principles, concepts, strengthen inter-departmental collaboration and build technical and governance capacities at the community level. Emphasis must also be placed on promoting integrated landscape management, climate resilience and inclusive stakeholder engagement. Investing in such comprehensive training and institutional strengthening will directly contribute to the success of FLR projects and generate wider co-benefits. These include improved ecological functionality, increased climate resilience and enhanced livelihoods, especially for vulnerable and forest-dependent communities. The TNA provides a strategic foundation for designing a coherent, inclusive and results-oriented capacity development roadmap. By addressing the identified gaps through targeted interventions, key stakeholders in Delhi and NCR will be better equipped to implement FLR effectively and sustainably. The findings of this TNA offer a strategic foundation for developing a cohesive and inclusive roadmap for capacity development paving the way for impactful and resilient FLR efforts across Delhi and the NCR.

19   WAY FORWARD

Training modules on Forest Landscape Restoration (FLR) have been developed as part of the Training Needs Assessment (TNA) to support the capacity building of the State Forest Departments, other line departments and local communities within Delhi and NCR of Haryana and Rajasthan. The next critical step is the effective implementation of training modules, their institutional uptake and long-term integration into stakeholders' capacity-building programs. The focus must now shift from planning to action, with an emphasis on rolling out training modules across key stakeholder levels and selected landscapes under the RECAP4NDC Project in the Delhi and NCR. To achieve this, a phased training implementation plan needs to be developed. This plan must prioritize the capacity building of front-line forest staff, community members and representatives from Panchayati Raj Institutions. These key actors are central to on-ground FLR interventions and must be equipped not only with technical knowledge but also with participatory and governance skills to support community-led FLR efforts. To ensure sustainability and scalability, a Training of Trainers model may be adopted using the developed training modules. By building a cadre of master trainers at the Forest Division level across Delhi and NCR, a self-sustaining system of ongoing capacity building can be created. Further, to institutionalize this effort, the FLR training modules should be integrated into the regular induction and in-service training programs of the State Forest Departments and other line departments. This will embed FLR knowledge and practices into the operational framework of State Forest Departments and other line departments. Leveraging technology-enabled platforms will be crucial to enhance reach and accessibility. Digital learning tools, mobile-based content and community radio can help engage participants in remote areas, promoting continuous learning beyond traditional classroom settings.

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GLIMPSES OF THE TNA SURVEYS -STATE FOREST DEPARTMENT

GLIMPSES OF THE TNA SURVEYS - 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: ……………………………………………

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: ……………………………………………

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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