Report
on
Evaluation of Works done under Compensatory Afforestation Fund Management and Planning Authority (CAMPA) in Jammu Region

Submitted to:

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Abbreviations

APO	Annual Plan of Operation
BP	Biological Park
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CEC	Central Empowered Committee
DRSM	Dry Rubble Soil Moisture
EPA	Entry Point Activity
FGD	Focused Group Discussion
GIS	Geographic Information System
ha	Hectare
IGA	Income Generation Activities
JFM	Joint Forest Management
J & K	Jammu and Kashmir
MDF	Moderately Dense Forest
M&E	Monitoring and Evaluation
NGO	Non- Government Organization
NPV	Net Present Value
NR	Natural Regeneration
OF	Open Forest
LULC	Land Use Land Cover
PA	Pretected Area
PAN	Protection Area Network
PRA	Participatory Rural Appraisal
RFA	Recorded Forest Area
RFT	Running Feet
RMT	Running Meter
Sq km	Square Kilometer
SHG	Self Help Group
SLMC	State Level Management Committee
SLSC	State Level Steering Committee
SMC	Soil Moisture Conservation
UT	Union Territory
VDF	Very Dense Forest
VFMC	Village Forest Management Committee
VFPMC	Village Forest Protection Management Committee
VMC	Vigilance and Monitoring Committee
WL	Wildlife
WLS	Wildlife Sanctuary

Executive Summary

I. Background

The Government of India vide notification dated 31.10.2019 has carved out two union territories of Jammu & Kashmir and Ladakh from the erstwhile State of Jammu & Kashmir. Situated in the northern- most part of the country, Jammu & Kashmir (UT) and Ladakh (UT), cover an area of 2,22,236 sq km, which is 6.76% of the geographical area of the country. The UT of Jammu & Kashmir is bordered by Pakistan in the west, UT of Ladakh is situated on the northern and eastern side and the States of Himachal Pradesh and Punjab lie South to the UT of Jammu & Kashmir. The UT of Ladakh has international border with Pakistan, Afghanistan and China. It shares borders with the UT of Jammu & Kashmir in the West and Himachal Pradesh in the South. The average annual rainfall varies from about 600 mm to about 800 mm and the average annual temperature from sub-zero to 40°C. The two UT's are drained by a number of rivers viz Jhelum, Chenab, Indus, Ravi, Tawi etc. All the 22 districts of UT of Jammu & Kashmir and two districts of UT of Ladakh are hill districts and both UT's do not have any tribal district. As per census 2011, the combined population of two UT's is 12.54 million accounting to 1.04% of India's population. The rural and urban population constitute 72.62% and 27.38% respectively. Tribal population is 11.91% of the UT's population. The average population density of the two UTs is 125 persons per sq km, which is lower than the national average. The 19th livestock census 2012 has reported a total livestock population of 9.2 million.

II. Forests in Jammu and Kashmir

Forests of the Union Territory are spread over two broad geo-climatic zones: Jammu and Kashmir. Vegetation and climate are broadly being categorized into sub-tropical, temperate and alpine zones with wide diversity of fauna and flora. More than 50% of the plant species used in British pharmacopoeia are reported to grow in Jammu and Kashmir. Literature review indicates that 572 plant species belonging to 109 different families have medicinal value.

As per State of Forest Report 2019 issued by Forest Survey of India, the forest cover in Recorded Forest Area (RFA) in the two UTs is 20,230 sq km of which 17,643 sq km is Reserved Forests, 2,551 sq km is Protected Forest, and 36 sq km is Unclassed Forests.

III. Current Study

The current study aims to physically monitor and evaluate work done under CAMPA during the years 2012-13 to 2018-19 in the three circles namely East, West and Chenab circle of Jammu region. The objective of the intended third-party Monitoring and Evaluation study is to conduct process monitoring, ascertain the execution and efficacy of the works including ancillary activities. The scope of the work of the study is delineated in the proceeding texts

Physical monitoring through enumeration method especially with respect to

i. Survival percentage of planted samplings, enclosure wise, along with number and species planted.
ii. Growth Parameters like Height and Girth and Crown status of Planted Plantation.
iii. Observation regarding the type and effectiveness of fencing and soil conservation works etc
iv. General public opinion based on FGD with the inhabitants residing in the nearby closure areas.
v. In case of failure of plantation or low survival percentage of the enclosure, the probable reasons thereof.

IV. Study Team and Manpower Deployment

The study team consisted of field teams under able guidance and direction of a multidisciplinary team of experts. The expert team was responsible for conceptualisation, planning, direction, expert observation and overall coordination. The expert's responsibilities also included the tasks of designing of methodology, designing of formats for collection of data from field, pilot field study, planning and execution of field data collection from plantation sites, analysis of data collected from field for interpretation of results and compilation of the evaluation report. The field teams consisted of field enumerators who

were responsible for collection of data (physical measurements and ocular observations), FGD with local community, checking of documents at Division and Range level from sample sites being evaluated. In the Jammu East and Chenab Circles, a team of 5 field enumerators (team 1) were deputed for data collection work whereas, 4 field enumerators (team 2) were deputed in the Jammu West Circle. The field enumerators were accompanied by skilled assistants for assisting in enumeration of all trees planted in a closure/site. After selecting the closure, the whole area was to be divided into sections, one allotted to each enumerator. Local staffs (mostly Block Officers) were always with the evaluation team so that they could verify the authenticity and correctness of the data collected. Each team of field enumerators was supervised by a circle coordinator.

V. Methodology

Sampling: About 10 % of the sites of CAMPA were covered for the current evaluation study. Before visiting the closure for monitoring, all the records pertaining to the plantation were obtained from the Range Headquarter and Closure Journal from the Block In-charge or from the Forest Guard. Apart from actual counting of the planted seedlings and recording height and girth of various species, observation regarding soil conservation measures and fencing were also made. A complete enumeration of all seedlings planted during the years 2012-13 to 2018-19 in each of the sampled sites was conducted. Inside each sampled site, five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site were laid for detailed monitoring and evaluation, i.e., measurement of growth, height, girth, crown conditions and for capturing the status of rejuvenation and regeneration of the plantation area.

Data Collection: The evaluation survey included both primary and secondary data collection.

Secondary Data Collection: Secondary data, i.e., official documents and records were collected from Division Headquarter/Range offices. An exhaustive checklist developed for this study was referred by the field enumerators and the coordinators to ensure collection of all relevant secondary data uniformly across all sites. The major documents collected *inter alia* included:

- Working plans;
- Site specific planning documents (micro plans if any);
- Plantation journals;
- Measurement books;
- Bill of materials;
- Proceeding of the meetings – at committee, tertiary level;
- Progress Reports if any;
- Catchment area treatment plan if any;
- CAMPA annual reports;
- Inspection and follow up notes;
- District statistical handbooks; etc.

Primary Data Collection: Primary data collection was done by physical measurements and observations in sample sites. Data pertaining to area, location, species planted, their numbers and survival, height and girth of plants, vigour of the plants, fencing and other maintenance activities, biotic pressure, site suitability and overall performance etc. was collected by the field enumerators and recorded. Besides, FGDs were conducted amongst the nearby inhabitants of the CAMPA closure sites for primary data collection with respect to the participation of community of the area in planning and execution of activities, demographic details, dependence on nearby plantation closure, issues and suggestions from the villagers, usufruct rights and benefit sharing mechanism.

VI. Major observations from the field

A total of 170 sites in 23 divisions of 3 circles, namely, East Circle (83 sites), West Circle (28 sites) and Chenab Circle (59 sites) for the work done under CAMPA during the year 2012-13 to 2018-19 were evaluated. As per records, a total of 16,34,561 plants were planted in three circles of Jammu region. In terms of survival, in the 170 sites of 3 circles, a total of 7,93,329 plants were recorded on the ground belonging to 93 species including fruit trees and ornamental plants, which gave an overall average of 48.53% in all the three circles. The Circle-wise observations are summarised below:

East Circle

In East Circle, 11 divisions namely Basoli (3 sites), Billawar (7 Sites), Jammu Social Forestry (14 sites), Jammu (14 sites), Kathua Social Forestry (7 sites), Kathua Soil and Water Conservation (6 sites), Kathua (7 sites), Kathua wildlife (2 sites), Ramnagar (8 sites), Samba (1 site) and Udhampur (14 sites) were evaluated. Among the 11 divisions with respect to survival percentage, the maximum survival percentage was recorded in Ramnagar division with an overall average of 66.12% followed by Kathua Wildlife 65.24%, Samba 61.24%, Billawar 60.43%, Kathua Social Forestry 57.59%, Kathua 41.51%, Udhampur 42.57%, Basoli 36.32%, Kathua Soil & Water Conservation 34.92% and Jammu 33.45%. The minimum survival percentage was recorded in Jammu Social Forestry division with 25.36%. In respect of growth parameter, the Kathua Social Forestry division has showed best performance in height and girth. The least performance in terms of height and girth was recorded in Basoli division. In the 83 sites of 11 units as per record, 6,53,174 plants were planted of which 3,00,367 plants were recorded surviving on ground belonging to 77 tree species including fruit trees and ornamental plants estimating to, an overall average survival of 45.99%. The maximum numbers of plants recorded on ground were *Dalbergia sissoo* (59,059) followed by *Pinus roxburghii* (48,895), *Dendrocalamus strictus* (27,254), *Bahunia variegate* (24,303), *Emblica officinalis* (13,970) & etc. The fencing variation in the East Circle was recorded on 6 sites out of 83 surveyed. The variation in fencing was observed in Billawar (1 site), Social forestry Jammu (1 site) and in Jammu (5 sites). The regeneration survey was conducted inside five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site taken up for detailed survey. Natural regeneration has been observed in all 83 sample sites for the naturally occurring species like *Pinus roxburghii, Mallotus philippensis, Leucaena leucocephala, Pyrus pashia, Dendrocalamus strictus, Ficus spp, Mulber, Dalbergia sisso, Bahunia variegate, Terminalia arjuna, Syzgium cumini, Pinus wallichiana, Cedrus deodara, Quercus spp, Dodonaea viscose, lantana, Wendlandia hayei, Carissa opaca etc.* The level of participants in the FGD was satisfactory in all the sites evaluated.

West Circle

In West Circle, 5 divisions namely Mahore (7 sites), Nowshera (5 sites), Poonch (7 sites), Rajouri (5 sites) and Reasi (4 sites) were evaluated. Among the 5 sites the maximum survival percentage was recorded in Rajouri division with an overall average of 59.56% followed by Poonch 57.12%, Reasi 55.89% and Nowshera 47.70%. The minimum survival percentage was recorded in Mahore division at 22.14%.

In respect of growth parameters, Nowshera division has showed best performance for height and Reasi division for girth. The least performance in height and girth was recorded in Mahore division. In the 28 sites of 5 divisions as per record, 2,77,982 plants were planted of which 1,24,469 plants of 53 species including fruit trees and ornamental plants, have been found surviving with an average survival of 44.78%. The maximum numbers of plants recorded on ground were *Robinia pseudo acacia (23,615), Ulmus vilosa (17,790), Pinus roxburghii (15,657), Cedrus deodara (12,775), Bahunia variegate (83,320) & etc*. In the 28 sites of West Circle the variation in fencing was recorded in only 1 site (closure 113 Ar 2014-15) of Gulab Gaarh Range of Mahore division. The regeneration survey was conducted inside five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site taken up for detailed survey. Natural regeneration has been observed in the sample sites for the naturally occurring species like *Pinus roxburghii, Cedrus deodara, Pinus wallichiana, Bahunia variegate, Ulmus wallichiana, Cassia fistula etc.* The level of community participation has been found to be satisfactory in all the sites evaluated.

Chenab Circle

In Chenab Circle, 7 divisions namely Baderwah (10 sites), Batote (8 sites), Doda (6 sites), Kishtwar (8 sites), Marwah (12 sites) NH1A Batote Ramban project (8 sites) and Ramban (7 sites) were evaluated. Among the 7 divisions with respect to survival percentage, the maximum survival percentage was recorded in NH1A Batote Ramban Project (71.60%) followed by Kishtwar (57.27%), Doda (54.43%), Baderwah (53.39%), Batote (52.33%) and Marwah (49.62%). The minimum survival percentage was recorded in Ramban division (41.12%). In respect of growth parameters, NH1A Batote Ramban Project has showed best

performance in height and in girth Batote division showed the best performance. The least performance in height and girth was recorded in Marwah and Ramban division, respectively. In the 59 sites of 07 divisions as per record 7,03,405 plants were planted of which 3,68,493 plants were recorded on ground belonging to 46 tree species including fruit trees and ornamental plants, with an overall survival of 52.39%. The maximum numbers of plants recorded on ground were *Cedrus deodara (1,32,825), Pinus wallichiana (83,177), Robinia pseudo acacia (50,776), Pinus roxburghii (24,288), Ulmus vilosa (13,668) & etc*. The variation in fencing in the Chenab circle was recorded in 2 sites out of 59 surveyed. The variation in fencing was observed in Ramban division (2 sites). The regeneration survey was conducted inside five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site taken up for detailed survey. Natural regeneration has been observed in the sample sites for the naturally occurring species like *Pinus roxburghii, Cedrus deodara, Pinus wallichiana, Robinia pseudoacacia, Ulmus wallichiana, etc.* In the 59 sites of Chenab circle evaluated the variation in fencing was recorded in 2 sites of Ramban division. The water harvesting structures were DRSM works and crate wire bunds. The variation in DRSM work was recorded in 1 sites of Batote division (13 cum) and in 1 site of Ramban division (60cum). The level of participants in the FGD was satisfactory in all the sites evaluated.

Community Perception (through FGD)

Views of the local community were collected, through Focused Group Discussion from the inhabitants of the closure sites and their views were solicited on various aspects like CAMPA project, rapport with forest department, incidence of forest fire in the area, public demands, usufruct right and benefit sharing mechanism etc. During FGD in the evaluation area it was observed that around 90% inhabitants of the CAMPA closure sites are aware of CAMPA project. However, the community was not involved in planning and implementation of the project barring a few persons who were involved at the time of fencing and plantation of closures. It was found that the contractors used their own labors for fencing of closures. The inhabitants of the closure sites are mostly dependent on livestock so on usufruct right and benefit sharing the response of the community was found satisfactory. They are getting fodder for livestock from the closure sites. During FGD it was recorded that, in case of fire

incident in the forest area, people are helping forest officials for dousing the fire, which is a good sign. People are demanding that they should be engaged by the department for any work that is to be done in the forest area. They are also demanding that watch and ward should be provided to the closure sites.

Year-wise Circle-wise survival & natural regeneration in Jammu Region

The overall picture of the survival and natural regeneration, Year-wise and Circle-wise based on the sample sites is presented as under:

Year	Circle	No. of Closures	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	No. of plants survived per ha	NR (per ha)	Total No. of Plants (Survived + NR) per ha	Result* (Very Good/ Good/Satisfactory/ Deficient)
2012-13	East Circle	5	100.00	59000	34127	57.84	341	780	1121	Very Good
	West Circle	2	40.00	32000	19640	61.38	491	760	1251	Very Good
	Chenab Circle	7	145.00	112300	64239	57.20	443	358	801	Good
	Jammu Region	14	285.00	203300	118006	58.05	414	632	1046	Very Good
2013-14	East Circle	12	195.00	90320	41884	46.37	215	711	926	Good
	West Circle	5	100.00	55900	26431	47.28	264	376	640	Satisfactory
	Chenab Circle	9	196.00	115500	55749	48.27	284	391	675	Satisfactory
	Jammu Region	26	491.00	261720	124064	47.40	253	493	746	Satisfactory
2014-15	East Circle	11	196.00	91163	40426	44.34	206	592	798	Good
	West Circle	4	75.00	42000	14072	33.50	188	360	548	Satisfactory
	Chenab Circle	7	135.00	85500	53499	62.57	396	457	853	Good
	Jammu Region	22	406.00	218663	107997	49.39	266	469	735	Satisfactory
2015-16	East Circle	10	201.20	106486	37685	35.39	187	494	681	Satisfactory
	West Circle	3	85.00	30000	17649	58.83	208	487	694	Satisfactory
	Chenab Circle	8	150.00	99600	48513	48.71	323	330	653	Satisfactory
	Jammu Region	21	436.20	236086	103847	43.99	238	437	675	Satisfactory
2016-17	East Circle	16	360.66	151396	63206	41.75	175	512	687	Satisfactory
	West Circle	3	80.00	42800	15878	37.10	198	333	532	Satisfactory
	Chenab Circle	11	232.00	116950	58047	49.63	250	327	577	Satisfactory
	Jammu Region	30	672.66	311146	137131	44.07	204	391	595	Satisfactory
2017-18	East Circle	16	230.50	101844	57385	56.35	249	548	797	Good
	West Circle	4	54.00	29300	8841	30.17	164	540	704	Satisfactory
	Chenab Circle	9	192.00	97325	47030	48.32	245	295	540	Satisfactory
	Jammu Region	29	476.50	228469	113256	49.57	238	378	616	Satisfactory
2018-19	East Circle	13	160.83	52965	25654	48.44	160	427	587	Satisfactory
	West Circle	7	143.00	45982	21958	47.75	154	258	412	Deficient
	Chenab Circle	8	90.00	76230	41416	54.33	460	324	784	Good

Year	Circle	No. of Closures	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	No. of plants survived per ha	NR (per ha)	Total No. of Plants (Survived + NR) per ha	Result* (Very Good/ Good/Satisfactory/ Deficient)
	Jammu Region	28	393.83	175177	89028	50.82	226	336	562	Satisfactory
	East Circle	83	1444.19	653174	300367	45.99	208	581	789	Good
	West Circle	28	577.00	277982	124469	44.78	216	410	626	Satisfactory
	Chenab Circle	59	1140.00	703405	368493	52.39	323	354	677	Satisfactory
	Jammu Region	170	3161.19	1634561	793329	48.53	251	448	699	Satisfactory

* 1001 and above plants per ha — Very Good
751 - 1000 plants per ha — Good
501-750 plants per ha — Satisfactory
≤ 500 plants per ha — Deficient

Based on the criteria of total density of plants (survived and natural regeneration), yearwise rating has been done of individual Circles in Jammu region and presented in the above table.

Other Assests procured/created under CAMPA

The assets procured/created under CAMPA (2012-13 to 2018-19) in various divisions of Jammu circle were GPS instruments, computers/laptops, printers, inverters, cameras, batteries and vehicles, etc. Under civil works, bathrooms, BO huts, office buildings, guest houses, etc., were constructed. In Kathua Wildlife Division view points, chain link fencing, boundary wall, ponds, etc., were constructed. In the Jammu region under CAMPA during 2012-13 to 2018-19, 49 GPS instruments, 13 Photostat machines, 40 computers, 25 printers, 14 inverters, 2 cameras, 27 batteries and 3 vehicles (2 water tankers and 1 Bolero) were purchased. The equipments were verified in the various divisions by NHC team and all were found functional and are serving the intended purpose. The civil works verified were found mostly in good condition except for 2 bathrooms constructed at DFO office Udhampur where there was no water available in the washrooms and the sanitary items were also not in good shape.

Output and Outcome

Output: The plantations made during 2012-13 to 2018-19 has shown a survival rate of 48.53% which can be considered as good in tough terrains. The primary output can be said to be

success in terms of afforestation. The degraded forest lands and the barren hills have been rehabilitated through gap fillings resulting in increased density of plants. The man-days required right from advance work to plantation and maintenance has been catered through deployment of local community and hence employment has been generated to them. The soil moisture conservation work is instrumental in checking soil moisture runoff which in many places have resulted in improved vegetation and productivity in the impacted catchment area. Increased grass for cattle grazing is another output which is basic occupational need of the catchment area. Awareness on environment and climate change resilience has also increased through training and capacity building. The joint forest management network has increased through their capacity building.

Outcome: The interventions have been found to be sustainable in the long run. The areas treated will be producing substantial quantity of bio mass for community use in terms of fodder and fuelwood. The improved soil moisture regime will be recharging the ground water level to be supportive to the vegetation and natural growth of flora in the area. The growth of shrubs, medicinal plants and herbs will be supporting to the livelihood security in the area. The crown and ground density of the forests will keep on increasing through growth and regeneration of the plants planted. The well-stocked forests in the future will be checking floods and soil moisture run off. The expanded forests will be attracting more rain and hence agricultural and horticultural prosperity in the catchment area.

VII. Suggestions and Recommendations

Based on the comprehensive surveys, enumerations and field observations the consultants are submitting a set of suggestions as follows:

1. The Forest Department may strengthen the network of Village Forest Management Committees (VFMCs) in the plantation sites so that they get the benefits of usufruct sharing in due course of time and also protect the plantation areas. This will encourage local people for protection of plantations on principle of “Care and Share”.
2. Success of any plantation also depends on the nursery stock. It was found that some of the divisions are getting planting stock from other divisions or from central

nurseries. The divisions should prefer to develop their own nursery stock close to plantation sites which may give better survival percent. In future plantations nurseries can be improved to produce quality saplings to minimise damage in transportation.

3. Success of plantation site is also dependent on the adaptability of species. Species - site matching to be assured and correct choice of species may avoid poor survival.
4. The data of plantations sites in most of the divisions is not up to the mark. It was observed during evaluation that closure journal of the sites is not maintained properly, as required. In the closure journals they have mentioned only name of species and total number, but not species wise numbers planted. This is required to assess and monitor the actual survival % of the species. It is suggested that plantation/closure journals should be well maintained and updated periodically.
5. During field evaluation it was found that the casual labours engaged under CAMPA for protection of closure are not getting salary in time. This has led to lack of motivation for protection of plantations and has adversely effected some closures. This is one of the main reasons for poor growth and survival in some closures.
6. Grazing pressure is very high in Jammu region due to the Bakarwals, the nomadic tribe. Watch and ward which is very important for success of closure, has been provided for most of the plantation sites but there are incidences of damaging the fencing and grazing. The major demands of local communities were for watch and ward of the closure where it was absent. The department may also plan for establishing fodder banks to reduce the pressure of grazing.
7. Forest fire is a major threat to success of closure. Department may conduct workshops for field functionaries and other stakeholders to train them in fire fighting and protection measures. Mock exercises may also be conducted. The department should also pamphlets for Do's and Don'ts in the forest area, in local language and get it distributed among the inhabitants particularly residing in the forest fringe areas.
8. Fencing of plantation site also improves the chances of plantation survival. The field functionaries should monitor fencing of the closure site. Whenever reported, worn out of fencing may be corrected immediately by engaging staffs. This will be helpful not only in protecting ANR plantation but also natural regeneration of the area from grazing.

9. Capacity building is one of the main components that need to be focused by the department. The field functionaries may be well trained on aspects like selection of sites, choice of species to be planted, nursery development, seed selection, seed processing, record keeping and maintaining closure journal. Awareness camps may also be organised, particularly for the inhabitants of the closure sites, to make them aware of the benefits of plantation. Training and capacity building of community in plantation and allied activities will help both in afforestation as well as conservation.
10. The Divisional Forest Officer may also engage staffs for effective internal monitoring of the plantation sites, for at least first two years who will submit quarterly report on plantation sites. This practice will also enhance plantation survival. The DFOs/ Conservators and other higher officials should periodically inspect the sites and write their inspection note and the follow up against these inspection notes should be monitored by the concerned DFOs.

Chapter 1: Background

1.1 Jammu & Kashmir in a Bird's Eye view

The Government of India vide notification dated 31.10.2019 has carved out two union territories of Jammu & Kashmir and Ladakh from the erstwhile State of Jammu & Kashmir. Situated in the northern- most part of the country, Jammu & Kashmir (UT) and Ladakh (UT), cover an area of 2,22,236 sq km, which is 6.76% of the geographical area of the country. The UT of Jammu & Kashmir is bordered by Pakistan in the west, UT of Ladakh is situated on the northern and eastern side and the States of Himachal Pradesh and Punjab lie South to the UT of Jammu & Kashmir. The UT of Ladakh has international border with Pakistan, Afghanistan and China. It shares borders with the UT of Jammu & Kashmir in the West and Himachal Pradesh in the South. The average annual rainfall varies from about 600 mm to about 800 mm and the average annual temperature from sub-zero to 40°C. The two UT's are drained by a number of rivers viz Jhelum, Chenab, Indus, Ravi, Tawi etc. All the 22 districts of UT of Jammu & Kashmir and two districts of UT of Ladakh are hill districts and both UT's do not have any tribal district. As per census 2011, the combined population of two UT's is 12.54 million accounting to 1.04% of India's population. The rural and urban population constitute 72.62% and 27.38% respectively. Tribal population is 11.91% of the UT's population. The average population density of the two UTs is 125 persons per sq km, which is lower than the national average. The 19th livestock census 2012 has reported a total livestock population of 9.2 million.

The typical features of the region are capsuled in the table 1.1:

Table 1.1 Land Use Pattern

Land Use Types	Area (in 000' ha)	%
Geographical Area	22,224	
Reporting area for land utilization	4,058	100.00
Forests	2,299	56.65
Not available for land cultivation	571	14.08
Permanent pastures and other grazing	113	2.77
Land under misc. tree crops and groves	57	1.39
Culturable wasteland	139	3.44
Fallow land other than current fallows	15	0.37
Current fallows	106	2.61
Net area sown	758	18.69

Source: Land Use Statistics, Ministry of Agriculture, GOI, (2014-15)

1.2 Forestry Scenario

As per the Champion & Seth Classification of Forest Types (1968), the forest in UT of Jammu & Kashmir and UT of Ladakh belong to eight Type Groups which are further divided into 42 Forest Types, the highest in the country. The Jammu & Kashmir Forest Act, 1987 is the only state-specific Forest/Wildlife act or rule that exists in the UTs. The two UTs have a Forest Protection Force to assist the Department in enforcing the forest laws on the ground and protection of forests and wildlife. The Forest Department of the two UTs have implemented various schemes focusing on rehabilitation of degraded forests, consolidation and demarcation, Eco Task Force, urban forestry, pasture and fodder development, stabilization of strip area on National Highways, development of Conifer Forests, CM's Participatory Afforestation Scheme, Integrated Forest Protection, participatory grazing land development programme etc. Literature indicates that 572 plant species belonging to 109 different families have medicinal value.

As per State of Forest Report 2019 issued by Forest Survey of India, the forest cover in Recorded Forest Area (RFA) in the two UTs is 20,230 sq km of which 17,643 sq km is Reserved Forests, 2,551 sq km is Protected Forest, and 36 sq km is Unclassed Forests.

The two UTs have so far notified 15,912 sq km under the Protection Area Network (PAN) which is 15.59% of the total geographical area of the combined UT, comprising five National Parks, 14 Wildlife Sanctuaries and 35 Conservation Reserves. The Protected Area (PA)

network of the two UTs is the highest in the country in terms of area, which is nearly 10% of the country's PA network.

1.2.1 Forest Types

Jammu and Kashmir has numerous chains of coniferous forests. With the increase in population of both human as well as livestock, the forests are under great pressure due to open grazing, heavy exploitation and excessive biotic dependence.

Some of the important forests of Jammu and Kashmir consist of deodar, willow, juniper, blue-pine, spruce, fir, yew, alder, elm, ash, sorrel, poplar, maple, birch, hazel, mulberry, silver-fir, cedar, beech, shisham, mohowa, jammun, bamboo, reed, numerous bushes, scrubs and grasses.

Based on the interpretation of IRS Resourcesat-2 LISS III satellite data of the period Sept 2017 to Nov 2017, the Forest Cover in the two UTs is 23,611.89 sq km which is 10.63% of the geographical area. In terms of forest canopy density classes, the UTs have 4,280.48 sq km under Very Dense Forest (VDF), 8,612.36 sq km under Moderately Dense Forest (MDF) and 10,719.05 sq km under Open Forest (OF). Forest Cover in the UTs has increased by 370.89 sq km as compared to the previous assessment reported in ISFR 2017.

Table 1.2 Combined Forest Cover of UTs of Jammu & Kashmir and Ladakh

Class	Area (in sq km)	% of GA
VDF	4,280.48	1.93
MDF	8,612.36	3.88
OF	10,719.05	4.82
Total	**23,611.89**	**10.63**
Scrub	547.54	0.25

The district-wise forest cover in the UT of Jammu and Kashmir is given in table 1.3.

Table 1.3 District- wise Forest Cover in Jammu & Kashmir, UT

(in sq km)

District	Shape File Area #	2019 Assessment				% of Shape File Area	Change wrt 2017 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Anantnag[H]	2,727	126.55	455.28	492.36	1,074.19	39.39	49.19	0.77
Badgam[H]	1,250	100.85	76.04	164.95	341.84	27.35	49.84	16.00
Bandipura[H]	2,676	270.85	177.16	194.83	642.84	24.02	34.84	3.53
Baramula[H]	2,062	287.57	211.90	370.79	870.26	42.20	63.26	7.05
Doda[H]	2,411	327.98	703.50	454.45	1,485.93	61.63	-30.07	0.40
Ganderbal[H]	1,620	129.36	179.13	186.01	494.50	30.52	58.50	6.58
Jammu[H]	2,407	0.00	241.41	526.22	767.63	31.89	22.63	35.54
Kathua[H]	2,512	108.16	607.96	615.32	1,331.44	53.00	-3.56	6.59
Kishtwar[H]	8,179	235.96	716.41	832.68	1,785.05	21.82	-20.95	5.82
Kulgam[H]	1,265	84.92	99.00	206.32	390.24	30.85	32.24	4.98
Kupwara[H]	2,744	783.42	408.34	273.19	1,464.95	53.39	-17.05	1.22
Mirpur[H]	3,759	0.00	484.66	753.13	1,237.79	32.93	12.79	41.56
Muzaffarabad[H]	4,663	873.97	441.86	293.20	1,609.03	34.51	-12.97	47.48
Pulwama[H]	896	15.70	117.72	240.72	374.14	41.76	70.14	5.60
Punch[H]	4,244	332.28	1,121.33	654.10	2,107.71	49.66	2.71	10.06
Rajauri[H]	2,635	42.04	424.48	838.78	1,305.30	49.54	0.30	7.43
Ramban[H]	1,288	70.55	287.17	308.52	666.24	51.73	-14.76	0.53
Reasi[H]	1,932	234.54	393.58	470.29	1,098.41	56.85	-4.59	12.37
Samba[H]	921	0.00	124.26	207.53	331.79	36.02	18.79	12.59
Shupiyan[H]	505	62.50	37.22	224.33	324.05	64.17	46.05	1.00
Srinagar[H]	282	0.24	20.03	24.97	45.24	16.04	18.24	0.00
Udhampur[H]	2,280	115.42	624.03	634.57	1,374.02	60.26	-27.98	22.45
Grand Total	**53,258**	**4,202.86**	**7,952.47**	**8,967.26**	**21,122.59**	**39.66**	**347.59**	**249.55**

 # Area of shape file provided by Survey of India (December, 2019). Notified geographical area from SOI awaited.

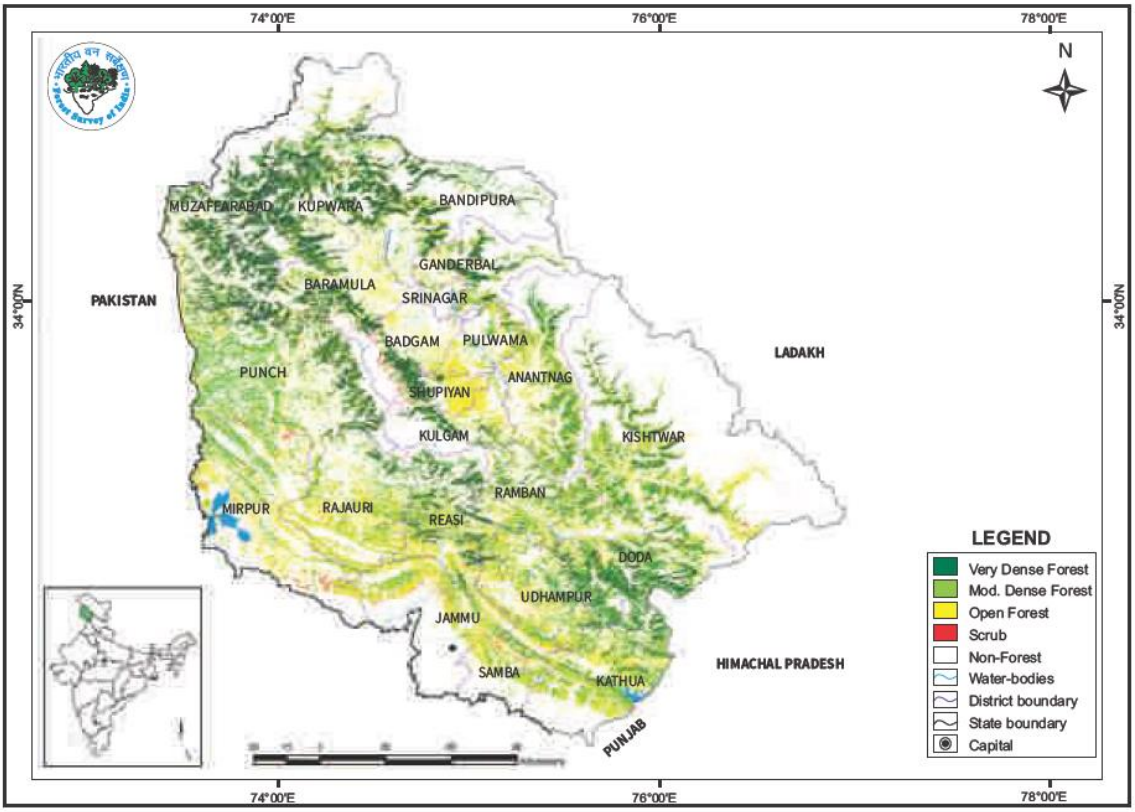


Exhibit 1: Forest Cover Map of Jammu and Kashmir

1.2.2 Recorded Forest Area

Broadly, five types of forest are found in Jammu & Kashmir viz., Subtropical Dry Evergreen, Himalayan Moist Temperate, Himalayan Dry Temperate, Subtropical Pine and Sub-alpine and alpine forests. The Forest Type Maps of 2011 have been refined in the recently completed exercise by FSI. Percentage area under different forest types of UTs of Jammu & Kashmir and Ladakh (combined) as per the Champion & Seth classification (1968), according to the latest exercise are presented in the following table.

Table 1.4: Forest Cover in Different Forest Type Groups

Sl.No.	Forest Type	% of Forest cover
1	5B/C2 Northern Dry Mixed Deciduous Forest	6.17
2	5B/DS1 Dry Deciduous Scrub	1.89
3	5/DS3 (*Euphorbia* Scrub)	0.01
4	5/E9 Dry Bamboo Brake	0.12

Sl.No.	Forest Type	% of Forest cover
5	5/1S2 *Khair-Sissu* Forest	0.02
6	9/C1a Lower or Siwalik Chir Pine Forest	10.8
7	9/C1b Upper or Himalayan Chir Pine Forest	4.27
8	9/DS1 Himalayan Subtropical Scrub	1.27
9	10/C1a *Olea Cuspidata* Scrub Forest	0.65
10	10/C1/DS1 Dodonaea Scrub	0.03
11	10/C1b Acacia Modesta Scrub Forest	0.04
12	12/C1a Ban Oak Forest (Q. incana)	2.75
13	12/C1b Moru Oak Forest (Q. dilatata)	0.16
14	12/C1/DS1 Oak Scrub	0.48
15	12/C1c Moist Deodar Forest (Cedrus)	8.93
16	12/C1d Western Mixed Coniferous Forest (Spruce, Blue Pine,	12.82
17	12/C1e Moist Temperate Deciduous Forest	0.12
18	12/C1f (Low-Level Blue Pine Forest (P. wallichiana))	6.47
19	12/C1/DS2 Himalayan Temperate Secondary Scrub	0.64
20	12/C2a Kharsu Oak Forest (Q. semecarpifolia)	0.00
21	12/C2b West Himalayan Upper Oak/Fir Forest	0.01
22	12/DS3 Himalayan Temperate Pastures	1.80
23	12/1S1 Alder Forest	0.02
24	12/1S2 Riverain Blue Pine Forest	0.21
25	12/2S1 Low-Level Blue Pine Forest	0.19
26	13(i)/C1 Dry Broadleaved and Coniferous Forest (Q. ilex-P.	2.55
27	13(i)/C2b Dry Deodar Forest (Cedrus)	3.12
28	13/C2/DS1 Pohu Scrub	0.24
29	13/C2/DS2 Dry Temperate Scrub	0.52
30	13(i)/C3 (West Himalayan Dry Temperate Deciduous Forest)	0.91
31	13(i)/C4 West Himalayan High-Level Dry Blue Pine Forest	4.83
32	13/1S2 Populus / Salix Forest	0.48
33	14/C1a West Himalayan Sub-Alpine Fir Forest	4.36
34	14/C1b West Himalayan Sub-Alpine Birch/Fir Forest	5.57

Sl.No.	Forest Type	% of Forest cover
35	14/DS1 Sub-Alpine Pastures	0.30
36	14/2S1 (Sub-Alpine Blue Pine Forest (P. wallichiana))	1.05
37	15/C1 Birch/Rhododendron Scrub Forest	0.56
38	15/C2 Deciduous Alpine Scrub	0.49
39	15/E1 Dwarf Rhododendron Scrub	0.04
40	15/C3 (Alpine Pastures)	2.37
41	16/C1 Dry Alpine Scrub	5.02
42	16/E1 Dwarf Juniper Scrub	2.82
43	Plantation/ TOF	4.84
	Total	100.00

Jammu region has 3 forest circles whereas Kashmir region is divided in 4 circles.

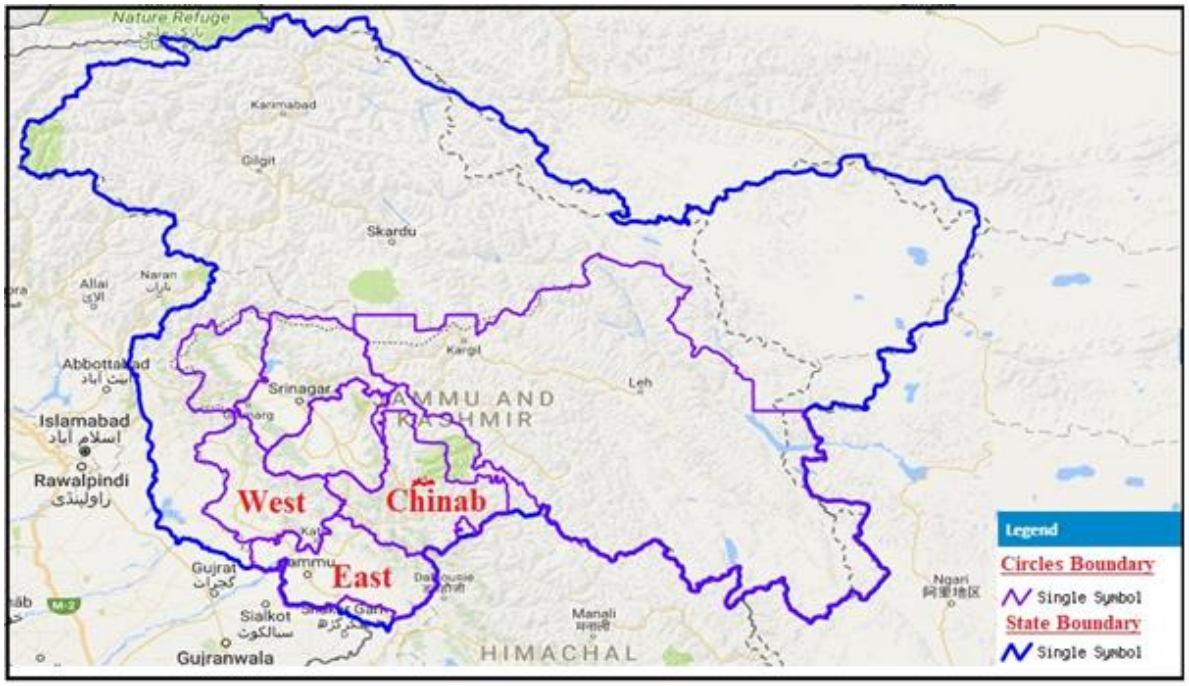


Exhibit 3: Map Showing Forest Circles of Jammu Region

The details of the forest divisions in each of the circles is given in the following table:

Table 1.5: Division-wise Forest Area in Kashmir and Jammu Region

Region	Forest Circle	Forest Division		Area in ha
a) Kashmir	Srinagar Circle	Budgam/Tangmarg		76588
		Sindh		37956
		Bandipora		199396
		Total		**313934**
	South Circle	Shopian	Kulgam	81270
		Anantnag		96016
		Liddar		106591
		Total		**283877**
	North Circle	Langate		35495
		Kamraj		71146
		Kehmil		62472
		Baramulla		45906
		Total		**215019**
	Central Circle	Leh		2937
		Kargil		651
		Total		**3588**
	Sub-Total Kashmir			**816418**
b) Jammu	East Circle	Jammu		79289
		Kathua		46364
		Billawar		68247
		Ramnagar		37065
		Udhampur		60465
		Total		**291430**
	West Circle	Poonch		95137
		Rajouri		71456
		Nowshera		58600

		Reasi	45039
		Mahore	89563
		Total	**359795**
	Chenab Circle	Kishwar	138775
		Bhaderwah	89116
		Doda	62146
		Ramban	48279
		Batote	31631
		Marwah	185451
		Total	**555398**
	Sub-Total Jammu		**1206623**
	Total Jammu & Kashmir		**2023041**

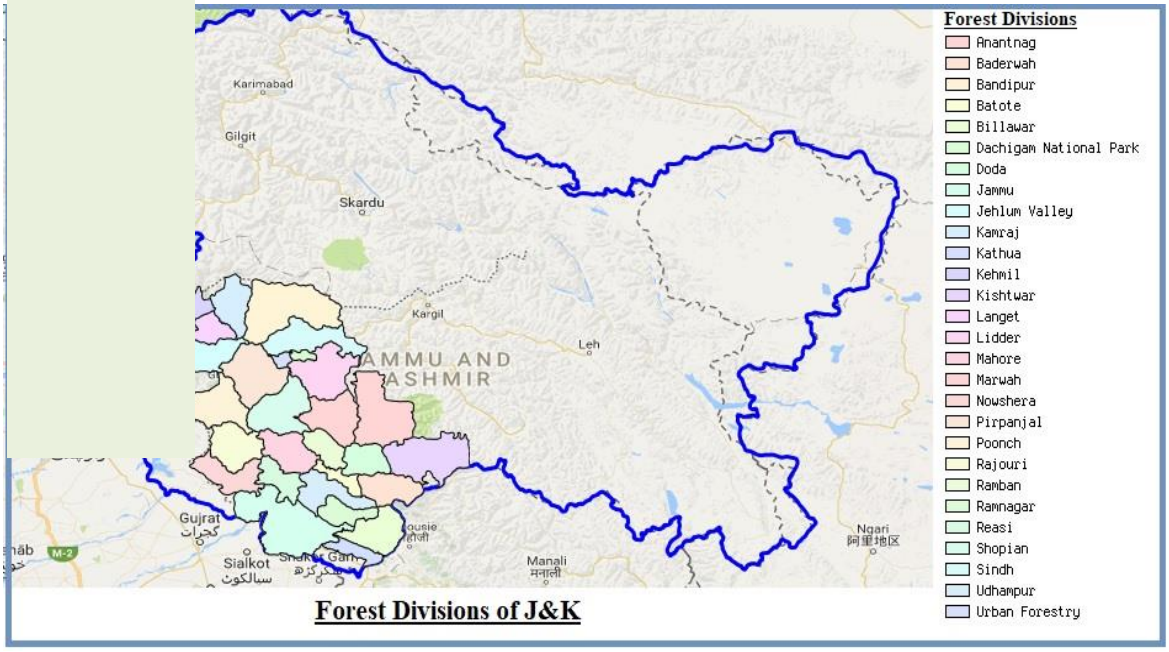


Exhibit 4: Map showing Forest Divisions of J & K

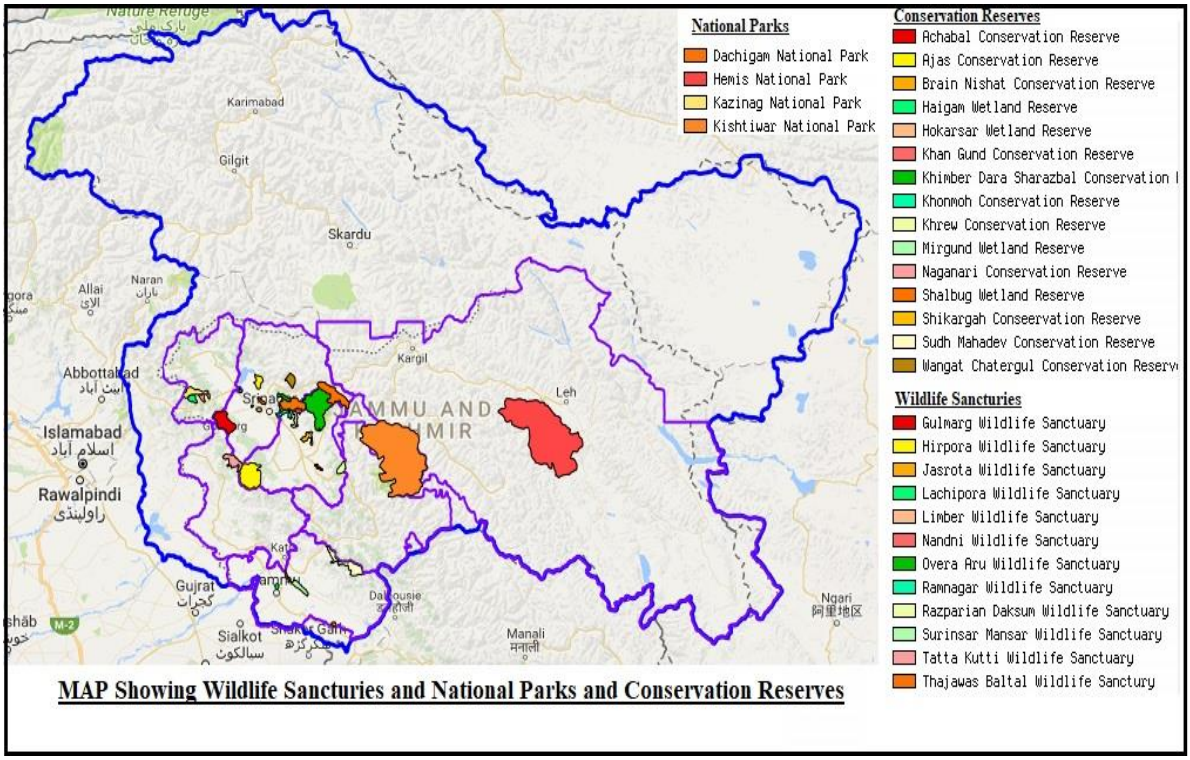


Exhibit 5: Map showing Wildlife Sanctuaries, National Parks and Conservation Reserves

1.3 Activities of Forest Department

The Forest Department activities involve raising economic plantations and quick growing species under various schemes of centre and state governments.

i) Rehabilitation of Degraded Forests
ii) Research Education and Training
iii) Working Plan and Research
iv) Consolidation and Demarcation
v) Development of Minor Forest Produce including Medicinal Plants
vi) Eco Task Force
vii) Infrastructure including Gutted Buildings
viii) Urban Forestry
ix) Pasture and Fodder Development
x) Stabilization of slip Areas on National Highway
xi) CM's Participatory Afforestation Scheme
xii) Forest Protection

xiii) Monitoring and Evaluation

xiv) Participatory Grazing Land Development Programme

xv) Integrated Forest Protection Scheme

1.4 Creation of CAMPA

When Forest Conservation Act 1980 was enacted, to replenish the lost forest area, a component of compensatory afforestation was provided, for which funds were to be deposited with the State Forest Department to be used for raising compensatory plantations. Later on, the component of funds for additional compensatory afforestation, catchment area treatment plan and for any other complaints was also included. Most importantly, component of Net Present Value (NPV), regulated by Honorable Supreme Court order dated 30-10-2002 in I.A. No. 566 in Writ Petition (C) No. 202 of 1995, was also introduced. Thus, necessity arose of managing this huge fund and therefore, in pursuance of above order of the apex court, Govt. of India constituted Compensatory Afforestation Fund Management and Planning Authority (CAMPA) under sub-section 3 of section 3 of Environment Protection Act 1986 (29 of 1986) on 3rd April 2004. Subsequently, the Honorable Supreme Court ordered to State of Jammu & Kashmir also to constitute similar fund. In 2004, MoEF issued directions to all states to constitute State CAMPA. In response to this, Govt. of Jammu & Kashmir constituted two committees- a State Level Management Committee (SLMC) and another State Level Steering Committee (SLSC) in 2005. SLSC in Feb 2006 decided that money available under CAMPA account would not be transferred to Central Ad-hoc CAMPA, because Jammu & Kashmir has its own Forest (Conservation) Act. On the recommendation of Central Empowered Committee (CEC), Honorable Supreme Court issued the direction in this regard in 2012. In the mean time, Govt. of Jammu & Kashmir, through SRO 354 dated 11th Nov 2009 constituted State CAMPA and issued operational guidelines to operate the scheme in first instance, for five years from 2010-11 to 2014-15. The salient features of the State CAMPA are:

i) It has three Committees namely, Governing Body (under the Chairmanship of Honorable Chief Minister), Steering Committee (with Chief Secretary as Chair person) and Executive Committee (headed by PCCF).

ii) Powers & functions of all the committees are mentioned.

iii) Aims & Objectives and strategy has been defined.

iv) Implementing agency is the different units of the department, but with the help of people's Vigilance and Monitoring Committee (VMCs) at village level.

v) Social audit as well evaluation by independent agency or consultant to be done every year.

Acting on the guidelines and making funds available, following areas have been planted from 2012-13 to 2018-19 in different units of East, West and Chenab circles of the Jammu Region (UT of J & K).

Table 1.6 Division wise area planted under CAMPA

Circle	Division	Year wise Area Planted in (ha)						
		2012-13	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
East Circle	Jammu	162	291	335	104	171	183	157
	Ramnagar	120	120	118	90	87	60	34
	Billawar	185	160	230	280	130	174	160
	Basoli	-	-	-	-	183	491.95	270
	Udhampur	295	268	158	263	99.2	70.66	164.5
	Kathua	308	190	152	100	262	165	190
	Samba	-	-	-	-	-	88	110
	ETF	150	120	90	130	190	200	140
	Total	**1220**	**1149**	**1083**	**967**	**1122.2**	**1432.61**	**1225.5**
West Circle	Reasi	220	200	160	125	91	305	250
	Nowshera	240	330	230	150	155	133.6	165
	Mahore	185	120	105	120	75	55	136
	Rajouri	500	600	360	171	120	266	260
	Poonch	195	400	240	230	140	391	195
	Total	**1340**	**1650**	**1095**	**796**	**581**	**1150.6**	**1006**
Chenab Circle	Ramban	140	105	90	125	125	100	154
	Doda	170	180	140	120	200	158	100
	NH1A	0	111	70	19	88	80	135
	Marwah	140	170	125	220	165	80	80

Circle	Division	Year wise Area Planted in (ha)						
		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
	Kishtwar	140	140	120	225	225	150	134
	Baderwah	190	135	160	175	90	133	172
	Batote	190	170	100	210	82	212	100
	Total	**970**	**1011**	**805**	**1094**	**975**	**913**	**875**

The evaluation of plantation work & activities done under CAMPA is to be done by an independent agency. The present study has been assigned to NH Consulting Pvt. Ltd, as a third-party evaluator for evaluation of the plantation activities carried out during the years 2012-13 and 2018-19 under CAMPA funds, in East, West and Chenab Circle of Jammu Region.

Chapter 2: Compensatory Afforestation Fund Management and Planning Authority (CAMPA)

2.1 The Project Dimensions

With a cover of 23% of geographical area of the country, forest in India comprise of a number of diverse forest types and reserved areas designated as National Parks and Wildlife Sanctuaries. In India, forests meet the livelihood needs of people living in and adjoining the forests in about 1,73,000 villages. Forests also act as carbon sinks and regulators of water regime.

Many development and industrial projects such as erection of dams, mining, and construction of industries or roads require diversion of forest land. Any project proponent, government or private must apply for forest clearance from Ministry of Environment and Forests (MoEF), before the conversion of land take place. This proposal is to be submitted through the concerned forest department of the state government. If clearance is given, then compensation for the lost forest land is also to be decided by the ministry and the regulators.

- The State CAMPA would presently receive funds collected from user agencies towards compensatory afforestation, additional compensatory afforestation, penal compensatory afforestation, Net Present Value (NPV) and all other amounts recovered from such agencies under the Forest (Conservation) Act, 1980 and presently lying with the Adhoc CAMPA. The State CAMPA would administer the amount received from the Adhoc CAMPA and utilize the funds collected for undertaking compensatory afforestation, assisted natural regeneration, conservation and protection of forests, infrastructure development, wildlife conservation and protection and other related activities and for matters connected therewith or incidental thereto.
- State CAMPA would provide an integrated framework for utilizing multiple sources of funding and activities relating to protection and management of forests and wildlife. Its prime task would be regenerating natural forests and building up the institution

engaged in this work in the State Forest Department including training of the forest officials of various levels with an emphasis on training of the staff at cutting edge level (forest range level). In short, the department would be modernized to protect and regenerate the forests and wildlife habitat.

The guidelines also talk about establishment of an independent system for concurrent monitoring and evaluation of the works implemented in the States utilizing the funds available.

2.2 Project Objectives

Compensatory Afforestation Fund Management and Planning Authority is meant to promote afforestation and regeneration activities as a way of compensating for forest land diverted to non-forest uses. National CAMPA Advisory Council has been established as per the orders of the Hon'ble Supreme Court with the following mandate:

- Regularly monitor and evaluate, in consultation with States, projects being undertaken by State CAMPA.
- Facilitate scientific, technological and other assistance that may be required by State CAMPA.
- Make recommendations to the State CAMPA based on review of their plans and programmes.
- Provide a mechanism to the State CAMPA to resolve issues of an inter-state or Centre-State character.
- Shall have the powers to order special inspection and financial audit of works executed by the State CAMPA by utilizing CAMPA money.

2.3 Project Components

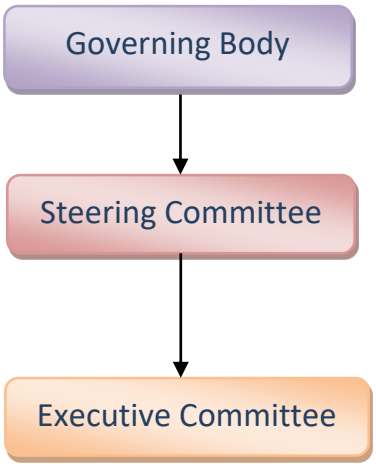
The project has following major components:

- Conservation, protection, regeneration and management of existing natural resources;

- Conservation, protection and management of wildlife and its habitat within and outside protected area including the consolidation of the protected area;
- Compensatory afforestation;
- Environment services which includes;
    - Provision of goods such as wood, non-timer forest produce, fuel, fodder & water and provision of services such as grazing, tourism, wildlife protection and life support;
    - Regulating services such as climate regulation, disease control, flood moderation, detoxification, carbon sequestration and health of soil, air and water regimes;
    - Non-material benefits obtained from ecosystem, spiritual, recreational, aesthetic, inspirational, educational and symbolic; and
    - Supporting such other services necessary for the production of ecosystem services, biodiversity, nutrient cycling and primary production.
- Research, Training and Capacity Building;
- Protection and conservation of natural resources through active participation /involvement of people;
- Checking land degradation depreciation and loss of bio-diversity.

2.4 Project Management Structure

The State Government established the Compensatory Afforestation Fund Management and Planning Authority (State CAMPA) in the State. At the state level, CAMPA is comprised of a Governing Body, Steering Committee, Executive Committee and a Monitoring Group. The Governing body of the State CAMPA is headed by the Head of the State as Chairperson, Ministers of Forests, Finance, Planning, Chief Secretary, Principle-Secretary (Finance), Principle Secretary (Planning), Principal Chief Conservator of Forests, Chief Wild Life Warden as members and Secretary (Forests) as Member Secretary. The Governing Body lays down the broad policy framework for the functioning of State level CAMPA and reviews its working from time to time.



The Steering Committee of State CAMPA is headed by Chief Secretary as Chairperson, Principal Chief Conservator of Forests, Principal Secretary Forests, Finance and Planning, Chief Wildlife Warden, Nodal Officer, a representative of the Ministry of Environment & Forests, two eminent NGO's nominated by the State Government as members and Chief Conservator of Forests (Plan/Schemes) as Member Secretary. The Steering Committee is responsible to lay down and / or approve rules and procedures for the functioning of the body and its Executive Committee (ii) monitor the progress of the utilization of funds released by the State CAMPA; (iii) approve the Annual Plan of Operation (APO) prepared by the Executive Committee; (iv) approve the annual reports and audited accounts of the State CAMPA; (vi) ensure inter-departmental coordination.

The Executive Committee is headed by Principal Chief Conservator of Forests as Chairperson, Chief Wildlife Warden, Chief Conservator of Forests (Plan/Schemes), Financial Controller/Financial Adviser in the O/o the Principal Chief Conservator of Forests, two eminent NGO's to be nominated by the State Government for a period of 2 years as member and Nodal Officer as Member Secretary. The State Level Executive Committee is responsible to take all steps for giving effect to the State CAMPA and overarching objectives and core principles, in accordance with rules and procedures approved by the Steering Committee and the approved APO; prepare the APO of the State for various activities, submit it to the Steering Committee before end of December for each financial year, and obtain the Steering Committee's concurrence for release of funds, while giving break-up of the proposed

activities and estimated costs; supervise the works being implemented in the State out of the funds released from the State CAMPA; be responsible for proper auditing of both receipt and expenditure of funds; develop the code for maintenance of the account at the implementing agency level; submit reports to the Steering Committee for review / consideration; and prepare Annual Report by end-June for each financial year.

An independent system for concurrent monitoring and evaluation of the works implemented in the States utilizing the funds available is evolved and implemented to ensure effective and proper utilization of funds. The National CAMPA Advisory Council have the powers to order special inspection and financial audit of works executed by the State CAMPA with utilizing CAMPA money. If satisfied that the funds released are not being utilized properly, the National CAMPA Advisory Council as well as the State Level Steering Committee has the power to withhold or suspend the release of remaining funds or part thereof.

Chapter 3: The Evaluation Study

3.1 The Backdrop

Under CAMPA, several activities have been taken up for conservation and development of natural forests, afforestation of degraded forest areas, forest protection, forest fire management, management of wildlife habitat, capacity building, research & development, infrastructure development and other allied activities from 2010-11 till now. There was a need to technically evaluate these activities. Therefore, the State CAMPA decided for third party evaluation of the CAMPA works undertaken as per Annual Plan of Operations (APO) of 2012-13 to 2018-19.

3.2 Evaluation/ Study

As part of project M&E, external evaluation/study is to be conducted for all projects taken up under JK CAMPA related to afforestation, soil and moisture conservation, habitat improvement and the like, in Jammu region. Projects taken up in forest areas need special evaluation focus as these are taken up in difficult terrain in remote locations where full participation of stakeholders and other means of verification is often difficult.

3.3 Scope of Work

The universe of the study spans over all the works executed under different components of CAMPA during 2012-13 to 2018-19 in all the Forest Divisions of the State by the Forest Department (Territorial) and allied departments namely,

- Wildlife Protection Department;
- Social Forestry Department;
- Soil and Water Conservation Department;
- State Forest Research Institute;
- Ecology Environment and Remote Sensing Department;
- Forest Protection Force.

These above mentioned departments fall in the three circles namely East, West and Chenab Circle of Jammu region.

The major activities undertaken by State CAMPA include plantations, management of wildlife and its habitat, soil and water conservation, development of infrastructures, demarcation and capacity building activities.

The broad scope of work includes, but not limited to:

- Field verification and validation of plantations and nurseries and quality of work done.
- Field verification and validation of Water Conservation Structures, closures, and assets created.
- Verification of related documents such as micro plan, plantation journal, plantation card, design and estimate for SMC and building construction, store register and other necessary supporting documents in relation to the field situation and periodical progress reports submitted.
- Assessment of the procedures/norms of procurement, construction, plantation, payment and any other proceedings for asset creation in relation to the guideline and procedures laid down under the project or defined by the government.
- Suggest Improvements.

The items to be verified and validated, but not limiting to, include:

Forestry & biodiversity conservation related activities	Construction	Record Keeping
– Survival rate of plantations under various models – In situ soil and moisture conservation, Boundary demarcation and Fencing – Wildlife Habitat Improvement – Biological parks – Eco-sites – Usufruct sharing	– Water conservation structures including Drainage Line Treatment and water points – Structures made under Entry Point Activity – Renovation of traditional water harvesting structures – Building Works-Office, Residential quarter, Barricade, Forest Camp, Pump Houses, etc.	Record to be checked – Survey map/ treatment map – Micro plan – Plantation journal – Plantation card – Site estimate – Transparency board – VFPMC/EDC/SHGs records

3.4 Study Team and Manpower Deployment

The study team consisted of field teams under able guidance and direction of a multidisciplinary team of experts. The expert team was responsible for conceptualisation, planning, direction, expert observation and overall coordination. The expert's responsibilities also included the tasks of designing of methodology, designing of formats for collection of data from field, pilot field study, planning and execution of field data collection from plantation sites, analysis of data collected from field for interpretation of results and compilation of the evaluation report. The field teams consisted of field enumerators who were responsible for collection of data (physical measurements and ocular observations), FGD with local community, checking of documents at Division and Range level from sample sites being evaluated. In the Jammu East and Chenab Circles, a team of 5 field enumerators (team 1) were deputed for data collection work whereas, 4 field enumerators (team 2) were deputed in the Jammu West Circle. The field enumerators were accompanied by skilled assistants for assisting in enumeration of all trees planted in a closure/site. After selecting the closure, the whole area was to be divided into sections, one allotted to each enumerator. Local staffs (mostly Block Officers) were always with the evaluation team so that they could verify the authenticity and correctness of the data collected. Each team of field enumerators was supervised by a circle coordinator.

Chapter 4: Methodology

4.1 General

The evaluation study was conducted through a combination of secondary as well as primary research. However, the prime focus was laid on the primary research which inter- alia included enumeration of the plantations, growth parameter measurement, community interviews, PRA, experts' observation of water harvesting structures and also interactive consultation with the tertiary and the secondary sector stakeholders.

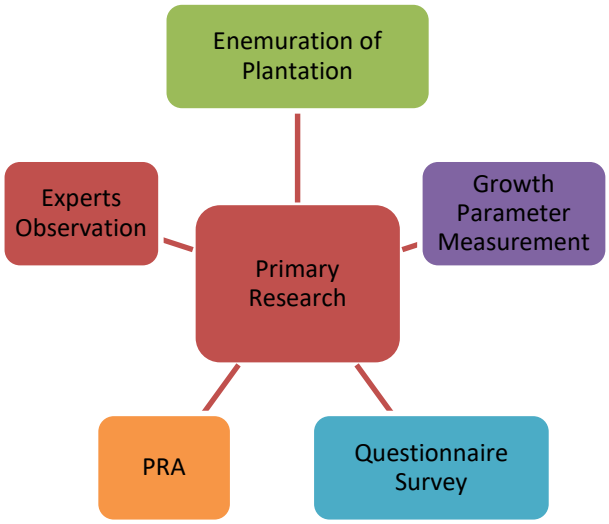
4.2 Secondary Research

The secondary research exercise was aimed at soliciting information from published sources which inter-alia will include:

- Working plans;
- Site specific planning documents (micro plans if any);
- Plantation journals;
- Measurement books;
- Bill of materials;
- Proceeding of the meetings – at committee, tertiary level;
- Progress Reports if any;
- Catchment area treatment plan if any;
- CAMPA annual reports;
- Inspection and follow up notes;
- District statistical handbooks; etc.

4.3 Primary Research

A five-dimension primary research was applied to solicit information on the actual position of the interventions at present. These were:



Primary data collection was done by physical measurements and observations in sample sites. Data pertaining to area, location, species planted, their numbers and survival, height and girth of plants, vigour of the plants, fencing and other maintenance activities, biotic pressure, site suitability and overall performance etc. was collected by the field enumerators and recorded. Besides, FGDs were conducted amongst the nearby inhabitants of the CAMPA closure sites for primary data collection with respect to the participation of community of the area in planning and execution of activities, demographic details, dependence on nearby plantation closure, issues and suggestions from the villagers, usufruct rights and benefit sharing mechanism.

4.3.1 Enumeration of Plantation

The sites selected through sampling method discussed in the proceeding paragraphs were enumerated. The enumeration was done species wise by counting the surviving trees. A typical enumeration sheet designed for the purpose is attached as Annexure-1.1.

4.3.2 Growth Parameter Measurement

Growth of surviving plants was measured in terms of their height and girth. Girth of the plants was measured at collar height if, the plants are below 2 m in height. The plants above 2 m were measured at the breast level for their girth. In case, the plants were infancy (at sapling level), their growth was measured through vegetative observations that is growth of leaves. The plants height for taller plants was measured using single pole method. The relevant measurement tapes for both height and girth were also be used for the purpose. The measurement sheet as recording tool is presented in Annexure-1.1.

4.3.3 Questionnaire Survey

There were multiple types of questionnaires, checklist and PRA facilitation sheets used to solicit the stakeholder's opinion. These survey tools are presented in Annexure-1.1 to 1.10. The opinion solicitation through these tools were made using probing exercise.

4.3.4 PRA/FGD

The participatory rural appraisal was conducted on each sample sites to understand the interventions process, practices, outcomes and outputs. The PRA was also focussed on understanding the level of community participation, conflict resolutions, social risks and overall transparency in project implementation. Inclusion of community demand in project interventions was also appraised through this exercise. The PRA was conducted after a transact walk by the consultants in the forests, plantation areas and other parts of interventions. A mixed social, gender and age group of villagers were made to participate in PRA/FGD. The PRA facilitation sheet is enclosed as Annexure-1.9.

4.3.5 Expert Observation

The multidisciplinary experts visited the sites mainly to understand suitably of the interventions and their outcome. The experts team focussed on the technical aspects of the afforestation works undertaken, water harvesting structures, soil moisture conservation work, assets created under EPA, assets created under project, working of JFMCs, SHGs, the process adopted for meetings, consensus building etc. The Evaluation Data Sheets addressing each of the above components are given in Annexure-1.

4.4 Sampling

About 10 % of the sites of CAMPA were covered for the current evaluation study. Before visiting the closure for monitoring, all the records pertaining to the plantation were obtained from the Range Headquarter and Closure Journal from the Block In-charge or from the Forest Guard. Apart from actual counting of the planted seedlings and recording height and girth of various species, observation regarding soil conservation measures and fencing were also made. A complete enumeration of all seedlings planted during the years 2012-13 to 2018-19 in each of the sampled sites was conducted. Inside each sampled site, five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site were laid for detailed monitoring and evaluation, i.e. measurement of growth, height, girth, crown conditions and for capturing the status of rejuvenation and regeneration of the plantation area.

Chapter 5: Observations from the Field

A total of 170 sites in 23 divisions of 3 circles, namely, East Circle (83 sites), West Circle (28 sites) and Chenab Circle (59 sites) for the work done under CAMPA during the year 2012-13 to 2018-19 were evaluated. As per records, a total of 16,34,561 plants were planted in three circles of Jammu region. In terms of survival, in the 170 sites of 3 circles, a total of 7,93,329 plants were recorded on the ground belonging to 93 species including fruit trees and ornamental plants, which gave an overall average of 48.53% in all the three circles. The Circle-wise observations are discussed in the proceeding paragraphs.

5.1 Jammu East Circle

For the purpose of finding out the overall survival of different species in Jammu East Circle, a total of 11 divisions were considered. 83 sites of CAMPA established during the year 2012-13 to 2018-19 at 11 divisions were taken up for monitoring and evaluation. The best five important species which survived in these divisions is ranked and given in table below.

Table 5.1 Species wise survival in different divisions

S. No.	Division	Species	Rank
01	Basoli	*Dalbergia sissoo*	1
		Bahunia variegate	2
		Emblica officinalis	3
		Terminalia bellirica	4
		Terminalia arjuna	5
02	Billawar	*Dalbergia sissoo*	1
		Pinus roxburghii	2
		Emblica officinalis	3
		Melia azadirachta	4

S. No.	Division	Species	Rank
		Bahunia variegate	5
03	Jammu (Social Forestry)	*Dalbergia sissoo*	1
		Dendrocalamus strictus	2
		Bahunia variegate	3
		Terminalia arjuna	4
		Emblica officinalis	5
04	Jammu	*Eucalyptus spp*	1
		Dalbergia sissoo	2
		Dendrocalamus strictus	3
		Acacia catechu	4
		Bahunia variegate	5
05	Kathua (Social Forestry)	*Dendrocalamus strictus*	1
		Eucalyptus spp	2
		Tectona grandis	3
		Dalbergia sissoo	4
		Bahunia variegate	5
06	Kathua (Soil & Water Conservation)	*Agave sisalana*	1
		Pinus roxburghii	2
		Dendrocalamus strictus	3
		Bahunia variegate	4
		Dalbergia sissoo	5
07	Kathua	*Dalbergia sissoo*	1
		Dendrocalamus strictus	2
		Eucalyptus	3
		Terminalia arjuna	4
		Tectona grandis	5
08	Kathua (Wildlife)	*Emblica officinalis*	1
		Dendrocalamus strictus	2
		Bahunia variegate	3

S. No.	Division	Species	Rank
		Terminalia arjuna	4
		Terminalia bellirica	5
09	Ramnagar	*Pinus roxburghii*	1
		Quercus inucana	2
		Dalbergia sissoo	3
		Bahunia variegate	4
		Cupressus	5
10	Samba	*Dendrocalamus strictus*	1
		Emblica officinalis	2
		Eucalyptus	3
		Dalbergia sissoo	4
		Syzgium cumini	5
11	Udhampur	*Pinus roxburghii*	1
		Dalbergia sissoo	2
		Bahunia variegate	3
		Cedrus deodara	4
		Dendrocalamus strictus	5

Further, if all the species of the plants planted in different divisions are clubbed together, then the species-wise survival ranking works out to be as under:

Table 5.2 Species wise survival ranking

S. No.	Species	Rank
1	*Abies pindrow*	59
2	*Acacia auriculiformis*	52
3	*Acacia catechu*	20
4	*Acacia modesta*	36
5	*Acacia Senegal*	60
6	*Aegle marmelos*	34

S. No.	Species	Rank
7	*Aesculus indica*	25
8	*Agave sisalana*	8
9	*Albizia lebbeck*	10
10	*Alstonia scholaris*	44
11	*Auriculiforium*	53
12	*Azadirachta indica*	46
13	*Bahunia variegate*	4
14	*Bombax ceiba*	72
15	*Bougainvilleaa glabra*	23
16	*Butea monosperma*	61
17	*Calendula spp*	51
18	*Callistemon*	22
19	*Cassia fistula*	33
20	*Cassia glauca*	42
21	*Castilla tunu*	58
22	*Cedrella toona*	54
23	*Cedrus deodara*	16
24	*Cestrum nocturnum*	47
25	*Cupressus*	18
26	*Dalbergia sissoo*	1
27	*Daphne oleoides*	62
28	*Delonix regia*	56
29	*Dendrocalamus strictus*	3
30	*Dodonaea viscose*	57
31	*Emblica officinalis*	5
32	*Eriobotrya japonica*	73
33	*Eucalyptus spp*	6
34	*Ficus racemosa*	43
35	*Ficus religiosa*	70

S. No.	Species	Rank
36	*Grewia optiva*	30
37	*Hibiscus rosa-sinensis*	45
38	*Ipomoea*	37
39	*Jacaranda*	55
40	*Jasminum spp*	66
41	*Jatropa curcas*	21
42	*Juglans regia*	40
43	*Juniper communis*	65
44	*Kinnow*	41
45	*Leucaena leucocephala*	17
46	*Limon*	68
47	*Litchi chinensis*	74
48	*Malus domestica*	32
49	*Mangifera indica*	49
50	*Melaleuca bracteata*	67
51	*Melia azadirachta*	11
52	*Morus alba*	75
53	*Murraya Paniculata*	63
54	*Nerium spp*	26
55	*Pinus roxburghii*	2
56	*Pinus wallichiana*	28
57	*Platanus orientalis*	71
58	*Pongamia pinnata*	24
59	*Populus deltoids*	35
60	*Prunus armeniaca*	27
61	*Psidium guajava*	15
62	*Pterospermun acerifolium*	64
63	*Punica granatum*	48
64	*Quercus inucana*	12

S. No.	Species	Rank
65	*Quercus robusta*	39
66	*Robinia pseudoacacia*	19
67	*Shorea robusta*	76
68	*Spandus makroosa*	29
69	*Syzgium cumini*	9
70	*Tamarind*	77
71	*Tecoma stans*	50
72	*Tectona grandis*	13
73	*Terminalia arjuna*	7
74	*Terminalia bellirica*	14
75	*Toona ciliate*	69
76	*Ulmus wallichiana*	38
77	*Ziziphus jujube*	31

Division with Highest Survival Percentage: Among the plantations of 2012-13 to 2018-19, Ramnagar Division of East Circle had shown the highest survival percentage of 66.12%. The ten prominent species of the division are given in the following table.

Table 5.3 Division having best survival percentage

S. No.	Species	Surviving (Nos.)	Rank
1	*Pinus roxburghii*	25614	1
2	*Quercus inucana*	6081	2
3	*Dalbergia sissoo*	5799	3
4	*Bahunia variegate*	4699	4
5	*Cupressus*	2978	5
6	*Melia azadirachta*	2450	6
7	*Robinia pseudoacacia*	2230	7
8	*Syzgium cumini*	2092	8
9	*Leucaena leucocephala*	2068	9
10	*Albizia lebbeck*	1772	10

Closure with best survival percentage: Among the sampled closures, the best survival percentage has been recorded in closure 23C (2016-17) of North Range of Ramnagar Division which is 74.52 and the details is produced in the table 5.4.

Table 5.4 Closure having best survival percentage

S. No.	Species	Surviving (Nos.)	Survival %
1	*Pinus roxburghii*	3343	30.67
2	*Emblica officinalis*	254	2.33
3	*Terminalia bellirica*	298	2.73
4	*Aegle marmelos*	341	3.13
5	*Psidium guajava*	574	5.27
6	*Dalbergia sissoo*	1452	13.32
7	*Acacia catechu*	287	2.63
8	*Melia azadirachta*	734	6.73
9	*Bahunia variegate*	514	4.72
10	*Albizia lebbeck*	138	1.27
11	*Alstonia scholaris*	41	0.38
12	*Cassia glauca*	36	0.33
13	*Pongamia pinnata*	49	0.45
14	*Terminalia arjuna*	62	0.57

However, in Kathua Soil and Water Conservation Division, the survival percentage of 91.50% at Lachipora and 90.86% at Wazir ki Tali, both of the same year 2017-18, was also recorded against the plantation size of 1200 and 350, but since these were in the shape of narrow strips and therefore not included in best performing. In addition to this, the survival percentage of 75.42% at Gughramudin 2017-18 plantation done by Kathua Social Forestry Division was also in the shape of narrow small strip of small plantation of 350 plants and hence this also has not been considered among the best survival.

Division having Least Survival Percentage: Among the plantations of 2012-13 to 2018-19, the least survival percentage was recorded as 25.36% in Social Forestry Jammu Division of East Circle depicted in table 5.5.

Table 5.5 Division having least survival percentage

S. No.	Species	Surviving (Nos.)	Survival %
1	*Dalbergia sissoo*	15130	13.47
2	*Dendrocalamus strictus*	3413	3.04
3	*Bahunia variegata*	3164	2.82
4	*Terminalia arjuna*	1949	1.74
5	*Emblica officinalis*	955	0.85

Closure having least survival percentage: Among the closure of 2012-13 to 2018-19, RDF 33K Bali established in 2014-15 of Akhnoor range of Social Forestry Jammu Division showed the least survival percentage of 2.08%. Details given in table 5.6.

Table 5.6 Closure having least survival percentage

S. No.	Species	Surviving (Nos.)	Survival %
1.	*Dalbergia sissoo*	38	0.25
2	*Terminalia arjuna*	217	1.45
3	*Albizia lebbeck*	15	0.1
4	*Dendrocalamus strictus*	42	0.28

Growth Parameters (Height and Girth)

The growth parameters were assessed by recording of average height and average girth. Among the plantations of 2012-13 to 2018-19, the average height and average girth of prominent species in different divisions is given in table 5.7.

Table 5.7 Division wise average height and girth of different species

S. No.	Division	Species	Average height (cm)	Rank	Average girth (cm)	Rank
01	Basoli	*Dalbergia sissoo*	76.2	3	3.81	5
		Bahunia variegate	11.76	4	5.08	4
		Emblica officinalis	106.8	1	8.89	1
		Terminalia bellirica	76.2	3	6.35	2
		Terminalia arjuna	91.44	2	5.93	3
		Average	**72.48**		**6.01**	
02	Billawar	*Dalbergia sissoo*	186.27	2	13.55	3
		Pinus roxburghii	95.25	5	13.97	2
		Emblica officinalis	156.50	4	12.99	4
		Melia azadirachta	172.72	3	13.55	3
		Bahunia variegate	261.14	1	16.72	1
		Average	**174.38**		**14.16**	
03	Jammu (Social Forestry)	*Dalbergia sissoo*	216.41	2	16.13	2
		Dendrocalamus strictus	316.92	1	43.18	1
		Bahunia variegate	195.79	3	9.02	4
		Terminalia arjuna	185.88	4	11.25	3
		Emblica officinalis	138.78	5	7.11	5
		Average	**210.76**		**17.34**	
04	Jammu	*Eucalyptus spp*	502.92	1	27.94	1
		Dalbergia sissoo	184.24	4	8.51	4
		Dendrocalamus strictus	254.00	2	-	
		Acacia catechu	172.67	5	9.31	3
		Bahunia variegate	209.13	3	9.55	2
		Average	**264.6**		**13.83**	
05	Kathua (Social Forestry)	*Dendrocalamus strictus*	493.66	2	-	
		Eucalyptus spp	731.52	1	40.6525	1

S. No.	Division	Species	Average height (cm)	Rank	Average girth (cm)	Rank
		Tectona grandis	487.68	3	26.035	2
		Dalbergia sissoo	284.48	5	12.7	4
		Bahunia variegate	358.70	4	14.084	3
		Average	**471.21**		**23.37**	
06	Kathua (Soil & Water Conservation)	*Agave sisalana*	81.28	4	-	
		Pinus roxburghii	60.96	5	7.62	2
		Dendrocalamus strictus	335.28	1	-	
		Bahunia variegate	156.21	3	7.62	2
		Dalbergia sissoo	167.64	2	8.89	1
		Average	**160.27**		**8.04**	
07	Kathua	*Dalbergia sissoo*	289.56	3	10.16	2
		Dendrocalamus strictus	418.58	2	-	
		Eucalyptus	838.20	1	24.13	1
		Terminalia arjuna	203.20	5	8.47	4
		Tectona grandis	241.72	4	9.14	3
		Average	**398.25**		**12.98**	
08	Kathua (Wildlife)	*Emblica officinalis*	243.84	3	12.7	3
		Dendrocalamus strictus	274.32	2	-	
		Bahunia variegate	335.28	1	17.78	2
		Terminalia arjuna	335.28	1	20.32	1
		Terminalia bellirica	198.12	4	11.31	4
		Average	**277.37**		**15.52**	
09	Ramnagar	*Pinus roxburghii*	114.94	4	10.16	4
		Quercus inucana	88.05	5	7.62	5
		Dalbergia sissoo	426.72	2	20.46	2
		Bahunia variegate	168.40	3	12.07	3
		Cupressus	579.12	1	25.40	1
		Average	**275.45**		**15.14**	

S. No.	Division	Species	Average height (cm)	Rank	Average girth (cm)	Rank
10	Samba	*Dendrocalamus strictus*	274.32	2	-	
		Emblica officinalis	152.4	4	10.16	2
		Eucalyptus	426.72	1	15.24	1
		Dalbergia sissoo	152.4	4	7.62	3
		Syzgium cumini	91.44	3	7.62	3
		Average	**219.46**		**10.16**	
11	Udhampur	*Pinus roxburghii*	58.65	5	6.69	3
		Dalbergia sissoo	149.06	2	11.82	1
		Bahunia variegate	157.75	1	11.64	2
		Cedrus deodara	60.96	4	5.75	4
		Dendrocalamus strictus	139.03	3	-	
		Average	**113.1**		**8.98**	

Division having best growth parameters: Among the plantations of 2012-13 to 2018-19, based on the prominent species planted, Kathua Social Forestry Division of East Circle showed the best performance in height and girth both and is presented in table 5.8.

Table 5.8 Division having best height and girth species wise

S. No.	Division	Species	Average height (cm)	Rank	Average girth (cm)	Rank
01	Kathua Social Forestry	*Dendrocalamus strictus*	493.65	2	-	
02		*Eucalyptus spp*	731.52	1	40.65	1
03		*Tectona grandis*	487.68	3	26.04	2
04		*Dalbergia sissoo*	284.48	5	12.70	4
05		*Bahunia variegate*	358.70	4	14.08	3
		Average	**471.21**		**23.37**	

Division having least growth: Among the plantations of 2012-13 to 2018-19, based on the prominent species planted, Basoli division of East Circle recorded least growth in terms of height and girth and the details are given below in table 5.9.

Table 5.9 Division having least growth data species wise

S.No.	Division	Species	Average Height (cm)	Rank	Average girth (cm)	Rank
01	Basoli	*Dalbergia sissoo*	76.2	3	3.81	5
02		*Bahunia variegate*	11.76	4	5.08	4
03		*Emblica officinalis*	106.8	1	8.89	1
04		*Terminalia bellirica*	76.2	3	6.35	2
05		*Terminalia arjuna*	91.44	2	5.93	3
		Average	**72.48**		**6.01**	

General observations East Circle (Division and closure wise): In East Circle a total of 83 closures were evaluated among the plantations of 2012-13 to 2018-19. In 83 closures 6,53,174 plants were planted of which 3,00,367 plants were recorded surviving, belonging to 77 tree species including fruit trees and ornamental plants which gave an overall average survival of 45.99% in East Circle. The maximum survival of 66.12% was recorded in Ramnagar division followed by 65.24% in Kathua Wild Life and minimum survival of 25.36% was recorded in Jammu Social Forestry division. The closure wise details including survival percentage, fencing status, water harvesting structures in each site is given in table below.

Table 5.10 Closure wise performance (East Circle)

Division	Name of site	Year of plantation	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	Fencing as per MB (rft)	Actual Fencing in field (rft)	% Variation Fencing	WHS as per MB (cum)	WHS in field (cum)
Basoli	36Blr	2016-17	32	12067	1245	10.32	9600	9600	0.00	0	0
	44 Basoli	2017-18	15	8285	4723	57.01	27960	27960	0.00	0	0
	52 Blr	2018-19	15	10300	5166	50.16	26600	26600	0.00	0	0
	Overall			**30652**	**11134**	**36.32**	**64160**	**64160**	**0.00**	**0**	**0**

Division	Name of site	Year of plantation	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	Fencing as per MB (rft)	Actual Fencing in field (rft)	% Variation Fencing	WHS as per MB (cum)	WHS in field (cum)
Billawar	15 BLR	2012-13	20	12000	7613	63.44	6000	6000	0.00	200.15	200.15
	48 BLR	2013-14	20	14800	5650	38.18	6500	5500	15.38	83	0
	15/RKT	2014-15	20	10000	6231	62.31	6000	6000	0.00	150	150
	17 BLR	2015-16	30	19600	13252	67.61	9000	9000	0.00	150.13	150.13
	6/RKT	2016-17	60	26120	17167	65.72	18000	18000	0.00	0	0
	43/Basoli	2017-18	15	12759	7942	62.25	19660	19660	0.00	0	0
	19 BLR	2018-19	10	3325	1732	52.09	3000	3000	0.00	0	0
	Overall			**98604**	**59587**	**60.43**	**68160**	**67160**	**1.47**	**583.28**	**500.28**
Social Forestry Jammu	V.W.Lot, Gandu Chak	2013-14	15	0	-	-	4400	0	100. Re-fenced in 2019-20	Nil	Nil
	Strip Bishnah to Nandpur	2013-14	2	3500	1422	40.63	5600	5600	0.00	0	0
	RDF Co. 31/K	2013-14	20	8000	189	2.36	6000	5150	14.17	100	0
	RDF Co. 6/S	2014-15	15	8000	3821	47.76	4600	4600	0.00	0	0
	RDF Co.33/K Bali	2014-15	30	15000	312	2.08	10000	10000	0.00	150	75
	RDF Co.46/S	2015-16	20	9200	1229	13.36	6000	6000	0.00	0	0
	RDF Co.33/K	2015-16	20	15000	1223	8.15	6000	6000	0.00	0	0
	RDF Co.63/S	2015-16	20	4500	1499	33.31	5100	5100	0.00	0	0
	RDF Co.5 Nandni Hill	2016-17	30	8000	2443	30.54	11000	11000	0.00	0	0
	RDF Co.34/K Nathal	2016-17	15	13700	2634	19.23	4500	4500	0.00	70	70
	RDF Co.37/B	2016-17	15	5000	1238	24.76	4500	4500	0.00	0	0
	V.W. Lot Kalowa	2016-17	22	15300	10640	69.54	6500	6500	0.00	0	0
	Strip Bandhu Rakh Extn	2018-19	1	500	324	64.80	1000	1000	0.00	0	0
	V.W.L Daleri	2018-19	11	5600	1249	22.30	3200	3200	0.00	Nil	Nil
	Overall			**111300**	**28223**	**25.36**	**78400**	**73150**	**6.70**	**320**	**145**
Jammu	2T	2013-14	11	0	0	0.00	3250	1600	50.77	0	0
	4N	2013-14	12	0	0	0.00	3500	3500	0.00	0	0
	7J	2013-14	15	0	0	0.00	4500	1500	66.67	0	0
	64B	2014-15	12	1800	506	28.11	3600	1100	69.44	0	0
	6N	2014-15	20	3713	1585	42.69	6000	4000	33.33		
	5N	2014-15	10	0	0	0.00	3500	3500	0.00	0	0
	8C	2015-16	15	NA	3254		4500	4500	0.00	0	0
	1T	2016-17	26	17200	1560	9.07	11000	8800	20.00	0	
	2N	2016-17	30	6119	2670	43.63	8500	8500	0.00	0	0
	4N	2017-18	15	6000	2779	46.32	4500	4500	0.00	0	0
	6Ch	2017-18	15	3500	602	17.20	4500	4500	0.00	0	0
	2P	2018-19	0.2	100	3	3.00	1614	1614	0.00	0	0
	5Ch	2018-19	15	NA	103		4500	4500	0.00	0	0
	3K	2018-19	20	6300	1899	30.14	6000	6000	0.00	0	0
	Overall			**44732**	**14961**	**33.45**	**69464**	**58114**	**16.34**	**0**	**0**
Kathua Social Forestry	21/K	2012-13	20	10000	6949	69.49	6000	6000	0.00	0	0
	Mela Kasab VWL	2013-14	20	9820	6944	70.71	6000	6000	0.00	0	0
	Parangoli VWL	2014-15	10	3000	1821	60.70	3000	3000	0.00	0	0
	20/K	2015-16	20	11750	3879	33.01	6000	6000	0.00	0	0
	Strip Plantation Kootah More	2016-17	1	1375	891	64.80	1420	1420	0.00	0	0
	Strip plantation Gughra mudin Hgr	2017-18	0.5	350	264	75.43	190	190	0.00	0	0
	Strip plantation samba 1 to 4	2018-19	1.23	2330	1495	64.16	3550	3550	0.00	0	0
	Overall			**38625**	**22243**	**57.59**	**26160**	**26160**	**0.00**	**0**	**0**
Kathua Soil and water Conservation	Galak Co.11	2013-14	20	15000	3738	24.92	6000	6000	0.00	75	75
	Galak Co.11	2014-15	19	13000	4966	38.20	5600	5600	0.00	275	275
	Co. 48/J Chadriyal	2015-16	20	22000	7321	33.28	6300	6300	0.00	207	207
	Wazir ki Tali	2017-18	1.5	350	318	90.86	860	860	0.00	0	0

Division	Name of site	Year of plantation	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	Fencing as per MB (rft)	Actual Fencing in field (rft)	% Variation Fencing	WHS as per MB (cum)	WHS in field (cum)
	Lachipora	2017-18	1.5	1200	1098	91.50	860	860	0.00	0	0
	Galak Co. 11	2018-19	8.4	3000	1609	53.63	4000	4000	0.00	90	90
	Overall			**54550**	**19050**	**34.92**	**23620**	**23620**	**0.00**	**647**	**647**
Kathua	30/K	2012-13	20	9000	5216	57.96	6000	6000	0.00	101	0
	20/J	2013-14	20	9200	4106	44.63	6000	6000	0.00	90	90
	21/J	2014-15	20	9100	3790	41.65	6000	6000	0.00	0	0
	18/K	2015-16	20	5000	1292	25.84	6000	6000	0.00	0	0
	8/K	2016-17	30	15665	4979	31.78	9000	9000	0.00	0	0
	10/K	2017-18	15	3600	1240	34.44	4500	4500	0.00	0	0
	77/J	2018-19	20	6000	3273	54.55	6000	6000	0.00	110	110
	Overall			**57565**	**23896**	**41.51**	**43500**	**43500**	**0.00**	**301**	**200**
Kathua Wildlife	Co.4 /a Jasrota	2017-18	30	12300	8479	68.93	7200	7200	0.00	350	350
	Co.1 Jasrota	2018-19	19	3000	1503	50.10	2808	2808	0.00	0	0
	Overall			**15300**	**9982**	**65.24**	**10008**	**10008**	**0.00**	**350**	**350**
Ramnagar	52/S	2012-13	20	18000	11569	64.27	5500	5500	0.00	150	150
	10DN	2013-14	20	20000	13251	66.26	5500	5500	0.00	100	100
	33A	2014-15	20	18550	12509	67.43	5500	5500	0.00	100	100
	41/S	2015-16	1.2	1936	926	47.83	4760	4760	0.00	0	0
	23C	2016-17	35	10900	8123	74.52	7000	7000	0.00	100	100
	70/BGH	2016-17	35	10000	5024	50.24	10000	10000	0.00	100	100
	38/S	2017-18	20	13500	9973	73.87	6000	6000	0.00	0	0
	10DN	2018-19	18	8450	5632	66.65	5500	5500	0.00	0	0
	Overall			**101336**	**67007**	**66.12**	**49760**	**49760**	**0.00**	**550**	**550**
Samba	67/B	2017-18	20	8000	4899	61.24	6000	6000	0.00	0	0
	Overall			**8000**	**4899**	**61.24**	**6000**	**6000**	**0.00**	**0**	**0**
Udhampur	Sansoo Rakh	2012-13	20	10000	2780	27.80	6000	6000	0.00	100	100
	Sansoo Rakh	2013-14	20	10000	6584	65.84	6000	6000	0.00	100	100
	Neranal Rakh	2014-15	20	9000	4885	54.28	6000	6000	0.00	70	70
	63 U	2015-16	35	17500	3810	21.77	10500	10500	0.00	150	150
	Sansoo Rakh	2016-17	4.66	0	0	0.00	1900	1900	0.00	0	0
	18 U strip plantation	2016-17	1	350	228	65.14	1400	1400	0.00	0	0
	93 D	2016-17	12	4800	2114	44.04	3500	3500	0.00	0	0
	94 D I	2016-17	12	4800	2250	46.88	3600	3600	0.00	0	0
	64 U Gangera hills	2017-18	30	5000	1725	34.50	5000	5000	0.00	287.25	287.25
	50 U Part I	2017-18	17	8500	5098	59.98	5100	5100	0.00	nil	nil
	27 P	2017-18	17	8500	3248	38.21	5100	5100	0.00	nil	nil
	50 U Part II	2017-18	17	8500	4345	51.12	5100	5100	0.00	nil	nil
	Dhar strip I plantation	2017-18	1	1500	652	43.47	2150	2150	0.00	nil	nil
	14 U Mand	2018-19	22	4060	1666	41.03	6600	6600	0.00	nil	nil
	Overall			**92510**	**39385**	**42.57**	**67950**	**67950**	**0.00**	**707.25**	**707.25**
	Overall East Circle			**653174**	**300367**	**45.99**	**507182**	**489582**	**3.47**	**3458.53**	**3099.53**

Regeneration Status East Circle:

The regeneration survey was conducted inside five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site taken up for detailed survey. Natural regeneration has been observed in all 83 sample sites for the naturally occurring species like *Pinus roxburghii, Mallotus philippensis, Leucaena leucocephala, Pyrus pashia, Dendrocalamus strictus, Ficus spp, Mulber, Dalbergia sisso, Bahunia variegate, Terminalia arjuna, Syzgium*

cumini, Pinus wallichiana, Cedrus deodara, Quercus spp, Dodonaea viscose, lantana, Wendlandia hayei, Carissa opaca etc. The observation on natural regeneration in the surveyed 83 sites of East Circle is presented in following table:

Table 5.11 Closure wise natural regeneration status in the sample plot (East Circle)

Division	Site	Year	Regeneration type	Species Name	Plants counted
Basoli	36 Blr	2016-17	NR	*Acacia Catechu*	21
	44 Basoli	2017-18	NR	*Pinus roxburghii*	12
				Cassia fistula	5
	52 Blr	2018-19	NR	*Pinus roxburghii*	16
				Dalbergia sissoo	7
				Cassia fistula	3
				Mangifera indica	4
Billawar	15 Blr	2012-13	NR	*Pinus roxburghii*	12
	48 BLR	2013-14	NR	*Pinus roxburghii*	9
				Wendlandia hayei	19
	15/RKT	2014-15	NR	*Mallotus philippensis*	14
				Syzgium cumini	7
				Cassia fistula	6
				Pyrus pashia	12
	17 BLR	2015-16	NR	*Quercus inucana*	9
	6/RKT	2016-17	NR	*Mallotus philippensis*	8
				Pinus roxburghii	14
				Carissa opaca	12
	43/Basoli	2017-18	NR	*Pinus roxburghii*	21
				Cassia fistula	9
	19 BLR	2018-19	NR	*Pinus roxburghii*	13
Social Forestry Jammu	V.W.Lot, Gandu Chak	2013-14	NR	*Acacia Catechu*	3
				Dalbergia sissoo	1
				Prosopis juliflora	3
	Strip Bishnah to Nandpur	2013-14	NR	*Leucaena leucocephala*	9
	RDF Co. 31/K	2013-14	NR	*Terminalia arjuna*	9
				Mallotus philippensis	6
	RDF Co. 6/S	2014-15	NR	*Albizia lebbeck*	7
				Leucaena leucocephala	9
	RDF Co.33/K Bali	2014-15	NR	*Pinus roxburghii*	8
	RDF Co.46/S	2015-16	NR	*Mallotus philippensis*	9
				Pinus roxburghii	7
	RDF Co.33/K	2015-16		*Syzgium cumini*	5

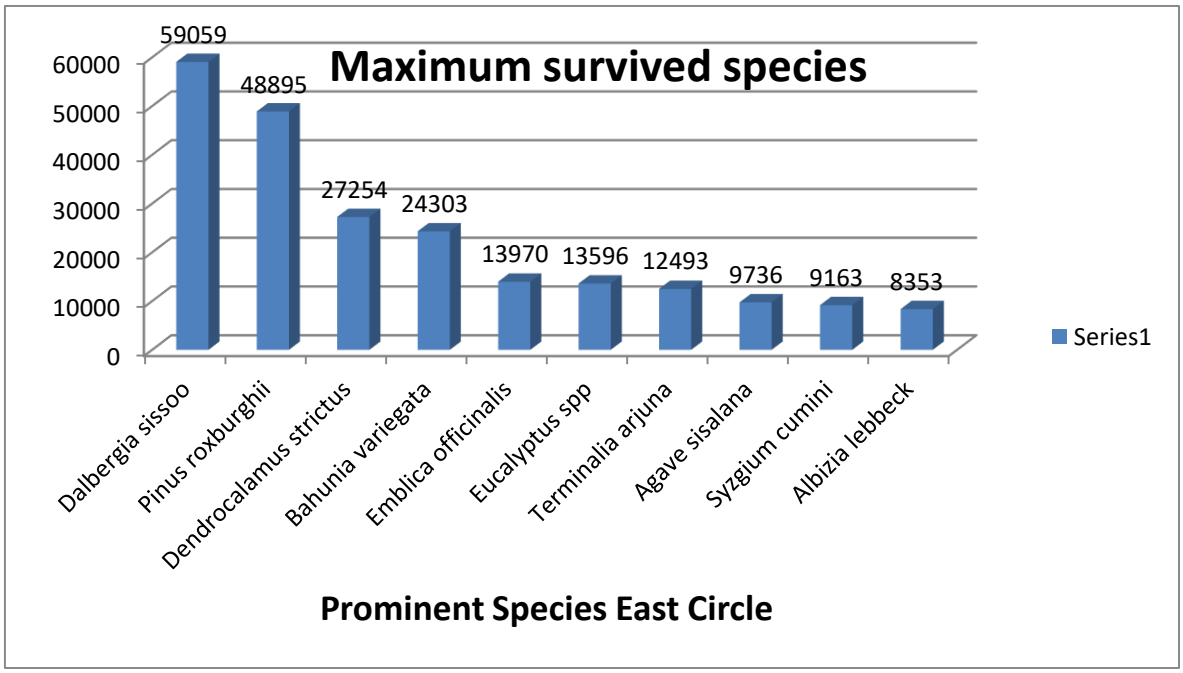
Division	Site	Year	Regeneration type	Species Name	Plants counted
				Dalbergia sissoo	7
				Pinus roxburghii	8
	RDF Co.63/S	2015-16	NR	*Albizia lebbeck*	11
				Acacia Catechu	13
				Dalbergia sissoo	6
	RDF Co.5 Nandni Hill	2016-17	NR	*Pinus roxburghii*	13
	RDF Co.34/K Nathal	2016-17	NR	*Pinus roxburghii*	16
				Robinia pseodoacacia	14
	RDF Co.37/B	2016-17		*Dendrocalamus strictus*	9
				Leucaena leucocephala	8
	V.W. Lot Kalowa	2016-17	NR	*Dendrocalamus strictus*	14
				Dalbergia sissoo	12
	Strip Bandhu Rakh Extn	2018-19	NR	*Grasses*	
	V.W.L Daleri	2018-19		*Butea monosperma*	7
				Dalbergia sissoo	5
Jammu	2T	2013-14	NR	*Albizia lebbeck*	12
				Acacia Catechu	9
	4N	2013-14		*Terminalia bellirica*	4
				Butea monosperma	3
				Leucaena leucocephala	9
				Dalbergia sissoo	6
	7J	2013-14	NR	*Cassia fistula*	7
				Mallotus philippensis	18
	64B	2014-15	NR	*Mallotus philippensis*	16
				Dalbergia sissoo	11
				Cassia fistula	10
	6N	2014-15	NR	*Pinus roxburghii*	7
				Dendrocalamus strictus	14
				Acacia Catechu	17
	5N	2014-15	NR	*Leucaena leucocephala*	7
				Eucalyptus	8
				Acacia Catechu	14
				Dalbergia sissoo	9
	8C	2015-16		*Grasses*	
	1T	2016-17		*Grasses*	

Division	Site	Year	Regeneration type	Species Name	Plants counted
	2N	2016-17	NR	*Bombax ceiba*	3
				Leucaena leucocephala	17
	4N	2017-18	NR	*Pinus roxburghii*	11
				Dalbergia sissoo	8
				Acacia Catechu	9
	6Ch	2017-18	NR	*Mallotus philippensis*	13
				Butea monosperma	10
	2P	2018-19		*Dendrocalamus strictus*	5
				Delonix regia	1
				Bahunia variegate	4
				Eucalyptus	3
	5Ch	2018-19	NR	*Dalbergia sissoo*	6
				Mallotus philippensis	14
	3K	2018-19	NR	*Cassia fistula*	8
				Dendrocalamus strictus	9
Kuthua social forestry	21/K	2012-13	NR	*Mallotus philippensis*	18
				Butea monosperma	4
				Cassia fistula	9
	Mela Kasab VWL	2013-14	NR	*Mangifera indica*	3
				Terminalia bellirica	7
				Cassia fistula	8
				Acacia Catechu	12
				Ziziphus jujuba	11
	Parangoli VWL	2014-15		*Mallotus philippensis*	14
				Mangifera indica	7
				Acacia Catechu	14
	20/K	2015-16	NR	*Butea monosperma*	4
				Mallotus philippensis	9
				Cassia fistula	10
	Strip Plantation Kootah More	2016-17	NR	*Grasses*	
	Strip plantation Gughra mudin Hgr	2017-18	NR	*Grasses*	
	Strip plantation samba 1 to 4	2018-19	NR	*Parthenium*	
Kathua SWC	Galak Co.11	2013-14	NR	*Pinus roxiburghii*	10
	Galak Co.11	2014-15		*Pinus roxiburghii*	14
	Co. 48/J Chadriyal	2015-16		*Melia azadirachta*	4
				Butea monosperma	5

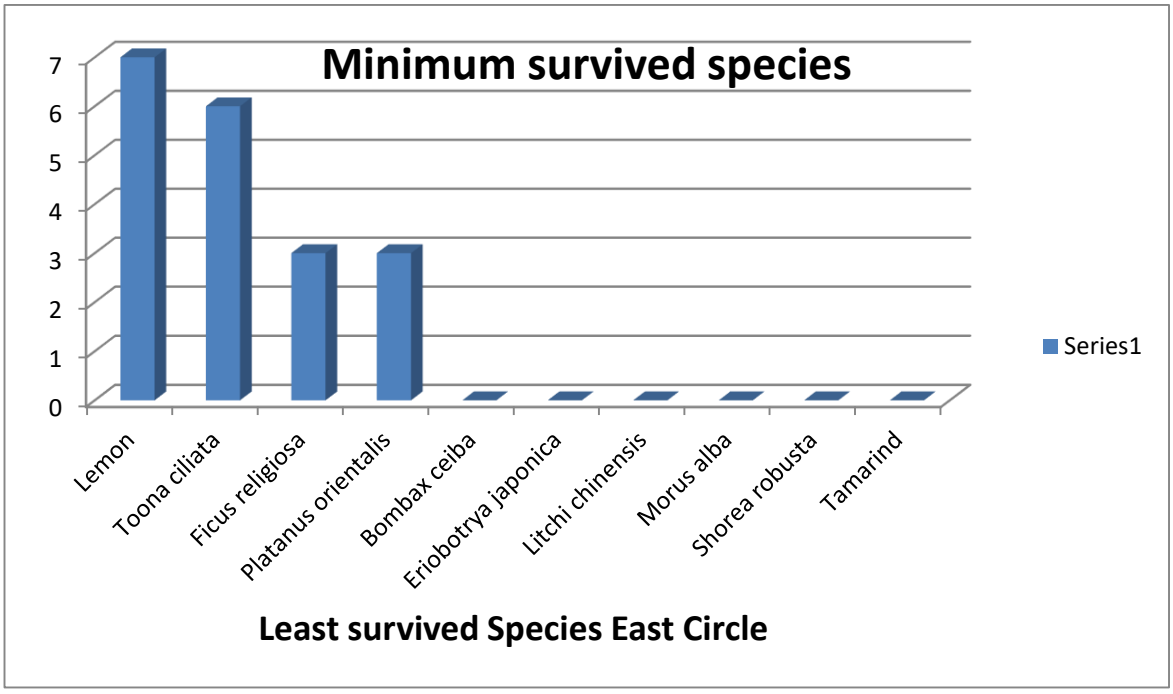
Division	Site	Year	Regeneration type	Species Name	Plants counted
				Mallotus philippensis	7
				Ipomea	19
	Wazir ki Tali	2017-18	NR	*Grasses*	
	Lachipora	2017-18	NR	*Grasses*	
	Galak Co. 11	2018-19	NR	*Pinus roxiburghii*	9
Kuthua	30/K	2012-13	NR	*Mallotus philippensis*	14
				Cassia fistula	5
				Butea monosperma	4
				Carissa opaca	9
				Leucaena leucocephala	4
	20/J	2013-14	NR	*Pinus roxiburghii*	14
				Cassia fistula	9
	21/J	2014-15	NR	*Ficus spp*	4
				Pinus roxiburghii	11
	18/K	2015-16	NR	*Dendrocalamus strictus*	17
				Mallotus philippensis	6
				Ziziphus jujuba	14
				Grewia optiva	7
	8/K	2016-17	NR	*Pinus roxiburghii*	11
				Cassia fistula	4
				Mallotus philippensis	8
	10/K	2017-18	NR	*Mallotus philippensis*	7
				Cassia fistula	8
	77/J	2018-19	NR	*Mallotus philippensis*	8
				Acacia catechu	10
				Ziziphus jujuba	9
				Butela monosperma	6
Kuthua wildlife	Co.4 /a Jasrota	2017-18	NR	*Carissa opaca*	14
				Mallotus philippensis	13
				Mangifera indica	3
	Co.1 Jasrota	2018-19	NR	*Cassia fistula*	12
				Butela monosperma	9
				Mallotus philippensis	14
Ramnagar	52/S	2012-13	NR	*Pinus roxiburghii*	19
	10DN	2013-14	NR	*Pinus roxiburghii*	14
				Leucaena leucocephala	10
	33A	2014-15	NR	*Robinia pseodoacacia*	18
				Pinus roxiburghii	14

Division	Site	Year	Regeneration type	Species Name	Plants counted
	41/S	2015-16	NR	*Quercus inucana*	7
				Pinus roxiburghii	11
	23C	2016-17	NR	*Pinus roxiburghii*	17
	70/BGH	2016-17	NR	*Pinus roxiburghii*	12
				Quercus inucana	9
	38/S	2017-18	NR	*Pinus roxiburghii*	13
				Quercus inucana	10
	10DN	2018-19	NR	*Pinus roxiburghii*	18
Samba	67/B	2017-18	NR	*Mallotus philippensis*	17
				Pinus roxiburghii	14
Udhampur	Sansoo Rakh	2012-13	NR	*Pyrus pashia*	54
				Dendrocalamus strictus	21
				Ficus spp	13
				Mulbery	9
	Sansoo Rakh	2013-14	NR	*Dalbergia sissoo*	79
				Bahunia variegate	26
				Dendrocalamus strictus	19
	Neranal Rakh	2014-15	NR	*Dalbergia sissoo*	52
	63 U	2015-16	NR	*Dendrocalamus strictus*	13
				Terminalia arjuna	9
	Sansoo Rakh	2016-17	NR	*Pyrus pashia, Syzgium cumini*	
	18 U strip plantation	2016-17	NR	*Grasses spp recorded*	
	93 D	2016-17	NR	*Cedrus deodara*	41
				Pinus wallichiana	23
	94 D I	2016-17	NR	*Cedrus deodara*	32
				Pinus wallichiana	26
	64 U Gangera hills	2017-18	NR	*Dendrocalamus strictus*	14
				Pinus roxburghii	17
	50 U Part I	2017-18	NR	*Pinus roxburghii*	31
	27 P	2017-18	NR	*Punica granatum*	62
				Cedrus deodara	34
				Quercus inucana	21
				Juglans regia	17
	50 U Part II	2017-18	NR	*Pinus roxburghii*	43
	Dhar strip I plantation	2017-18	NR	*Leucaena leucocephala*	5
	14 U Mand	2018-19	NR	*Pinus roxburghii*	29

Graphical representation of 10 prominent species survived in different years (2012-13 to 2018-19) in different sites of East Circle under CAMPA plantation:



Graphical representation of least survived species in different years (2012-13 to 2018-19) in different sites of East Circle under CAMPA plantation:



Fencing and water harvesting Structures:

Closures have mostly 4 strand barbed wire fencing with concrete cement (CC) poles, and in few closures it is chain link fencing. In some cases, fencing was of 4 strands + 2 crisscross. Distance between pole and poles vary from 8 feet to 10 feet. From the 83 evaluated sampled sites of East Circle the variation in fencing was recorded in 7 sites namely, Billawar (1 site) Social Forestry Jammu (1 site) and Jammu (4 sites). The water harvesting works was carried in 25 sites out of surveyed 83 sites. The water harvesting structures were DRSM works and crate wire bunds. The water harvesting structures were found mostly serving the purpose. However, the variation was recorded in 4 sites of East Circle i.e. Billawar (1 site 83 cum), Social forestry Jammu (2 sites 175 cum) and Kathua (1 site 101 cum). The details on fencing and water harvesting structures of east circle are given in table 3.10 above.

5.2 Jammu West Circle

For the purpose of finding out the overall survival of different species in Jammu West Circle, a total of 5 divisions were considered. 28 sites of CAMPA established during year 2012-13 to 2018-19 at 5 divisions were taken up for monitoring and evaluation. The best five important species which survived in different divisions is ranked and given in table 5.12.

Table 5.12 Species wise survival in different divisions

S.No.	Divisions	Species	Rank
01	Mahore	*Robinia pseudoacacia*	1
		Pinus roxburghii	2
		Aesculus indica	3
		Ulmus wallichiana	4
		Pinus wallichiana	5
02	Nowshera	*Bahunia variegate*	1
		Dalbergia sissoo	2
		Pinus roxburghii	3
		Dendrocalamus strictus	4

S.No.	Divisions	Species	Rank
		Emblica officinalis	5
03	Poonch	*Cedrus deodara*	1
		Robinia pseudo acacia	2
		Pinus roxburghii	3
		Ulmus wallichiana	4
		Dalbergia sissoo	5
04	Rajouri	*Robinia pseudo acacia*	1
		Ulmus vilosa	2
		Bahunia variegate	3
		Pinus wallichiana	4
		Cedrus deodara	5
05	Reasi	*Bahunia variegate*	1
		Acacia catechu	2
		Dalbergia sissoo	3
		Emblica officinalis	4
		Albizia lebbeck	5

Further, if all the species of the plants planted in different divisions are clubbed together, then the species-wise survival ranking works out to be as presented in table 5.13.

Table 5.13 Species wise survival ranking

S.No.	Species	Rank
1	*Acacia catechu*	9
2	*Acacia glauca*	42
3	*Aesculus indica*	12
4	*Albizia lebbeck*	10
5	*Bahunia variegate*	5
6	*Bombax ceiba*	44
7	*Bougainvilleaa glabra*	33
8	*Callistemon*	38

S.No.	Species	Rank
9	*Cassia fistula*	30
10	*Cassia glauca*	25
11	*Castilla tunu*	28
12	*Cedrus deodara*	4
13	*Cestrum nocturnum*	37
14	*Chikri*	29
15	*Cupressus*	43
16	*Dalbergia sissoo*	6
17	*Delonix regia*	45
18	*Dendrocalamus strictus*	11
19	*Dodonaea viscose*	32
20	*Emblica officinalis*	8
21	*Eriobotrya japonica*	47
22	*Eucalyptus*	31
23	*Ficus spp*	46
24	*Grevillea robusta*	14
25	*Grewia optiva*	27
26	*Jacaranda mimosifolia*	39
27	*Jatropa curcas*	35
28	*Juglans regia*	36
29	*Leucaena leucocephala*	18
30	*Malus domestica*	48
31	*Melia azadirachta*	22
32	*Phoenix dactylifera*	49
33	*Pinus roxburghii*	3
34	*Pinus wallichiana*	7
35	*Populus deltoids*	13
36	*Prunus armeniaca*	15
37	*Psidium guajava*	20
38	*Pterospermum acerifolium*	26
39	*Punica granatum*	24

S.No.	Species	Rank
40	*Putranjiva roxburghii*	50
41	*Pyrus communis*	51
42	*Quercus inucana*	16
43	*Robinia pseudo acacia*	1
44	*Salix spp*	34
45	*Spandus makroosa*	41
46	*Syzgium cumini*	19
47	*Tecoma stans*	52
48	*Tectona grandis*	53
49	*Terminalia arjuna*	21
50	*Terminalia bellirica*	17
51	*Toona ciliate*	23
52	*Ulmus vilosa*	2
53	*Ziziphus jujube*	40

Division with highest survival percentage: Rajouri division of West Circle had shown the highest survival percentage of 59.56% among the plantations of 2012-13 to 2018-19. The ten prominent species of the division are shown in table 5.14.

Table 5.14 Division having best survival percentage

S.No.	Species	Surviving (Nos.)	Rank
1	*Robinia pseudo acacia*	9038	1
2	*Ulmus vilosa*	7466	2
3	*Bahunia variegate*	2845	3
4	*Pinus wallichiana*	2430	4
5	*Cedrus deodara*	2204	5
6	*Emblica officinalis*	1907	6
7	*Pinus roxburghii*	1819	7
8	*Grevillea robusta*	1544	8
9	*Albizia lebbeck*	832	9
10	*Grewia optiva*	217	10

Closure with best survival percentage: The best survival percentage has been recorded in closure 01/GG (2012-13) of Gulab Garh Range of Mahore division which is 69.52% details of which are given in table 5.15.

Table 5.15 Closure having best survival percentage

S.No.	Species	Surviving (Nos.)	Survival %
1	*Robinia pseudoacacia*	3356	20.98
2	*Populus deltoids*	1812	11.33
3	*Quercus spp*	1005	6.28
4	*Pinus wallichiana*	1263	7.89
5	*Ulmus wallichiana*	1564	9.78
6	*Aesculus indica*	2123	13.27

Division having least survival percentage: Among the plantations of 2012-13 to 2018-19, the least survival percentage of 22.14% was recorded in Mahore division of West Circle details of which are presented in table 5.16.

Table 5.16 Division having least survival percentage

S.No.	Species	Surviving (Nos.)	Survival %
1.	*Robinia pseudoacacia*	5843	6.64
2.	*Pinus roxburghii*	2972	3.38
3.	*Aesculus indica*	2220	2.52
4.	*Ulmus wallichiana*	2197	2.50
5.	*Pinus wallichiana*	2003	2.28

Closure having least survival percentage: Among the closure of 2012-13 to 2018-19, closure 113Ar of 2014-15 of Mahore Range of Mahore division showed least survival percentage of 1.39% which is detailed in table 5.17.

Table 5.17 Closure having least survival percentage

S.No.	Species	Surviving (Nos.)	Survival %
1.	Ulmus wallichiana	127	0.79
2	Pinus wallichiana	67	0.42
3	Quercus spp	29	0.18

Growth Parameters (height and girth) West Circle:

The growth parameters were assessed by recording of average height and average girth. Among the plantations of 2012-13 to 2018-19, the average height and average girth of prominent species in different divisions is given in table 5.18.

Table 5.18 Division wise average height and girth of different species

S.No.	Division	Species	Average height (cm)	Rank	Average girth (cm)	Rank
01	Mahore	*Robinia pseudoacacia*	274.32	1	22.26	1
		Pinus roxburghii	91.44	4	8.82	5
		Aesculus indica	243.84	2	13.97	2
		Ulmus wallichiana	155.7	3	12.7	3
		Pinus wallichiana	86.28	5	10.16	4
		Average	**170.32**		**13.58**	
02	Nowshera	*Bahunia variegata*	312.14	2	18.12	1
		Dalbergia sissoo	236.52	3	14.21	2
		Pinus roxburghii	90.21	5	9.6	4
		Dendrocalamus strictus	378.12	1	-	
		Emblica officinalis	236.19	4	12.7	3
		Average	**250.64**		**13.66**	
03	Poonch	*Cedrus deodara*	91.44	4	10.16	4
		Robinia pseudo acacia	304.8	1	20.4	1

S.No.	Division	Species	Average height (cm)	Rank	Average girth (cm)	Rank
		Pinus roxburghii	86.21	5	10.12	5
		Ulmus wallichiana	256.23	2	18.86	3
		Dalbergia sissoo	243.84	3	20.32	2
		Average	**196.50**		**15.97**	
04	Rajouri	*Robinia pseudo acacia*	297.5	1	16.30	3
		Ulmus vilosa	194.14	3	17.41	2
		Bahunia variegata	213.15	2	17.78	1
		Pinus wallichiana	90.21	5	9.20	5
		Cedrus deodara	101.12	4	10.16	4
		Average	**179.22**		**14.17**	
05	Reasi	*Bahunia variegata*	236.24	3	20.12	2
		Acacia catechu	243.84	2	15.24	4
		Dalbergia sissoo	274.32	1	20.32	1
		Emblica officinalis	182.88	5	17.78	3
		Albizia lebbeck	224.13	4	15.24	4
		Average	**232.29**		**17.74**	

Division having best growth parameters: Among the plantations of 2012-13 to 2018-19, based on the prominent species planted, Nowshera division showed the best performance in height, Reasi division showed the best performance in girth as presented in table 5.19.

Table 5.19 Division having best height and girth species wise

S. No.	Division	Species	Average height (cm)	Rank
01	Nowshera	*Bahunia variegate*	312.14	2
02		*Dalbergia sissoo*	236.52	3
03		*Pinus roxburghii*	90.21	5
04		*Dendrocalamus strictus*	378.12	1

05		*Emblica officinalis*	236.19	4
		Average	**250.64**	
S.No.	**Division**	**Species**	**Average girth (cm)**	**Rank**
01	Reasi	*Bahunia variegate*	20.12	2
02		*Acacia catechu*	15.24	4
03		*Dalbergia sissoo*	20.32	1
04		*Emblica officinalis*	17.78	3
05		*Albizia lebbeck*	15.24	4
		Average	**17.74**	

Division having least growth data: Among the plantations of 2012-13 to 2018-19, based on the prominent species planted, Mahore division recorded the least growth in terms of height and girth as shown in table 5.20.

Table 5.20 Division having least growth data species wise

S.No.	Division	Species	Average height (cm)	Rank	Average girth (cm)	Rank
01	Mahore	*Robinia pseudoacacia*	274.32	1	22.26	1
02		*Pinus roxburghii*	91.44	4	8.82	5
03		*Aesculus indica*	243.84	2	13.97	2
04		*Ulmus wallichiana*	155.7	3	12.7	3
05		*Pinus wallichiana*	86.28	5	10.16	4
		Average	**170.32**		**13.58**	

General observations West Circle (Division and closure wise): In West Circle a total of 28 closures were evaluated among the plantations of 2012-13 to 2018-19. In 28 closures 2,77,982 plants were planted of which 1,24,469 plants were recorded on ground belonging to 53 tree species including fruit trees and ornamental plants which gave an overall average

survival of 44.78% in West Circle. The maximum survival of 59.56% was recorded in Rajouri division followed by Poonch having a survival 57.12%. Minimum survival of 22.14% was recorded in Mahore division. The closure wise details including survival percentage, fencing status, water harvesting structures in each site is given in table 5.21.

Table 5.21 Closure wise performance (West Circle)

Division	Name of site	Year of plantation	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	Fencing as per MB (rft)	Actual Fencing in field (rft)	% Variation Fencing	WHS as per MB (cum)	WHS in field (cum)
Poonch	264Skt	2012-13	20	16000	8517	53.23	6500	6500	0.00	0	0
	256Skt	2013-14	20	11900	7510	63.11	6500	6500	0.00	0	0
	43Skt	2014-15	20	8000	4957	61.96	6500	6500	0.00	0	0
	55h	2015-16	20	10000	6340	63.40	6500	6500	0.00	0	0
	52H	2016-17	40	22000	11172	50.78	13000	13000	0.00	0	0
	239H	2018-19	18	3171	2051	64.68	5400	5400	0.00	0	0
	185M	2018-19	16	2811	1651	58.73	4800	4800	0.00	0	0
	Overall			**73882**	**42198**	**57.12**	**49200**	**49200**	**0.00**	**0**	**0**
Rajouri	94KK	2013-14	20	8000	5351	66.89	6000	6000	0.00	0	0
	196R	2014-15	20	12000	6467	53.89	6000	6000	0.00	0	0
	45R	2015-16	30	10000	6298	62.98	10000	10000	0.00	0	0
	58K	2017-18	25	10000	6195	61.95	8000	8000	0.00	0	0
	1R	2018-19	12	12000	6658	55.48	3600	3600	0.00	0	0
	Overall			**52000**	**30969**	**59.56**	**33600**	**33600**	**0.00**	**0**	**0**
Reasi	77K	2013-14	20	10000	5753	57.53	6000	6000	0.00	0	0
	97K	2016-17	20	4800	3017	62.85	6000	6000	0.00	0	0
	77K	2017-18	2.5	800	438	54.75	4500	4500	0.00	0	0
	78K	2018-19	22	9000	4540	50.44	7000	7000	0.00	0	0
	Overall			**24600**	**13748**	**55.89**	**23500**	**23500**	**0.00**	0	0
Nowshera	118N	2013-14	20	10000	4453	44.53	6000	6000	0.00	0	0
	112-13N	2014-15	15	6000	2425	40.42	4500	4500	0.00	0	0
	109	2015-16	35	10000	5011	50.11	10500	10500	0.00	0	0
	132N	2017-18	6.5	2500	1394	55.76	4500	4500	0.00	0	0
	104N	2018-19	25	8000	4126	51.58	7500	7500	0.00	0	0
	Overall			**36500**	**17409**	**47.70**	**33000**	**33000**	**0.00**	**0**	**0**
Mahore	01/GG	2012-13	20	16000	11123	69.52	6000	6000	0.00	200	200
	01/GG	2013-14	20	16000	3364	21.03	6000	6000	0.00	200	200
	113/Ar	2014-15	20	16000	223	1.39	6000	4500	25.00	200	200
	102/Ar	2016-17	20	16000	1689	10.56	6000	6000	0.00	150	150
	126/Ar	2017-18	20	16000	814	5.09	6000	6000	0.00	0	0
	106/Ar	2018-19	20	0	Nil	Nil	6000	6000	0.00	0	0
	4/GG	2018-19	30	11000	2932	26.65	9000	9000	0.00	0	0
	Overall			**91000**	**20145**	**22.14**	**45000**	**43500**	**3.33**	**750**	**750**
	Overall West Circle			**277982**	**124469**	**44.78**	**184300**	**182800**	**0.81**	**750**	**750**

Regeneration Status West Circle:

The regeneration survey was conducted inside five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site taken up for detailed survey. Natural regeneration has been observed in the sample sites for the naturally occurring species like

*Pinus roxburghii, Cedrus deodara, Pinus wallichiana, Bahunia variegate, Ulmus wallichiana, Cassia fistula etc. Th*e observation on natural regeneration in the surveyed 28 sites of West Circle is presented in table 5.22.

Table 5.22 Closure wise natural regeneration status in the sample plot (West Circle)

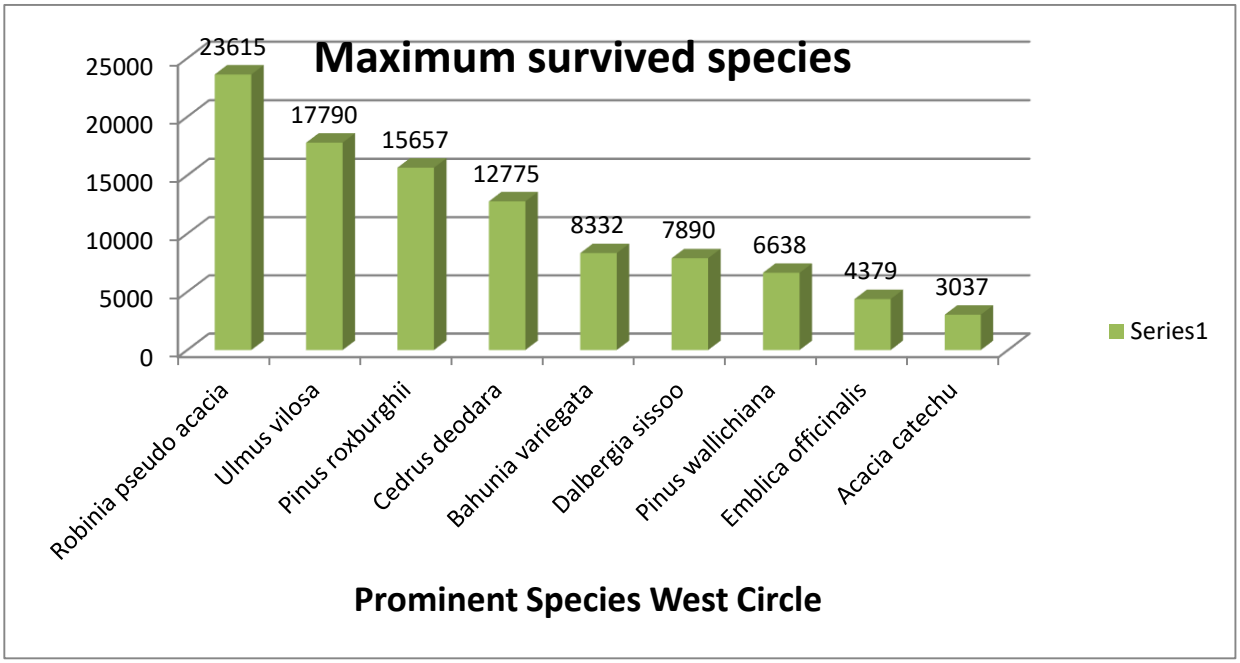
Division	Site	Year	Regeneration type	Species Name	Plants counted (Nos.)
Poonch	264Skt	2012-13	NR	*Ulmus wallichiana*	6
				Cedrus deodara	11
	256Skt	2013-14	NR	*Pinus roxburghii*	9
				Dalbergia sissoo	7
	43Skt	2014-15	NR	*Cedrus deodara*	14
				Ulmus wallichiana	9
	55h	2015-16	NR	*Cedrus deodara*	15
				Ulmus wallichiana	9
	52H	2016-17	NR	*Cedrus deodara*	14
				Pinus wallichiana	7
	239H	2018-19	NR	*Cedrus deodara*	9
	185M	2018-19	NR	*Pinus roxburghii*	10
Rajouri	94KK	2013-14	NR	*Cedrus deodara*	12
				Ulmus wallichiana	8
	196R	2014-15	NR	*Bahunia variegata*	6
				Pinus roxburghii	8
	45R	2015-16	NR	*Ulmus wallichiana*	7
				Pinus roxburghii	15
	58K	2017-18	NR	*Pinus roxburghii*	10
				Bahunia variegata	9
	1R	2018-19	NR	*Robinia pseudo acacia*	6
				Pinus roxburghii	9
Reasi	77K	2013-14	NR	*Dendrocalamus strictus*	14
				Acacia catechu	9
	97K	2016-17	NR	*Robinia pseudo acacia*	8
				Terminalia arjuna	7
	77K	2017-18	NR	*Acacia catechu*	11
				Cassia fistula	9

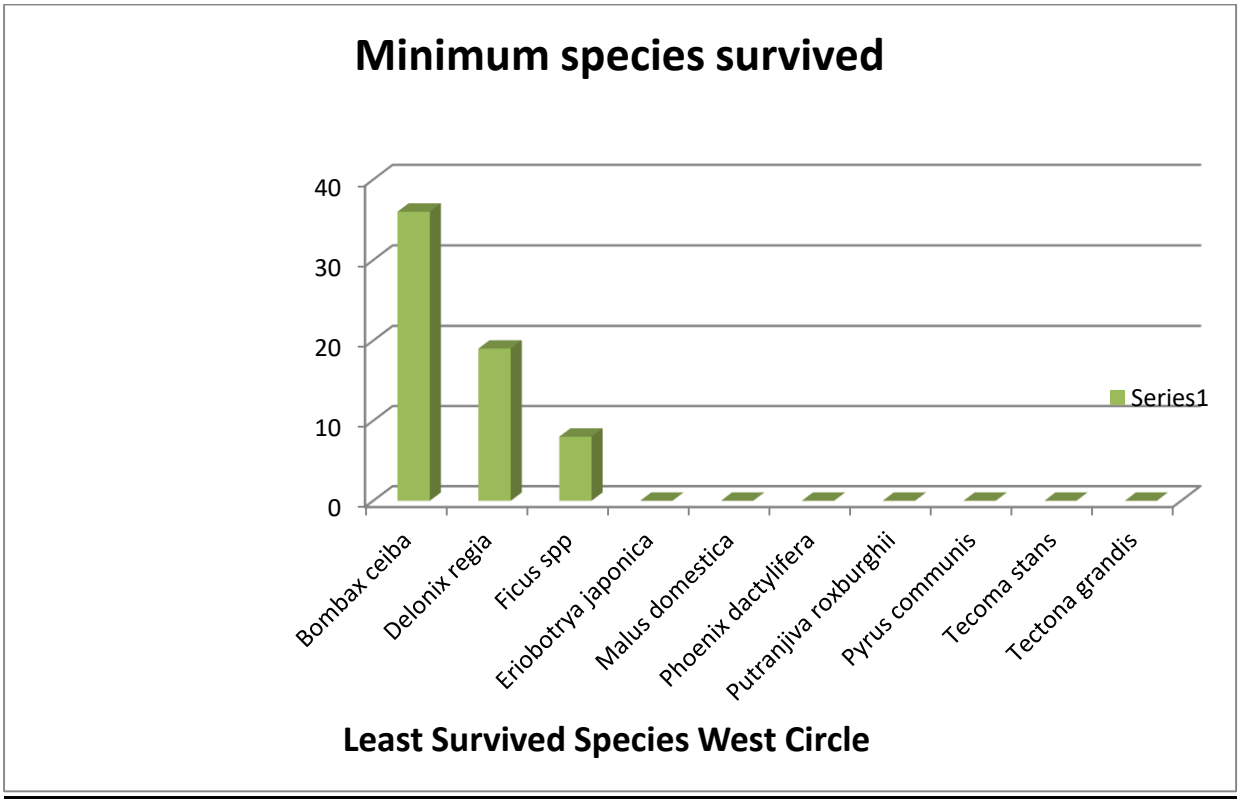
Division	Site	Year	Regeneration type	Species Name	Plants counted (Nos.)
	78K	2018-19	NR	*Pinus roxburghii*	12
				Robinia pseudo acacia	7
Nowshera	118N	2013-14	NR	*Acacia catechu*	7
				Dalbergia sissoo	12
	112-13N	2014-15	NR	*Grewia optiva*	12
				Cassia fistula	8
	109	2015-16	NR	*Dendrocalamus strictus*	18
				Cassia fistula	9
	132N	2017-18	NR	*Emblica officinalis*	6
				Mangifera indica	3
	104N	2018-19	NR	*Acacia catechu*	7
Mahore	01/GG	2012-13	NR	*Pinus roxburghii*	16
				Robinia pseudo acacia	32
				Quercus inucana	11
	01/GG	2013-14	NR	*Pinus roxburghii*	10
				Quercus inucana	6
	113/Ar	2014-15	NR	*Pinus roxburghii*	12
				Pinus wallichiana	3
	102/Ar	2016-17	NR	*Pinus wallichiana*	14
	126/Ar	2017-18	NR	*Pinus wallichiana*	11
	106/Ar	2018-19	NR	*Pinus roxburghii*	14
	4/GG	2018-19	NR	*Pinus roxburghii*	14

Fencing and water harvesting Structures:

Closures have mostly 4 strand barbed wire fencing with concrete cement (CC) poles, and in few closures it was chain link fencing. In some cases, fencing was of 4 strands + 2 crisscross. Distance between pole and poles vary from 8 feet to 10 feet. In the 28 sites of West Circle, the variation in fencing was recorded only in 1 site closure (113 Ar 2014-15) of Gulab Gaarh Range of Mahore division. The water harvesting structures variation (350 cum) was recorded in 2 sites of Mahore division. The details on fencing and water harvesting structures of West Circle are given in Table 5.21 in the preceeding paragraphs.

Graphical representation of 10 prominent species survived in different years (2012-13 to 2018-19) in different sites of West Circle under CAMPA plantation:





5.3 Chenab Circle

For the purpose of finding out the overall survival of different species in Chenab Circle, a total of 07 divisions were considered. 59 sites of CAMPA established during the year 2012-13 to 2018-19 at 5 divisions were taken up for monitoring and evaluation. The best five important species which survived in different divisions is ranked and given in table 5.23.

Table 5.23 Species wise survival in different divisions

S.No.	Division	Species	Rank
01	Baderwah	*Pinus roxburghii*	1
		Cedrus deodara	2
		Pinus wallichiana	3
		Prunus armeniaca	4
		Grevillea robusta	5
02	Batote	*Cedrus deodara*	1
		Robinia Pseudoacacia	2
		Amlook	3
		Pinus wallichiana	4
		Pinus roxburghii	5
03	Doda	*Robinia pseudoacacia*	1
		Cedrus deodara	2
		Ulmus villosa	3
		Pinus wallichiana	4
		Prunus armeniaca	5
04	Kishtwar	*Cedrus deodara*	1
		Pinus wallichiana	2
		Aesculus indica	3
		Prunus armeniaca	4
		Pinus roxburghii	5
05	Marwah	*Cedrus deodara*	1

S.No.	Division	Species	Rank
		Pinus wallichiana	2
06	NH1A Batote Project	*Robinia pseudoacacia*	1
		Pinus wallichiana	2
		Agave sisalana	3
		Punica granatum	4
		Cedrus deodara	5
07	Ramban	*Cedrus deodara*	1
		Pinus wallichiana	2
		Robinia Pseudoacacia	3
		Cupress	4
		Aesculus indica	5

Further, if all the species of the plants planted in different divisions are clubbed together, then the species-wise survival ranking works out to be as depicted in table 5.24.

Table 5.24 Species wise survival ranking

S.No.	Species	Rank
1	*Abies pindrow*	29
2	*Aesculus indica*	8
3	*Agave sisalana*	9
4	*Ailanthus excels*	14
5	*Amlook*	13
6	*Bahunia variegate*	16
7	*Berberis aristata*	26
8	*Bougainvilleaa glabra*	41
9	*Cassia fistula*	33
10	*Cassia glauca*	34
11	*Cedrus deodara*	1

S.No.	Species	Rank
12	*Cedrus deodara*	6
13	*Cupressus*	10
14	*Dalbergia sissoo*	21
15	*Delonix regia*	42
16	*Dendrocalamus strictus*	30
17	*Dioscoria*	19
18	*Dodonaea viscose*	20
19	*Emblica officinalis*	24
20	*Grevillea robustas*	11
21	*Juglans regia*	31
22	*Makhan*	43
23	*Malus domestica*	18
24	*Melia azadirachta*	35
25	*Melia azadirachta*	36
26	*Morus alba*	22
27	*Nerium spp*	40
28	*Picea smithiana*	38
29	*Pinus roxburghii*	4
30	*Pinus wallichiana*	2
31	*Populus deltoids*	17
32	*Prunus armeniaca*	7
33	*Prunus avium*	37
34	*Psidium guajava*	25
35	*Punica granatum*	12
36	*Punica granatum*	28
37	*Pyrus communis*	39
38	*Red clover*	32
39	*Robinia Pseudoacacia*	3
40	*Salix alba*	27

S.No.	Species	Rank
41	*Spandus makroosa*	44
42	*Syzgium cumini*	23
43	*Tecoma stans*	45
44	*Tectona grandis*	46
45	*Ulmus villosa*	5
46	*Ulmus wallichiana*	15
47	*Ziziphus jujube*	47

Division with highest survival percentage: Among the plantations of 2012-13 to 2018-19 established under CAMPA, NH1a Batote Ramban Project of Chenab Circle has shown the highest survival percentage of 71.60%. The ten prominent species of the division are given in the table 5.25.

Table 5.25 Division having best survival percentage

S.No.	Species	Surviving (Nos.)	Rank
1	*Robinia pseudoacacia*	21870	1
2	*Pinus wallichiana*	6827	2
3	*Agave sisalana*	6326	3
4	*Punica granatum*	4226	4
5	*Cedrus deodara*	3086	5
6	*Prunus armeniaca*	2418	6
7	*Bahunia variegate*	2367	7
8	*Ulmus villosa*	1792	8
9	*Pinus roxburghii*	1181	9
10	*Dodonaea viscose*	1053	10

Closure with best survival percentage: The best survival percentage has been recorded in as 86.99 % in the closure 13Btt (2013-14) of Batote Udhampur sector range of NH1A Batote Ramban Project and the details are given in table 5.26.

Table 5.26 Closure having best survival percentage

S.No.	Species	Surviving (Nos.)	Survival %
1	*Robinia pseudoacacia*	13591	66.30
2	*Prunus armeniaca*	2063	10.06
3	*Agave sisalana*	2179	10.63

Division having least survival percentage: Among the plantations of 2012-13 to 2018-19, the least survival percentage of 41.12% was recorded in Ramban Division of Chenab Circle details of which are as depicted in table 5.27.

Table 5.27 Division having least survival percentage

S.No.	Species	Surviving (Nos.)	Survival %
1.	Cedrus deodara	26339	17.62
2.	Pinus wallichiana	17780	11.89
3.	Robinia Pseudoacacia	4852	3.25
4.	Cupress	4121	2.76
5.	Aesculus indica	3521	2.36

Closure having least survival percentage: Among the closure of 2012-13 to 2018-19, the closure 47 Peerbaba 2013-14 of Banihal range of Ramban division showed 0 % survival and the same is produced in table 5.28.

Table 5.28 Closure having least survival percentage

S.No	Species	Planted	Surviving (Nos.)	Survival %
1.	*Cedrus deodara*	13500	0	0
2	*Pinus wallichiana*	10000	0	0

Growth Parameters (Height and Girth) Chenab circle

The growth parameters were assessed by recording of average height and average girth. Among the plantations of 2012-13 to 2018-19, the average height and average girth of prominent species in different divisions is given in table 5.29.

Table 5.29 Average height and girth of different divisions

S.No.	Divisions	Species	Average height (cm)	Rank	Average girth (cm)	Rank
01	Baderwah	*Pinus roxburghii*	90.12	5	10.24	4
		Cedrus deodara	112.14	3	12.21	3
		Pinus wallichiana	96.14	4	9.26	5
		Prunus armeniaca	304.8	1	28.12	1
		Grevillea robusta	182.88	2	15.24	2
		Average	**157.22**		**15.01**	
02	Batote	*Cedrus deodara*	91.44	5	7.62	5
		Robinia Pseudoacacia	365.76	1	20.32	2
		Amlook	274.32	2	48.12	1
		Pinus wallichiana	102.54	4	12.15	3
		Pinus roxburghii	112.23	3	11.81	4
		Average	**189.26**		**20.0**	
03	Doda	*Robinia pseudoacacia*	274.10	1	22.12	1
		Cedrus deodara	90.12	4	10.21	3
		Ulmus villosa	194.16	3	10.16	4
		Pinus wallichiana	86.20	5	7.18	5
		Prunus armeniaca	213.36	2	18.14	2
		Average	**171.59**		**13.56**	
04	Kishtwar	*Cedrus deodara*	118.14	3	12.15	5
		Pinus wallichiana	102.16	4	14.21	4
		Aesculus indica	243.84	2	22.86	2

S.No.	Divisions	Species	Average height (cm)	Rank	Average girth (cm)	Rank
		Prunus armeniaca	274.32	1	26.4	1
		Pinus roxburghii	96.22	5	14.24	3
		Average	**166.94**		**17.97**	
05	Marwah	*Cedrus deodara*	136.12	1	18.12	1
		Pinus wallichiana	124.20	2	16.19	2
		Average	**130.16**		**17.15**	
06	NH1A Batote Project	*Robinia pseudoacacia*	614.63	1	28.58	1
		Pinus roxiburghii	152.4	4	19.05	2
		Agave sisalana	121.92	3	-	
		Punica granatum	342.4	2	12.23	3
		Cedrus deodara	60.76	5	7.04	4
		Average	**258.42**		**16.73**	
07	Ramban	*Cedrus deodara*	114.19	4	8.03	4
		Pinus wallichiana	111.54	5	8.78	3
		Robinia Pseudoacacia	335.28	1	19.05	1
		Cupress	123.44	3	7.04	5
		Aesculus indica	189.61	2	12.61	2
		Average	**174.81**		**11.10**	

Division having best growth parameters: Among the plantations of 2012-13 to 2018-19, based on the prominent species planted, NH1A Batote Ramban Project showed the best performance in height and Batote division showed the best performance in girth and is presented in table 5.30.

Table 5.30 Division having best height and girth species wise

S.No.	Division	Species	Average height (cm)	Rank
01	NH1A Batote Ramban Project	*Robinia pseudoacacia*	614.63	1
02		*Pinus roxiburghii*	152.4	4
03		*Agave sisalana*	121.92	3
04		*Punica granatum*	342.4	2
05		*Cedrus deodara*	60.76	5
		Average	**258.42**	
S.No.	**Division**	**Species**	**Average girth (cm)**	**Rank**
01	Batote	*Cedrus deodara*	7.62	5
02		*Robinia Pseudoacacia*	20.32	2
03		*Amlook*	48.12	1
04		*Pinus wallichiana*	12.15	3
05		*Pinus roxburghii*	11.81	4
		Average	**20.0**	

Division having least growth data: Among the plantations of 2012-13 to 2018-19, based on the prominent species planted, Marwah division was appeared least in height and Ramban division recorded least for girth and the details are given in table 5.31.

Table 5.31 Division having least growth data species wise

S.No.	Division	Species	Average height (cm)	Rank
01	Marwah	*Cedrus deodara*	136.12	1
02		*Pinus wallichiana*	124.20	2
		Average	**130.16**	
S.No.	**Division**	**Species**	**Average girth (cm)**	**Rank**
01	Ramban	*Cedrus deodara*	8.03	4

02		*Pinus wallichiana*	8.78	3
03		*Robinia Pseudoacacia*	19.05	1
04		*Cupress*	7.04	5
05		*Aesculus indica*	12.61	2
		Average	**11.10**	

General observations Chenab circle (Division and Closure wise): In Chenab Circle a total of 59 closures were evaluated among the plantations of 2012-13 to 2018-19. In 59 closures, 7,03,405 plants were planted of which 3,68,493 plants were recorded on ground belonging to 47 tree species including fruit trees and ornamental plants which gave an overall average survival of 52.39% in Chenab circle. The maximum survival of 71.60% was recorded in NH1A Batote Ramban Project followed by 57.27% in Kishtwar and a minimum survival of 41.12% was recorded in Ramban division. The closure wise details including survival percentage, fencing status, water harvesting structures in each site is given in table 5.32.

Table 5.32 Closure wise performance (Chenab Circle)

Division	Name of site	Year of plantation	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	Fencing as per MB (rft)	Actual Fencing in field (rft)	% Variation Fencing	WHS as per MB (cum)	WHS in field (cum)
Baderwah	1 MC	2018-19	4	1620	821	50.68	2400	2400	0.00	0	0
	2M	2017-18	25	9175	4688	51.10	6750	6750	0.00	0	0
	1N	2014-15	20	3300	1704	51.64	6000	6000	0.00	0	0
	1M(a)	2018-19	4	1580	870	55.06	2400	2400	0.00	0	0
	4K(a)	2018-19	4	1590	928	58.36	2400	2400	0.00	0	0
	11N	2013-14	40	26000	13995	53.83	12000	12000	0.00	0	0
	11N	2012-13	25	21000	11787	56.13	6750	6750	0.00	0	0
	4K (b)	2018-19	4	16000	8040	50.25	2400	2400	0.00	0	0
	62 b/K	2016-17	40	8750	4782	54.65	12000	12000	0.00	0	0
	49K	2016-17	20	4500	2316	51.47	6000	6000	0.00	0	0
	Overall			**93515**	**49931**	**53.39**	**59100**	**59100**	**0.00**	**0**	**0**
Batote	12Btt	2012-13	15	13300	10011	75.27	4200	4200	0.00	0	0
	10Btt	2013-14	15	12000	5406	45.05	4500	4500	0.00	0	0
	11Btt	2014-15	20	13000	9004	69.26	6000	6000	0.00	150	150
	10C	2015-16	20	11000	4797	43.61	6000	6000	0.00	53	40
	10C	2016-17	5	6700	3711	55.39	1550	1550	0.00	nil	Nil
	10C	2017-18	15	0	0	0.00	4650	4650	0.00	nil	Nil
	12A	2017-18	38	14300	3272	22.88	11400	11400	0.00	nil	Nil
	14C	2018-19	4	4440	2914	65.63	1200	1200	0.00	nil	Nil
	Overall			**74740**	**39115**	**52.33**	**39500**	**39500**	**0.00**	**203**	**190**
Doda	7Sbl	2012-13	20	15000	9440	62.93	6000	6000	0.00	177	177
	Keshwan 21 b	2013-14	20	12500	6125	49.00	6000	6000	0.00	70	70
	7Sbl	2014-15	20	14000	7420	53.00	6000	6000	0.00	55	55
	Kshwan II 10	2015-16	20	12000	6120	51.00	6000	6000	0.00	0	0

Division	Name of site	Year of plantation	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	Fencing as per MB (rft)	Actual Fencing in field (rft)	% Variation Fencing	WHS as per MB (cum)	WHS in field (cum)
	Keshwan 22	2016-17	30	11500	6095	53.00	9000	9000	0.00	90	90
	Keshwan 11	2017-18	28	11500	6440	56.00	8100	8100	0.00	0	0
	Overall			**76500**	**41640**	**54.43**	**41100**	**41100**	**0.00**	**392**	**392**
Kishtwar	59K	2012-13	20	11000	7200	65.45	6000	6000	0.00	0	0
	16N	2013-14	20	12000	7440	62.00	6000	6000	0.00	0	0
	19K	2014-15	20	11000	6490	59.00	6000	6000	0.00	0	0
	58K	2015-16	20	10600	5404	50.98	6000	6000	0.00	0	0
	20bn	2015-16	15	12000	6960	58.00	4500	4500	0.00	0	0
	16 N	2016-17	20	12000	6360	53.00	6000	6000	0.00	0	0
	15N	2016-17	20	4000	2080	52.00	6000	6000	0.00	0	0
	64K	2017-18	10	2550	1103	43.25	3000	3000	0.00	0	0
	Overall			**75150**	**43037**	**57.27**	**43500**	**43500**	**0.00**	**0**	**0**
Marwah	Watsar & Bungam 79b/U	2012-13	20	7000	3640	52.00	6000	6000	0.00	0	0
	Watsar & Bungam 80a/U	2012-13	20	7000	3924	56.06	6000	6000	0.00	0	0
	Major Kuchal 30/U	2013-14	20	2000	1220	61.00	6000	6000	0.00	0	0
	Watsar & Bungam 79b/U	2013-14	20	3000	1530	51.00	6000	6000	0.00	0	0
	Watsar & Bungam 80a/U	2013-14	20	4000	2200	55.00	6000	6000	0.00	0	0
	Chingam 94/U	2015-16	30	18000	9137	50.76	9000	9000	0.00	65	65
	Maliknar 103a/U	2015-16	30	26000	12774	49.13	9000	9000	0.00	90	90
	Gurinal 30/U	2016-17	30	17000	7053	41.49	9000	9000	0.00	190	190
	Maliknar 103a/U	2016-17	20	15000	7780	51.87	6000	6000	0.00	0	0
	Chingam 94/U	2016-17	20	15000	7760	51.73	6000	6000	0.00	0	0
	Gurinal 30/U	2017-18	20	3800	1938	51.00	6000	6000	0.00	0	0
	Burmal pura 31 U	2017-18	20	38000	18349	48.29	6000	6000	0.00	0	0
	Overall			**155800**	**77305**	**49.62**	**81000**	**81000**	**0.00**	**345**	**345**
NH1A Batote Ramban Project	13/Btt	2013-14	26	20500	17833	86.99	8000	8000	0.00	100	100
	28/Btt	2014-15	15	8000	6512	81.40	4500	4500	0.00	100	100
	89/Dudu	2017-18	16	8000	4896	61.20	4890	4890	0.00	90	90
	89/Dudu	2014-15	20	11200	8948	79.89	6000	6000	0.00	141	141
	10/Kothri	2016-17	7	1500	1204	80.27	2000	2000	0.00	22	22
	39/Rbn	2015-16	-	-	-	-	-	-	-	300	300
	40/Rbn	2018-19	10	11000	5154	46.85	3000	3000	0.00	50	50
	55/Bn	2018-19	20	18000	11451	63.62	6200	6200	0.00	80	80
	Overall			**78200**	**55998**	**71.61**	**34590**	**34590**	**0.00**	**883**	**883**
Ramban	18 (shalgarh)	2014-15	20	25000	13421	53.68	6600	6600	0.00	73	73
	33 (Daran)	2018-19	40	22000	11238	51.08	12000	12000	0.00	-	-
	40 (srachi)	2015-16	15	10000	3321	33.21	4950	3500	29.29	-	-
	41 (Nagee Mandoo)	2016-17	20	21000	8906	42.41	6600	6600	0.00	-	-
	47 (Peerbaba)	2013-14	15	23500	0	0.00	4500	2500	44.44	60	0
	47(shatan Nallah)	2017-18	20	10000	6344	63.44	6000	6000	0.00	-	0
	48 (DooniMandoo)	2012-13	25	38000	18237	47.99	7500	7500	0.00	100	100
	Overall			**149500**	**61467**	**41.12**	**48150**	**44700**	**7.17**	**233**	**173**
	Overall Chenab Circle			**703405**	**368493**	**52.39**	**346940**	**343490**	**0.99**	**2056**	**1983**

Regeneration Status Chenab Circle:

The regeneration survey was conducted inside five sample plots of 0.1 ha in the direction of east, west, north, south and centre of the closure site taken up for detailed survey. Natural regeneration has been observed in the sample sites for the naturally occurring species like *Pinus roxburghii, Cedrus deodara, Pinus wallichiana, Robinia pseudoacacia, Ulmus wallichiana, etc. Th*e observation on natural regeneration in the surveyed 59 sites of East Circle is presented in table 5.33:

Table 5.33 Closure wise natural regeneration status in the sample plot (Chenab circle)

Division	Site	Year	Regeneration type	Species Name	Plants counted (Nos.)
Baderwah	1 MC	2018-19	NR	*Cedrus deodara*	7
				Pinus wallichiana	6
	2M	2017-18	NR	*Cedrus deodara*	9
				Pinus wallichiana	8
	1N	2014-15	NR	*Cedrus deodara*	10
				Pinus wallichiana	14
	1M(a)	2018-19	NR	*Cedrus deodara*	6
				Pinus wallichiana	7
	4K(a)	2018-19	NR	*Cedrus deodara*	8
	11N	2013-14	NR	*Pinus wallichiana*	9
				Cedrus deodara	12
	11N	2012-13	NR	*Cedrus deodara*	6
				Pinus wallichiana	5
	4K (b)	2018-19	NR	*Cedrus deodara*	7
	62 b/K	2016-17	NR	*Cedrus deodara*	6
				Pinus wallichiana	5
	49K	2016-17	NR	*Cedrus deodara*	9
				Pinus wallichiana	8
Batote	12Btt	2012-13	NR	*Pinus roxiburghii*	14
				Cedrus deodara	19
	10Btt	2013-14	NR	*Pinus roxiburghii*	22
				Cedrus deodara	14
	11Btt	2014-15	NR	*Cedrus deodara*	12

Division	Site	Year	Regeneration type	Species Name	Plants counted (Nos.)
				Pinus wallichiana	11
				Amlook	9
	10C	2015-16	NR	*Cedrus deodara*	7
	10C	2016-17	NR	*Pinus wallichiana*	7
				Cedrus deodara	8
	10C	2017-18	NR	*Cedrus deodara*	
	12A	2017-18	NR	*Cedrus deodara*	11
	14C	2018-19	NR	*Ulmus wallichiana*	8
				Melia azadirachta	5
Doda	7Sbl	2012-13	NR	*Ulmus wallichiana*	3
				Pinus wallichiana	6
	Keshwan 21 b	2013-14	NR	*Cedrus deodara*	8
				Ulmus wallichiana	4
	7Sbl	2014-15	NR	*Cedrus deodara*	12
				Pinus wallichiana	14
	Kshwan II 10	2015-16	NR	*Cedrus deodara*	18
	Keshwan 22	2016-17	NR	*Pinus wallichiana*	10
				Cedrus deodara	9
	Keshwan 11	2017-18	NR	*Ulmus wallichiana*	7
				Pinus wallichiana	11
Kishtwar	59K	2012-13	NR	*Cedrus deodara*	9
				Ulmus wallichiana	7
	16N	2013-14	NR	*Cedrus deodara*	8
	19K	2014-15	NR	*Cedrus deodara*	9
				Pinus wallichiana	7
	58K	2015-16	NR	*Cedrus deodara*	6
				Pinus wallichiana	10
	20bn	2015-16	NR	*Cedrus deodara*	8
				Pinus wallichiana	12
	16 N	2016-17	NR	*Pinus wallichiana*	9
	15N	2016-17	NR	*Cedrus deodara*	7
				Ulmus wallichiana	4
	64K	2017-18	NR	*Pinus wallichiana*	7

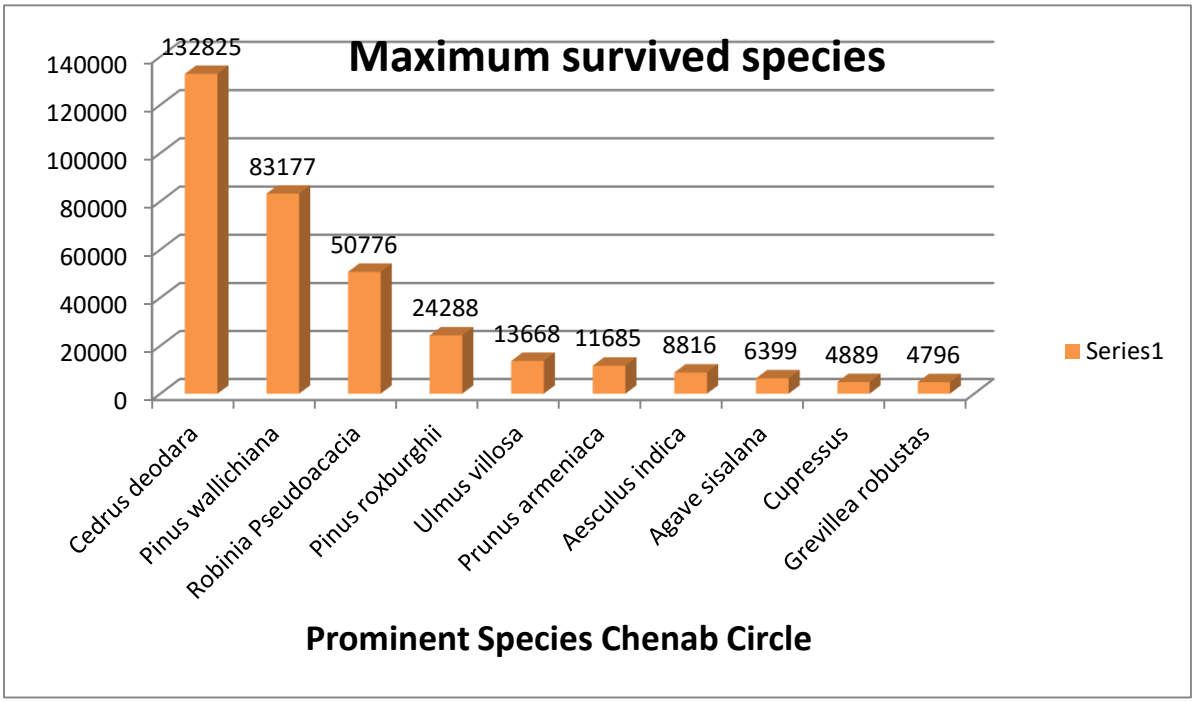
Division	Site	Year	Regeneration type	Species Name	Plants counted (Nos.)
Marwah	Watsar & Bungam 79b/U	2012-13	NR	*Cedrus deodara*	7
				Pinus wallichiana	9
	Watsar & Bungam 80a/U	2012-13	NR	*Pinus wallichiana*	8
				Cedrus deodara	10
	Major Kuchal 30/U	2013-14	NR	*Cedrus deodara*	12
	Watsar & Bungam 79b/U	2013-14	NR	*Pinus wallichiana*	6
				Cedrus deodara	14
	Watsar & Bungam 80a/U	2013-14	NR	*Cedrus deodara*	9
				Pinus wallichiana	8
	Chingam 94/U	2015-16	NR	*Pinus wallichiana*	13
	Maliknar 103a/U	2015-16	NR	*Cedrus deodara*	7
				Pinus wallichiana	5
	Gurinal 30/U	2016-17	NR	*Cedrus deodara*	9
	Maliknar 103a/U	2016-17	NR	*Pinus wallichiana*	7
				Cedrus deodara	14
	Chingam 94/U	2016-17	NR	*Pinus wallichiana*	10
				Cedrus deodara	11
	Gurinal 30/U	2017-18	NR	*Pinus wallichiana*	9
	Burmal pura 31 U	2017-18	NR	*Cedrus deodara*	11
NH1A Batote Ramban Project	13/Btt	2013-14	NR	*Ulmus wallichiana*	5
				Leucaena leucocephala	10
				Pinus roxburghii	9
	28/Btt	2014-15	NR	*Pinus roxburghii*	17
	89/Dudu	2017-18	NR	*Pinus roxburghii*	16
	89/Dudu	2014-15	NR	*Pinus roxburghii*	19
	10/Kothri	2016-17	NR	*Cedrus deodara*	14
				Pinus wallichiana	11
	39/Rbn	2015-16			

Division	Site	Year	Regeneration type	Species Name	Plants counted (Nos.)
	40/Rbn	2018-19	NR	*Punica granatum*	14
	55/Bn	2018-19		*Cedrus deodara*	21
				Pinus wallichiana	10
Ramban	18 (shalgarh)	2014-15	NR	*Pinus wallichiana*	21
	33 (Daran)	2018-19	NR	*Pinus wallichiana*	19
	40 (srachi)	2015-16	NR	*Cedrus deodara*	14
				Pinus wallichiana	13
	41 (Nagee Mandoo)	2016-17	NR	*Cedrus deodara*	17
	47 (Peerbaba)	2013-14	NR	*Grasses*	
	47(shatan Nallah)	2017-18	NR	*Robinia pseudoacacia*	19
				Pinus roxburghii	4
	48 (Dooni Mandoo)	2012-13	NR	*Cedrus deodara*	21

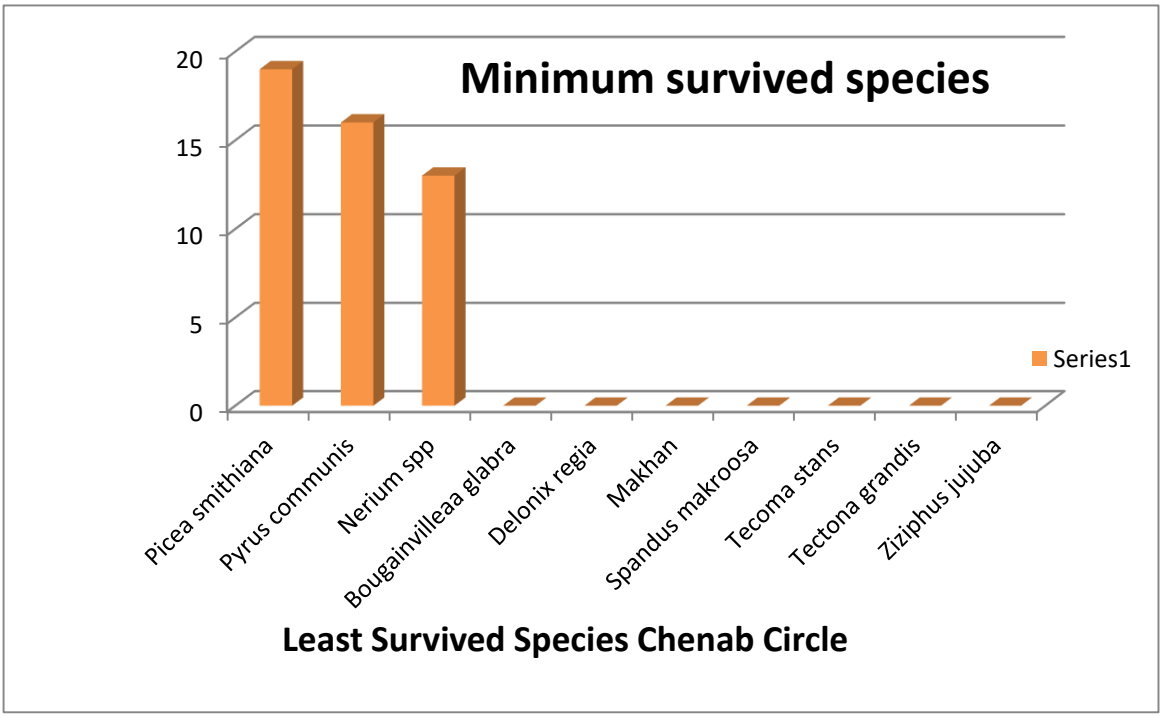
Fencing and water harvesting structure:

Closures have mostly 4 strand barbed wire fencing with concrete cement (CC) poles, and in few closures it is chain link fencing. In some cases, fencing was of 4 strands + 2 crisscross. Distance between poles vary from 8 feet to 10 feet. In all the evaluated 59 sites of Chenab Circle, the variation in fencing was recorded only in 2 sites of Ramban division. The water harvesting structures were DRSM works and crate wire bunds. The variation in DRSM works was recorded in 1 site of Batote division (13 cum) and in 1 site of Ramban division (60cum). The details on fencing and water harvesting structures of Chenab circle are given in table 5.32 above.

Graphical representation of 10 prominent species survived in different years (2012-13 to 2018-19) in different sites of Chenab Circle under CAMPA plantation:



Graphical representation of Least survived species in different years (2012-13 to 2018-19) in different sites of Chenab Circle under CAMPA plantation:



5.4 Community Perception (through FGD)

Views of the local community were collected, through Focused Group Discussion from the inhabitants of the closure sites and their views were solicited on various aspects like CAMPA project, rapport with forest department, incidence of forest fire in the area, public demands, usufruct right and benefit sharing mechanism etc. During FGD in the evaluation area it was observed that around 90% inhabitants of the CAMPA closure sites are aware of CAMPA project. However, the community was not involved in planning and implementation of the project barring a few persons who were involved at the time of fencing and plantation of closures. It was found that the contractors used their own labors for fencing of closures. The inhabitants of the closure sites are mostly dependent on livestock so on usufruct right and benefit sharing the response of the community was found satisfactory. They are getting fodder for livestock from the closure sites. During FGD it was recorded that, in case of fire incident in the forest area, people are helping forest officials for dousing the fire, which is a good sign. People are demanding that they should be engaged by the department for any work that is to be done in the forest area. They are also demanding that watch and ward should be provided to the closure sites.

5.5 Year-wise Survival & Natural Regeneration for Jammu Region

The overall picture of the survival and natural regeneration Division-wise and Year-wise is presented in table 5.34.

Table 5.34 Division wise and year wise survival & natural regeneration for Jammu Region

Circle	Division	2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		Survival % Division wise	NR (per ha)
		Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)		
East Circle	Basoli									10.32	420	57.01	340	50.16	600	36.32	453
	Billawar	63.44	240	38.18	560	62.31	780	67.61	180	65.72	680	62.25	600	52.09	260	60.43	471
	Social Forestry Jammu			14.01	240	17.97	240	13.77	440	40.37	430			25.79	240	25.36	318
	Jammu			0.00	450	37.93	753			18.14	400	35.59	510	29.72	267	33.45	476
	Kathua Social Forestry	69.49	620	70.71	820	60.70	700	33.01	460	64.80		75.43		64.16		57.59	650
	Kathua Soil and Water Conservation			24.92	200	38.20	280	33.28	700			91.35		53.63	180	34.92	340
	Kathua	57.96	720	44.63	460	41.65	300	25.84	880	31.78	460	34.44	300	54.55	660	41.51	540
	Kathua Wildlife											68.93	580	50.10	700	65.24	640
	Ramnagar	64.27	380	66.26	480	67.43	640	47.83	360	62.90	380	73.87	460	66.65	360	66.12	437
	Samba											61.24	620			61.24	620
	Udhampur	27.80	1940	65.84	2480	54.28	1040	21.77	440	46.15	813	47.09	976	41.03	580	42.57	1181
	Overall East Circle	**57.84**	**780**	**46.37**	**711**	**44.34**	**592**	**35.39**	**494**	**41.75**	**512**	**56.35**	**548**	**48.44**	**427**	**45.99**	**581**
West Circle	Poonch	53.23	340	63.11	320	61.96	460	63.40	480	50.78	420			61.89	190	57.12	368
	Rajouri			66.89	400	53.89	280	62.98	440			61.95	380	55.48	300	59.56	360
	Reasi			57.53	460					62.85	300	54.75	400	50.44	380	55.89	385
	Nowshera			44.53	380	40.42	400	50.11	540			55.76	180	51.58	140	47.70	328
	Mahore	69.52	1180	21.03	320	1.39	300			10.56	280	5.09	220	26.65	280	22.14	430

Circle	Division	2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		Survival % Division wise	NR (per ha)
		Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)	Survival %	NR (per ha)		
	Overall West Circle	**61.38**	**760**	**47.28**	**376**	**33.50**	**360**	**58.83**	**487**	**37.10**	**333**	**30.17**	**295**	**47.75**	**258**	**44.78**	**410**
Chenab Circle	Baderwah	56.13	220	53.83	420	51.64	480			53.57	280	51.10	340	51.27	205	53.39	324
	Batote	75.27	660	45.05	720	69.26	640	43.61	140	55.39	300	22.88	220	65.63	260	52.33	420
	Doda	62.93	180	49.00	240	53.00	520	51.00	360	53.00	380	56.00	360			54.43	340
	Kishtwar	65.45	320	62.00	160	59.00	320	54.71	360	52.75	200	43.25	140			57.27	250
	Marwah	54.03	340	55.00	327			49.80	250	48.07	286	48.53	200			49.62	281
	NH1A Batote Ramban Project			86.99	480	80.52	360	-		80.27	500	61.20	320	57.26	450	71.61	422
	Ramban	47.99	420			53.68	420	33.21	540	42.41	340	63.44	460	51.08	380	41.12	427
	Overall Chenab Circle	**57.20**	**357**	**48.27**	**391**	**62.57**	**457**	**48.71**	**330**	**49.63**	**327**	**48.32**	**291**	**54.33**	**324**	**52.39**	**354**
	Overall Jammu Division	**58.05**	**632**	**47.40**	**493**	**49.39**	**469**	**43.99**	**437**	**44.07**	**391**	**49.57**	**378**	**50.82**	**336**	**48.53**	**448**

The overall picture of the survival and natural regeneration Year-wise and Circle-wise based on the sample sites is presented in table 5.35. Individual Circles have also been rated yearwise based on the total number of plants i.e. survived and natural regeneration.

Table 5.35 Year wise circle wise survival & natural regeneration for Jammu Region

Year	Circle	No. of Closures	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	No. of plants survived per ha	NR (per ha)	Total No. of Plants (Survived + NR) per ha	Result* (Very Good/ Good/Satisfactory/ Deficient)
2012-13	East Circle	5	100.00	59000	34127	57.84	341	780	1121	Very Good
	West Circle	2	40.00	32000	19640	61.38	491	760	1251	Very Good
	Chenab Circle	7	145.00	112300	64239	57.20	443	358	801	Good
	Jammu Region	14	285.00	203300	118006	58.05	414	632	1046	Very Good
2013-14	East Circle	12	195.00	90320	41884	46.37	215	711	926	Good
	West Circle	5	100.00	55900	26431	47.28	264	376	640	Satisfactory
	Chenab Circle	9	196.00	115500	55749	48.27	284	391	675	Satisfactory
	Jammu Region	26	491.00	261720	124064	47.40	253	493	746	Satisfactory
2014-15	East Circle	11	196.00	91163	40426	44.34	206	592	798	Good
	West Circle	4	75.00	42000	14072	33.50	188	360	548	Satisfactory
	Chenab Circle	7	135.00	85500	53499	62.57	396	457	853	Good
	Jammu Region	22	406.00	218663	107997	49.39	266	469	735	Satisfactory
2015-16	East Circle	10	201.20	106486	37685	35.39	187	494	681	Satisfactory
	West Circle	3	85.00	30000	17649	58.83	208	487	694	Satisfactory
	Chenab Circle	8	150.00	99600	48513	48.71	323	330	653	Satisfactory
	Jammu Region	21	436.20	236086	103847	43.99	238	437	675	Satisfactory
2016-17	East Circle	16	360.66	151396	63206	41.75	175	512	687	Satisfactory
	West Circle	3	80.00	42800	15878	37.10	198	333	532	Satisfactory
	Chenab Circle	11	232.00	116950	58047	49.63	250	327	577	Satisfactory
	Jammu Region	30	672.66	311146	137131	44.07	204	391	595	Satisfactory
2017-18	East Circle	16	230.50	101844	57385	56.35	249	548	797	Good
	West Circle	4	54.00	29300	8841	30.17	164	540	704	Satisfactory
	Chenab Circle	9	192.00	97325	47030	48.32	245	295	540	Satisfactory
	Jammu Region	29	476.50	228469	113256	49.57	238	378	616	Satisfactory
2018-19	East Circle	13	160.83	52965	25654	48.44	160	427	587	Satisfactory
	West Circle	7	143.00	45982	21958	47.75	154	258	412	Deficient
	Chenab Circle	8	90.00	76230	41416	54.33	460	324	784	Good
	Jammu Region	28	393.83	175177	89028	50.82	226	336	562	Satisfactory
	East Circle	83	1444.19	653174	300367	45.99	208	581	789	Good
	West Circle	28	577.00	277982	124469	44.78	216	410	626	Satisfactory

Year	Circle	No. of Closures	Area (ha)	No. of plants planted	No. of surviving plants	Survival %	No. of plants survived per ha	NR (per ha)	Total No. of Plants (Survived + NR) per ha	Result* (Very Good/ Good/Satisfactory/ Deficient)
	Chenab Circle	59	1140.00	703405	368493	52.39	323	354	677	Satisfactory
	Jammu Region	170	3161.19	1634561	793329	48.53	251	448	699	Satisfactory

* 1001 and above plants per ha — Very Good
751 - 1000 plants per ha — Good
501-750 plants per ha — Satisfactory
≤ 500 plants per ha — Deficient

Based on the criteria of total density of plants (survived and natural regeneration), yearwise rating has been done of individual Circles in Jammu region and presented in the above table.

5.6 Other Assests procured/created under CAMPA

The assets procured/created under CAMPA (2012-13 to 2018-19) in various divisions of Jammu circle were GPS instruments, computers/laptops, printers, air conditioners, inverters, cameras, batteries and vehicle, etc. Under civil works, bathrooms, BO huts, office buildings, guest houses, etc., were constructed except in Kathua Wildlife Division where view points, chain link fencing, boundary wall, ponds, etc., were constructed. In the Jammu region under CAMPA during 2012-13 to 2018-19, 49 GPS instruments, 13 Photostat machines, 40 computers, 25 printers, 2 air conditioners, 14 inverters, 2 cameras, 27 batteries and 3 vehicles (2 water tankers and 1 Bolero) were purchased. The equipments were verified in the various divisions by NHC team and all were found functional and are serving the intended purpose. The civil works verified were found mostly in good condition except for 2 bathrooms constructed at DFO office Udhampur where there was no water available in the washrooms and the sanitary items were also not in good shape.

Table 5.36: Details of assets, civil works of CAMPA purchased/verified by NHC Team in Jammu Region (2012-13 to 2018-19)

S. No.	Division	GPS	Photostat machine	Computer/ Laptop	Printer	AC	Inverter	Camera	Battery	Vehicle	Equipments verified by NH Consultancy team	Civil works Done	Works verified by NHC team
1	Basoli	3		2	2	0	1	0	2	0	Computer 1 no.	Range office Mahunpur Basoli	Range office Mahunpur Basoli
2	Billawar	0	1	1		1	1		2	0	Photostat machine. Computer, Inverter & 2 batteries	1.Range office building at Billawar 2., BO Hut At Duggan (2 No.)	Range office building at Billawar
3	Jammu Social forestry	0	0	0	1	0	0		0	0	1 printer and 1 GPS		
4	Jammu	0	0	2	1	0	0	0		0	1 computer & 1 printer	BO Hut Bahu	BO Hut
5	Kathua Soil & water Conservation	2	0	1	1		1	0	1	0	1 Computer & 1 printer		
6	Kathua Social Forestry	2								1			
7	Kathua	4	1	2	2	0	0	0	2	0	1 GPS, 1 Computer and 1 Photostat machine		
8	Kathua wildlife									0		Viewpoints 2, chain link Fencing at Jasrota & Mansar, Ponds, Guest house, Boundary wall Jasrota training centre	All works verified
9	Ramnagar	6	1	2	2	1		1	0	1	2 GPS, 1 printer and 1 computer. 1 balero vehicle		
10	Samba	3	0	0	0	0	0	0	0	0			
11	Udhampur	8		1	0	0	0	0	2	1	1 GPS, 1 Computer, 1 Battery, 1 water tanker	Bathroom 2 nos. at Division office	Bathroom 2 nos.

S. No.	Division	GPS	Photostat machine	Computer/ Laptop	Printer	AC	Inverter	Camera	Battery	Vehicle	Equipments verified by NH Consultancy team	Civil works Done	Works verified by NHC team
12	Mahore	4	1	3	2	0	1	0	2		1 Computer, 2 battery, 1 printer and1 GPS	DFO office building	DFO office building
13	Nowshera	5	1	2	2	0	0	0	2		1 GPS and 1 photostat & 1 computer	-	-
14	Poonch	3	1	2	2	0	1	0	1		1 Computer and1 Printer	-	-
15	Rajouri	5	1	3	1	0	1	0	1		1 GPS, 1 photo stat machine	-	-
16	Reasi	7	0	2	1	0	1	0	2		1 GPS, I computer & 1 battery	-	-
17	Baderwah	4	0	3	1	0	1	0	1		I computer & 1 battery	-	-
18	Batote	3	1	3								Construction of BO Hut Batote, Agumentation of DCF/ACF building at Batote	Construction of BO Hut Batote
19	Doda	5	1	3	2	0	2	0	3		1 computer, 1 photostat machine & 1 printer		
20	Kishtwar	4	1	2	1	0	1	0	2		1 GPS, 1 Inverter and 1 Battery		
21	NH1A Batote Ramban project	2	1	1	1		1	1	1		1 computer and 1 printer	DFO Office Building At Batote	DF office building
22	Ramban	4	1	3	2	0	1	0	2	0	1 Computer & 1 printer	-	-
23	Marwah	3	1	2	1	0	1	0	1		1 GPS and 1 computer	-	-
Total		**49**	**13**	**40**	**25**	**2**	**14**	**2**	**27**	**3**			

5.7 Output and Outcome

Output: The plantations made during 2012-13 to 2018-19 has shown a survival rate of 48.53% which can be considered as good in tough terrains. The primary output can be said to be success in terms of afforestation. The degraded forest lands and the barren hills have been rehabilitated through gap fillings resulting in increased density of plants. The man-days required right from advance work to plantation and maintenance has been catered through deployment of local community and hence employment has been generated to them. The soil moisture conservation work is instrumental in checking soil moisture runoff which in many places have resulted in improved vegetation and productivity in the impacted catchment area. Increased grass for cattle grazing is another output which is basic occupational need of the catchment area. Awareness on environment and climate change resilience has also increased through training and capacity building. The joint forest management network has increased through their capacity building.

Outcome: The interventions have been found to be sustainable in the long run. The areas treated will be producing substantial quantity of bio mass for community use in terms of fodder and fuelwood. The improved soil moisture regime will be recharging the ground water level to be supportive to the vegetation and natural growth of flora in the area. The growth of shrubs, medicinal plants and herbs will be supporting to the livelihood security in the area. The crown and ground density of the forests will keep on increasing through growth and regeneration of the plants planted. The well-stocked forests in the future will be checking floods and soil moisture run off. The expanded forests will be attracting more rain and hence agricultural and horticultural prosperity in the catchment area.

Chapter VI: Suggestions and Recommedations

Based on the comprehensive surveys, enumerations and field observations the consultants are submitting a set of suggestions as follows:

1. The Forest Department may strengthen the network of Village Forest Management Committees (VFMCs) in the plantation sites so that they get the benefits of usufruct sharing in due course of time and also protect the plantation areas. This will encourage local people for protection of plantations on principle of "Care and Share".
2. Success of any plantation is dependent on the nursery stock. It was found that some of the divisions are getting planting stock from other divisions or from central nurseries. The divisions should prefer to develop their own nursery stock close to plantation sites which may give better survival percent. In future plantations nurseries can be improved to produce quality saplings to minimise damage in transportation.
3. Success of plantation site is also dependent on the adaptability of species. Species - site matching to be assured and correct choice of species may avoid poor survival.
4. The data of plantations sites in most of the divisions is not up to the mark. It was observed during evaluation that closure journal of the sites is not maintained properly, as required. In the closure journals they have mentioned only name of species and total number, but not species wise numbers planted. This is required to assess and monitor the actual survival % of the species. It is suggested that plantation/closure journals should be well maintained and updated periodically.
5. During field evaluation it was found that the casual labours engaged under CAMPA for protection of closure are not getting salary in time. This has led to lack of motivation for protection of plantations and adversely effected some closures. This is one of the main reasons for poor growth and survival in some closures.
6. Grazing pressure is very high in Jammu region due to the Bakarwals, the nomadic tribe. Watch and ward which is very important for success of closure, has been provided for most of the plantation sites but there are incidences of damaging the fencing and

grazing. The major demands of local communities were for watch and ward of the closure where it was absent. The department may also plan for establishing fodder banks to reduce the pressure of grazing.

7. Forest fire is a major threat to success of closure. Department may conduct workshops for field functionaries and other stakeholders to train them in fire fighting and protection measures. Mock exercises may also be conducted. The department should also pamphlets for Do's and Don'ts in the forest area, in local language and get it distributed among the inhabitants particularly residing in the forest fringe areas.
8. Fencing of plantation site also improves the chances of plantation survival. The field functionaries should monitor fencing of the closure site. Whenever reported, worn out of fencing may be corrected immediately by engaging staffs. This will be helpful not only in protecting ANR plantation but also natural regeneration of the area from grazing.
9. Capacity building is one of the main components that need to be focused by the department. The field functionaries may be well trained on aspects like selection of sites, choice of species to be planted, nursery development, seed selection, seed processing, record keeping and maintaining closure journal. Awareness camps may also be organised, particularly for the inhabitants of the closure sites, to make them aware of the benefits of plantation. Training and capacity building of community in plantation and allied activities will help both in afforestation as well as conservation.
10. The Divisional Forest Officer may also engage staffs for effective internal monitoring of the plantation sites, for at least first two years who will submit quarterly report on plantation sites. This practice will also enhance plantation survival. The DFOs/ Conservators and other higher officials should periodically inspect the sites and write their inspection note and the follow up against these inspection notes should be monitored by the concerned DFOs.

Photographs

RDF CO. 5 Nandni Hills Jammu Range (Social Forestry Jammu Division)

Closure 67 (Samba Division)

Closure 52 Mahanpur Range (Basoli Division)

Closure 30K (Kathua Division)

Closure 23C Ramnagar Division

Closure 21 Jasrota Range (Kathua Division)

Closure 20 Jasrota Range (Kathua Division)

Closure 17 Sukral (Billawar Division)

Closure 15 RKT (Billawar Division)

Closure 15 BLR (Billawar Division)

Closure 8C Bahu Range (Jammu)

Closure 6 RKT (Billawar Division)

Closure 4/a Jasrota Range (Kathua Wildlife Division)

Closure 1 Jasrota Range (Kathua Wildlife Division)

Closure 6RKT (Billawar Division)

Closure 15BLR (Billawar Division)

Closure 15RKT (Billawar Division)

Social Forestry Mela Kasba (Kathua Social Forestry)

Social Forestry Samba (Kathua Social Forestry)

SC Wazir ki Taki (Kathua Soil and Water Conservation Division)

SC Wazir Ki Tali (Kathua Soil and Water Conservation Division)

SWC Chandriyal (Kathua Soil and Water Conservation Division)

SWC Dalhoti (Kathua Soil and Water Conservation Division)

SWC Galak (Kathua Soil and Water Conservation Division)

Closure 20 Jasrota (Kathua Territorial)

SWC Galak (Kathua Soil and Water Conservation Division)

1 GG Mahore Division

Civil Works at Kathua Wild Life Division

Boundary Wall of Training Centre at Jasrota

Construction of View Point, Jasrota (Kathua Wildlife Division)

Chain Link Fencing, Jasrota (Kathua Wildlife Division)

Range Office Building at Billawar

Water Tanker at Udhampur Division

Annexure - 1

Survey Tools

1: Plantation Site Evaluation Data Sheet

1.0 Location Data

1.1 Division: ……..

1.2 Forest Range: ……

1.3 Forest Beat: ……

1.4 Compartment No.: ……..

1.5 District: ……..

1.6 Name of the Plantation Site: ……

1.7 Plantation Model: ……

1.8 Landmark: ……

1.9 Display Board at Site: Y/N, if Y size …… (take photograph)

1.10 Year of plantation: ……

1.11 Total area planted (Ha): ……

1.12 Actual area using GPS (Ha): ……

1.13 Aspect: ……

Longitude	Latitude	Altitude

1.14 Distance of site from motorable Road ……

1.15 Distance of site from Habitation ……

1.16 Distance of Site from Range/Division Office: ……

1.17 Geological Formations of the Site ……..

……..

……..

……..

1.18 No. of Plants planted per ha:……

1.19 Total No. of Plants Planted & Species

S. No.	Name of species	Number
1		
2		
3		
4		
5		
6		

1.20 Source of Saplings: ……

1.21 Direct sowing if any:

S. No.	Name of species	Area
1		
2		
3		
4		
5		
6		

1.22 Distance of the nursery from the plantation site (Km.): ……

1.23 Size of sapling (nursery):

S No.	Species	Size of sapling
1.		
2.		
3.		
4.		

1.24 Mode of transportation: ……

1.25 % of Damaged saplings during transportation: …….

2.0 Other Intervention Components in and around the site …….
Contour Trench

V-Ditches

Water hole

Fencing

3.0 Terrain Description (write about soil, rock, water source, surroundings etc.)

……
……
……
……
……
……

4.0 Type of Participation by Villagers

……
……
……

5.0 Fencing status

Barbed Wire Fence					
Barbed Wire Fence Id / No.	**Length in Measurement Book**	**Actual Length in field**	**% variation (+/-)**	**Present status – Intact/Worn out**	**Effectiveness of the Fence (Very effective / Moderately effective / Not effective**

Chain Link Fence					
Chain Link Fence Id / No.	**Height X Length in Measurement Book**	**Actual Size (Height X Length) in field**	**% variation (+/-)**	**Present status – Intact/Worn out**	**Effectiveness of the Fence (Very effective / Moderately effective / Not effective**

6.0 Cost of fencing

……

……

7.0 Biotic Pressure Status

7.1 Incidence of Grazing ……

7.2 Incidence of fodder collection ……

7.3 Incidence of NTFP collection ……

7.4 Incidence of Logging ……

7.5 Incidence of fire ……

7.6 Other biotic pressure ……

8.0 Enumeration Sheet

S. No.	Sample Plot No	GPS coordinates of center of plot	Size of plot (32mx32m)	Species	Spacing of plantation (in mt.)	No. of Surviving Plants	No. of Dead Plants	Regeneration Status, if any
1								
2								
3.								
…..								

8.1 Growth parameters

Growth Parameters						
Sl. No.	Species	Plants No.	Height (cm)	Girth (B/C) cm		
				B	C	Crown condition
1.						
2.						
3.						
4.						
……..						

Name of Evaluator ……..

Name & designation of Officer interacted…….

Signature of Evaluator ……..…….. Signature of Officer Interacted ……..…..

Date of Enumeration ……..

2: Soil and Water Harvesting Structure Evaluation Data Sheet

1.0 Location Data

1.1 Division: ……..

1.2 Forest Range: ……

1.3 Forest Beat: ……..

1.4 Compartment No.: ……

1.5 District: ……..

1.6 Name of Village: ……..

2.0 Dimension of the Structure

DRSM/ Crate ID No.	GPS Coordinates	Type of structure	Year of construction	Size (Width*Depth * Length) as in Measurement Book (m)	Size (Width*Depth*Length) as per Actual Size in field (m)	Present Status

2.1 Financial details

DRSM/ Crate ID No.	Total Cost Incurred (Rs.)	Maintenance done (Y/N)	Cost incurred in Maintenance (Rs.)	When (year)	Details of maintenance works done

2.2 Water retention at the time of visit, retention period and use pattern:

DRSM/ Crate ID No.	Water retention Ample (1) Moderate (2) Poor (3) No Water (4)	Retention Period Less than 1 month (1) Less than 3 months (2) Less than 6 months (3) Throughout the year (4)	Use Pattern For Irrigation (1) For Cattle Thirst Quenching (2) For Human Bathing (3) As drinking water for human (4) Any Other (specify) (5)

2.3 Process of site selection, kindly mark (√)

DRSM/ Crate ID No.	By Community	By Forest Department	By Engineering Wing of Forest Department	Through Participatory Approach

2.4 Total Area Impacted by the asset (ha)

DRSM/ Crate ID No.	Arable	Non-arable	Forest

2.5 Impact on Ground Water Recharge {Improved-(1), Constant-(2), Decreased-(3)}

DRSM/ Crate ID No.	Well water level	Hand pump water availability	Pond water level

2.6 Maintenance of assets created

DRSM/ Crate ID No.	Status (Well maintained / Not maintained)

2.7 Benefit sharing mechanism, if any: ……..

2.8 Present status of the assets (take 3 photograph of each asset from different angles):

……

……..

……..

……..

Name of Evaluator ……

Name and designation of official Interviewed…….……

Signature of Evaluator …….……..

Signature of Officer Interacted ……..

Date of visit ……..

3: Wildlife Habitat Improvement Evaluation Data Sheet

1.0 Location Data

1.1 Division: ……..

1.2 Forest Range: ……

1.3 Forest Beat: ……..

1.4 Compartment No.: ……

1.5 District: ……..

1.6 Name of Village: ……..

2.0 Wildlife Habitat Improvement

Habitat Development ID No.	Year	Assets	Area (Width*Depth * Length) as in Measurement Book (m)	Actual Size (Width*Depth*Length) as per Actual Size in field (m)	% Variation

Remarks: Presence or indirect signs – pellet, dung, nests, sighting records of all works done in Wildlife Habitat Improvement.

Note: *Collect physical and financial reports.*

Name of Evaluator ……

Name and designation of official Interviewed……

Signature of Evaluator ……..……..

Signature of Officer Interacted ……..…..

Date of visit ……..

4: Civil Works Evaluation Data Sheet

1.0 Location Data

1.1 Division: ……..

1.2 Forest Range: ……

1.3 Forest Beat: ……..

1.4 Compartment No.: ……

1.5 District: ……..

1.6 Name of Village: ……..

2.0 Civil Works

Building Works (Office, Residential quarter, Barricade, Forest camp, Pump house, etc.)	
Building Id	

Site Location	**Good / Fair / Poor**
Serving the intended purpose	**Good / Fair / Poor**
Structurally sound and free of cracks	**Good / Fair / Poor**
Free of dampness and leakage	**Good / Fair / Poor**
Overall finish and look	**Good / Fair / Poor**

Name of Evaluator ……

Name and designation of official Interviewed……

Signature of Evaluator ……..……...

Signature of Officer Interacted ……..

Date of visit ……..

5: Equipments Evaluation Data Sheet

(Note:- This information needs to be collected at divisional office level only)

1.0 Location Data

1.1 Circle: ……

1.2 Division: ……..

2.0 Equipments and Vehicle Status

S. No.	Equipment	Purchased during the year							Total No. purchased	No. of Working units	No. of non-functional units
		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019			
1	Computer										
2	GPS										
3	Lab Equipments										
4	Vehicle										
5	Other specify										
	Total										

Name of Evaluator ……

Name and designation of official Interviewed……

Signature of Evaluator ……..……..

Signature of Officer Interacted ……..

Date of visit ……..

6: EPA Asset Evaluation Data Sheet

1. **General Information:**

   1.1 Name of Village: ……

   1.2 Division: ……

   1.3 Range: ……..

   1.4 Compartment No.: ……

   1.5 Forest Beat: ……

2. Type of Asset Created: ……

3. Selection process:
   a. Community demand ☐ c. Imposition by Forest Deptt. ☐
   b. Scientifically selected by engineering wing ☐ d. Any other: ☐

4. Placement of Asset: ……

5. Dimensions: ……

6. Total Cost Incurred: ……

7. Year of Construction: ……

8. Present Status of the Asset: ……

9. Sustainability: ……

10. Usefulness of Assets: ……

11. No. of People Benefited: ……

Name of Person Contacted: …… Evaluator's Name: ……..

Designation: …… Signature: ……

Signature: …… Date: ……

7: Questionnaire for Range Officers/DFOs/DCFs/CFs

1. Information

Name –…….. Designation – ……

Circle – …….. Division – ……..

Forest Range – ……

2. What is the basis for selection of sites for plantation:

3. In your view whether the site selection for treatment was good? Y/N

4. What is the basis for selection of the interventions like species / structures/areas for:

a. Afforestation Model

b. Water Harvesting Structures e.g. Check dams (Masonry / vegetative), Anicuts, DLTs

c. Contour trenching, terracing, diversion drains, contour bunding, gully plugging.

d. Upstream/Downstream treatment

e. Silvi-Pasture development

5. Is the compartment history maintained and regularly updated?

6. Do you have plantation journal, is it regularly updated / maintained?

7. Do you have management plan for wildlife?

8. Types of infrastructure created for the implementation of project?

9. Was the planning top down/ bottom up / mix?

10. Sowing Vs Planting (naked root / Potted)

11. Is there any land use board or any other institution existing / operating in the state level for co-ordination of overall catchment area treatment in the state? If so, is it effective?

12. What is the current institutional structure / at field for co – ordination of various soil conservation works in the catchment area by different department / agencies?

13. What is the interval of inspection? Where the inspection observations are noted, how these are disseminated & follow up action taken, recorded?

14. Comment on the internal monitoring:

i. What kind of reporting mechanism is put in place?

ii. Whether reports are periodically / regularly submitted?

iii. What were your major observations during Internal monitoring?

15. Whether the work site registered online at http://egreenwatch.nic.in/? (Yes / No) ☐

16. What measures (including watch and ward) have been adopted for protection and maintenance of assets created under CAMPA?

(The quantity equality of such measures and their effectiveness to be brought out.)

17. Comments on Maintenance of records

- **Nursery Journal**

- **Plantation Journal**

- **Measurement Books**

18. What are the constraints you faced during the implementation of project in?

i. Afforestation

ii. Water Harvesting Structures

iii. Downstream treatment

iv. Silvi-Pasture development

v. Soil moisture conservation

19. What is the incidence of fire in your area?

20. What is the incidence of grazing in your area?

21. What is the incidence of illicit cutting / felling in your area?

22. Was there any community demand for the project? If yes, when and what type of?

23. Was there any conflict with any stake holder during the implementation of project? If yes, what kind and how did you resolve?

24. What is local people's understanding and expectation from the project now?

25. Programme Constraints/Limitations/Funds Flow

26. Whether the project should be continued on the same lines or some modification are necessary?

27. Suggestion for Management

Name of Investigator …….

Name and designation of officer Interviewed ……

Signature of Investigator…… Signature of Officer Interviewed …….

Date of Interview ……..

8: Data Format for JFM

1. Name & Address of JFMC
2. Year of Constitution
3. Executive Committee Details

Post	Name	Occupation	Gender (M/F)	Social Category			
				General	OBC	SC/ST	Minority

4. Are the Chairperson and Treasurer elected or nominated?

5. Education level of Chairman and Treasurer

	Intermediate	Up to Senior Secondary	Above Senior Secondary
Chairperson			
Treasurer			

6. Bank Account Details:
    - Name of the Bank-
    - Branch-
    - Date of Opening of Account-
    - Current Balance-
    - Whether passbook is regularly updated-

7. Total Budget sanctioned and amount retained till date

8. Selection of EPA assets
    - Imposed by Forest Officials
    - Proposed by Community

9. Type of EPA asset, its current physical status and end use pattern

10. Frequency of EBM and GBM

11. Normal Attendance level during EBM and GBM

12. Are the proceedings recorded? □ Yes □ No

    Who writes the proceedings…….

13. Process of Consensus made on Emerging issues

14. Activities performed through your JFM
    - Plantation
    - EPA
    - Soil Moisture Conservation
    - SHG formation and IGA

15. Status of SHGs supported by You

    Number of SHGs-

    Number of Members-

    Composition of SHG-
    -Men
    -Women

16. IGAs undertaken by SHGs and their status

17. Status of Revolving Fund

Loan Given To	In Rs	Data	Balance on Today
SHG1			
SHG2			
SHG3			

Loan Repayment	In Rs	Data	Balance on Today
SHG1			
SHG2			
SHG3			

18. Is Village Development Fund (VDF) available? If yes, mention current balance.
19. SHGs' contribution to Forests
20. Participation in Forest Activities
21. Social Risk Involved in Plantation Activities

Name of Investigator …….

Name and designation of officer Interviewed ……

Signature of Investigator…… Signature of Officer Interviewed …….

Date of Interview ……..

9: PRA (Facilitation Sheet for Community)

1. **Are you aware about the CAMPA Project? If yes. what do you know about it?**

2. **Was there any demand from you for the plantation, EPA, WHS, etc.?**

3. **Were You or the community in any way involved**

(a) In the planning of the project? If Yes, how & when give details

(b) In the implementation of the project? If Yes, how & when give details

(c) In the maintenance of the project components (Afforestation / Pasture development, downstream treatment, soil conservation measures)? If Yes, how & when. Give details

4. **Whether site selection for plantation was good?**

5. Did any type of conflict arise in regard to:

S. No.	Particulars	Type of Conflict	Conflict between whom	Measures taken to resolve conflict
1	Need for the project			
2	Planning of the project			
3	Implementation of the project			
4	Maintenance of the project			
5	Usufructs rights and its sharing			
6	Benefit sharing from project components			
7	Any other			

6. Are you aware about the overall land-use pattern of the catchment area

Land Type	Total Area	Percentage
Forest (Dense, Open, scrub, Grassland)		
Agriculture		
Homestead		
Wasteland including exposed rocks		
Other Category		

7. Status of

S.No.	Particulars	Before the project was implemented	Present Status
1	Land Slip		
2	Soil Erosion		
3	Floods		
4	Flash floods		
5	Siltation		

8. Status of the following in the Project Area

Type	Before implementation of the project	Present
Fodder		
Fuel wood		
Medicinal Plants		
Agriculture		
Irrigation		
Water Supply		
Water Quality		
Electricity		
Others		

9. What is the incidence of fire in the forest Land?

(a) High ☐

(b) Moderate ☐

(c) Low ☐

(d) Absent ☐

10. What is the incidence of the grazing in the forest Land?

(a) High ☐

(b) Moderate ☐

(c) Low ☐

(d) Absent ☐

11. Details about Rotational Grazing pattern

Site Name	Total Area	Season (in Months)

12. Incidence of illegal cutting of trees/ poles

(a) High ☐

(b) Moderate ☐

(c) Low ☐

(d) Absent ☐

13. What is your perception for the project now?

14. If project is to be continued, do you have any specific suggestion for improvement? If yes give details.

15. Any other remarks.

Name of Facilitator ……..

Signature of Facilitator ……..…… ……

Date of PRA …….

Name and Signature of Participants

	Name	Signature
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

10: Data Format for SHGs

1. **Name and Address of SHG …….**

2. **Date of Formation ……**

3. **Membership Detail**

Person	Designation	Age	Gender	Education Level	Occupation

4. **Status of Bank Account**

Name of Bank ---------- Branch ----------

Account Number ----------

Date Last Updated ----------

Current Balance Rs. ----------

5. **Members Saving Details**

Amount Per Individual Per Month …….

Total Savings till Date ……..

Number of Defaulting Members and Recovery Mechanism……..

Whether Members Passbook Updated ……..

6. **Intra Loaning Status**

Total Loans Dispersed Till Date ……

Common purposes of Loan ……

Interest Rate ……

Money Recovered……..

Process of Sanction ……

Mechanism of Recovery of Bad Loans ……

…….

7. Frequency of Meetings……

8. Number of Members attending the Meeting (Averaged) ……..

9. Are the Proceedings of Meetings Recorded ……..

10. Who writes the Proceedings……..

11. Training and Capacity Building

By Whom……..

Subjects ……

Frequency ……..

Lessons Learnt ……..

12. IGA undertaken

Date of Commencement ……

Individuals Income by IGA ……

Benefit Sharing Mechanism ……..

13. Participation in Forestry Activities …….

14. Whether any Member in EC of JFM……..

15. Types of Conflict Emerging and Conflict Resolution Mechanism Adopted

16. Revolving Fund Received from JFM…….

17. Money Returned to Revolving Fund……

18. Seed Money Received from Project…….

19. Whether Underwent Exposure Tour? Yes/ No

If Yes, Where, When and Why ……

……..

20. Overall Benefit Received from the Project ……

……

21. Observation and Suggestions ……

……..

……

Name of Investigator …….

Signature of Investigator……

Date of Interview ……..

The Compensatory Afforestation Fund Management & Planning Authority (CAMPA)

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