

# Chapter 1

## INTRODUCTION

### 1.1 About CAMPA

Human being and other species are directly or indirectly dependent on forests. Forests are used for nature reserve, national park, wildlife sanctuary, biosphere reserve, as a habitat of any endangered/ threatened species of flora and fauna and for agriculture purposes for the rehabilitation of the persons displaced from their residences by reason of any river valley or hydroelectric projects etc. Forest land is generally diverted for non-forestry purpose under the Forest (Conservation) Act, 1980 for facilitating developmental activities like construction of power projects, irrigation projects, roads, railways, schools, hospitals, rural electrification, telecommunication, drinking water facilities and mining, etc.

Compensatory Afforestation Management and Planning Authority (CAMPA) is a body constituted by the Central government as a consequence of the Supreme Court's order in 2002. The cost of creating the compensatory forest is borne by the 'User Agency' proposing the forest diversion for its project, which can be a public or private sector enterprise or a government body owning the project. Whenever development projects seek land inside a Reserved Forest or a Protected Area (PA), such as a wildlife sanctuary or a national park, certain levies are imposed by the government on the project proponent (the User Agency) towards compensatory afforestation (CA), additional compensatory afforestation (ACA), penal compensatory afforestation (PCA), net present value (NPV) of forestland, catchment area treatment (CAT) plan funds, etc.<sup>1</sup>

In April 2004, the Central Government, under the orders of the Honorable Supreme Court, constituted the CAMPA for the management of money towards CA, NPV and other money recoverable, in compliance of the conditions stipulated by the central government and in accordance with the Forest (Conservation) Act, 1980. The CAMPA functions under the supervision of the Central Government in the Ministry of Environment, Forests & Climate Change (MoEF& CC). Its jurisdiction extends to the whole of India. Under CAMPA, large-scale activities have been taken up to accelerate preservation of natural forests, management of wildlife, capacity building, research & development, infrastructure development in the sector and other allied works.

The Ministry of Environment and Forests, Government of India, in their letter dated 2 July 2009 have issued the Guidelines on State Compensatory Afforestation Fund Management and Planning Authority (State CAMPA). Based on these guidelines, the Government of Andhra Pradesh, in their G.O.Ms.No.78, E.F.S.& T (For. I) Department dated 11 September 2009 issued orders establishing the Andhra Pradesh State Compensatory Afforestation Fund Management and

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<sup>1</sup> CAMPA Fact Sheet: A Compromised Composition CAF Bill and PSC Report, CSE, 7p.

planning authority (A.P. State CAMPA). The main purpose enunciated in the Notification is enhancement of forest and tree cover and conservation and management of wildlife by utilizing funds received towards CA, NPV etc. in compliance to the conditions stipulated by the Central Government while according approval under Forest (Conservation) Act, 1980 (69 of 1980) for non-forest uses of the forest lands.<sup>2</sup>

With the Compensatory Afforestation Fund Bill 2016 (*hereafter referred to as 'the Bill'*), the Government of India now seeks to make this corpus available to state governments to initiate necessary compensatory afforestation programmes, independent of the Supreme Court. The Bill provides for an institutional mechanism to ensure 'expeditious utilization' of the amounts collected from the diversion of forestlands till present.

## 1.2 Necessity of CAMPA

The necessity of CAMPA is to compensate for the loss of tangible as well as intangible benefits from the forest lands which were diverted for non-forest use compensatory afforestation is required to be done over an equivalent area of non-forest land or double the amount of degraded forest land in relation to the actual area being diverted. If clearances for diversion of forest land are granted, certain levies are imposed on the project proponents by the Government to compensate for the loss of forestlands, and this money is to be utilized for afforestation activities elsewhere. This concept is 'Compensatory Afforestation', defined as 'afforestation done in lieu of the diversion of forest land for non-forest use under the Forest (Conservation) Act, 1980 (ref. 5). In order to determine the cost of compensatory afforestation, the appropriate authority will evaluate the area of the forest area/degraded identified for compensatory afforestation. From such money, a huge corpus of over 42,000 crores has accumulated into accounts of Ad hoc CAMPA, a temporary body set up in 2006 by the Supreme Court to manage such funds. The corpus is increasing at the rate of about 6,000 crores per year. The disbursement of funds under the corpus to state governments was previously supervised by the Supreme Court to ensure effective monitoring and regulation of these funds.<sup>3</sup>

CAMPA fund is to be used for assisted natural regeneration (ANR), natural forest management, forest protection, biodiversity conservation, infrastructure development, wildlife

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<sup>2</sup> Manual of Guidelines and Accounting Procedure on works relating to A.P. State Compensatory Afforestation Fund Management and Planning Authority (A.P. State Campa), 38p.

<sup>3</sup> Text of the Supreme Court Order, dated 10 July 2009, on National and State CAMPAs.

protection and management, the supply of wood and other forest produce saving devices and other allied activities.

### **1.3      CAMPA in Telangana**

Telangana state formed in June 2014 from the northwestern part of the Joint State of Andhra Pradesh has an area of 112,102 square kilometers and a population of 35,193,978.<sup>4</sup> The notified forest area of the State is 26903.70 square kilometers, which is 23.99% of the geographical area.<sup>5</sup> The Telangana State Forest Department (TSFD) is implementing CAMPA activities in the state of Telangana since 2009-2010.

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<sup>3</sup> Census of India (2011).

<sup>5</sup> Telangana State of Forest report (2014), TSFD, 144p.

## Chapter 2

### WORKS TAKEN UP UNDER DIFFERENT CAMPA COMPONENTS

This chapter describes the works taken up by TSFD during 2011-2012 under different CAMPA components. Compensatory Afforestation (CA) and Net Present Value (NPV) components for which activities have been undertaken by Telangana State Forest department during 2011-2012 are shown in Fig 2.0.

**Fig 2.0: Works undertaken for different CA and NPV components during 2011-2012.**

Compensatory Afforestation (CA)	Net Present Value (NPV)
<ul style="list-style-type: none"> <li>➤ Compensatory Afforestation</li> <li>➤ Additional CA</li> <li>➤ Safety Zone</li> </ul>	<ul style="list-style-type: none"> <li>➤ Natural Forest Management (NFM)</li> <li>➤ Forest Protection (FP)</li> <li>➤ Forest Fire Management (FFM)</li> <li>➤ Bio-diversity Conservation and Development (BDC)</li> <li>➤ Research and Development (R&amp;D)</li> <li>➤ Capacity Building (CB)</li> <li>➤ Information Communication and Technology (ICT)</li> <li>➤ Infrastructure development &amp; Maintenance (IDM)</li> <li>➤ Ecotourism (ET)</li> <li>➤ Office Support (OS)</li> </ul>

**2.1 Compensatory Afforestation (CA):** The main mandate of Telangana State CAMPA is afforestation of the compensatory area given by the user agency in lieu of the forest areas diverted for non-forestry purposes. Under Compensatory afforestation, planting of trees is carried out on another piece of land equivalent in area to the original forestland diverted for non-forest purposes. It is mandated under the Forest (Conservation) Act, 1980 that compensatory afforestation is done over an equivalent area of non-forestland. Equivalent non-forestland identified for the purpose would subsequently be transferred to the ownership of the State Forest Department and declared as Protected Forests so that the plantation raised can be maintained permanently. Where non-forestlands are not available, compensatory afforestation may be carried out over degraded forest twice in the extent to the area diverted or to twice the difference between forestland being diverted and available non-forestland, as the case may be. The activities under CA head namely CA / Addl.CA / Safety Zone are taken up by TSFD strictly as per the Government of India stipulations while granting the stage - I & II clearances of CA proposals.

Under CA during 2011-2012, a total of 274 works were undertaken by TSFD with an expenditure of 448.55204 lakhs. Division wise total number of works and expenditure under CA is shown in Table 2.1a.

**Table 2.1a: Division wise number of works undertaken and expenditure (lakhs) incurred under CA by TSFD, CAMPA during the year 2011-2012.**

Name of the Circle	Name of the Division	No of works undertaken	Expenditure (lakhs)
Adilabad	Adilabad	18	39.37267
	Mancherial	11	11.01896
	Bellampally	4	6.54535
	<b>Circle total</b>	<b>33</b>	<b>53.93698</b>
Hyderabad	Hyderabad	3	1.999
	Mahabubnagar	17	6.29216
	Nalgonda	15	8.97769
	<b>Circle total</b>	<b>35</b>	<b>17.26885</b>
Khammam	Khammam	9	37.93205
	Kothagudam	7	7.30108
	Paloncha	86	133.1162
	Bhadrachalam (N)	25	69.88545
	Bhadrachalam (S)	25	60.33252
	Bhadrachalam (Logging)	10	37.93205
	<b>Circle total</b>	<b>162</b>	<b>308.56730</b>
Nizamabad	Nizamabad	13	6.7454
	Kamareddy	5	13.54035
	Medak	5	4.28994
	<b>Circle total</b>	<b>23</b>	<b>24.57569</b>
Warangal	Warangal (N)	1	0.28981
	Karimnagar (E)	4	0.272
	Karimnagar (W)	1	0.1874
	<b>Circle total</b>	<b>6</b>	<b>0.74921</b>
FDPT	Achampet	2	0.616
	Nagarujan Sagar (G)	13	39.83801
	<b>Circle total</b>	<b>15</b>	<b>40.45401</b>
<b>Grand total</b>		<b>274</b>	<b>448.55204</b>

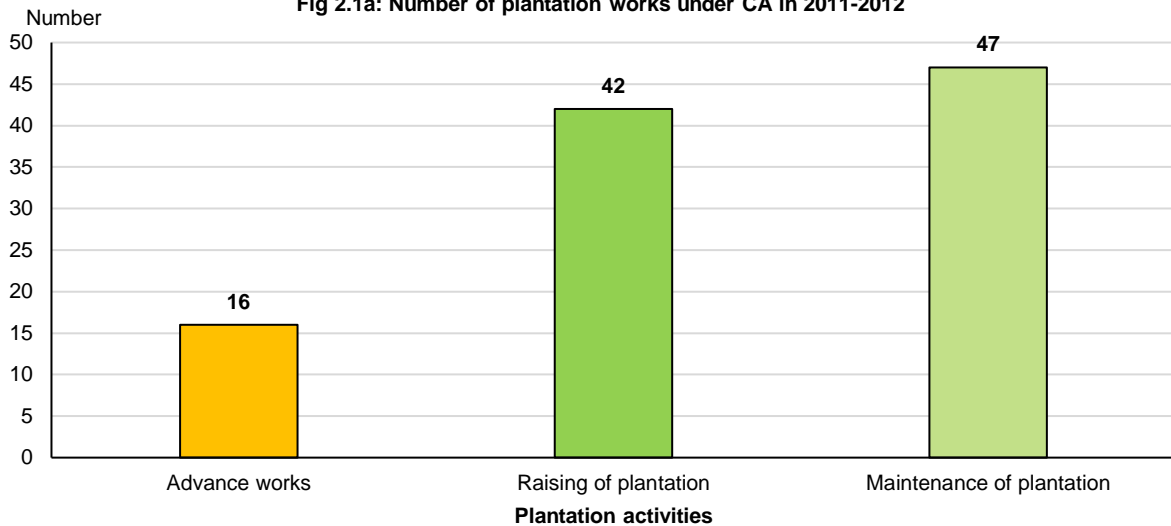
Plantation targets and achievements under CA during 2011-2012 is shown in Table 2.1b.

**Table 2.1b: Division wise plantation targets and achievements under CA component during 2011-2012.**

Sl. No	Name of the Circle	Name of the Division	Target				Achievements			
			CA	Addl.CA	Safety Zone	Total	CA	Addl.CA	Safety Zone	Total
1	Adilabad	Adilabad	60	0	0	60	58	0	0	58
		Bellampally	0	0	0	0	0	0	0	0
		Mancherial	60	0	0	60	26	0	0	26
		<b>Circle Total</b>	<b>120</b>	<b>0</b>	<b>0</b>	<b>120</b>	<b>84</b>	<b>0</b>	<b>0</b>	<b>84</b>
2	Hyderabad	Hyderabad	0	2	0	2	0	2	0	2
		Mahabubnagar	0	0	0	0	0	0	0	0
		Nalgonda	0	0	0	0	0	0	0	0
		<b>Circle Total</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>
3	Khammam	Khammam	6	83	7	96	6	83	7	96
		Kothagudem	9	0	25	34	9	0	15	24
		Paloncha	689	0	4	693	575	0	0	575
		Bhadrachalam N.	197	2	0	199	197	2	0	199
		<b>Circle Total</b>	<b>900</b>	<b>85</b>	<b>36</b>	<b>1021</b>	<b>787</b>	<b>85</b>	<b>22</b>	<b>894</b>
4	Nizamabad	Nizamabad	2	0	0	2	2	0	0	2
		Kamareddy	32	0	0	32	16	0	0	16
		Medak	0	0	0	0	0	0	0	0
		<b>Circle Total</b>	<b>34</b>	<b>0</b>	<b>0</b>	<b>34</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>18</b>
5	Warangal	Karimnagar East	0	0	0	0	0	0	0	0
		Warangal North	0	0	0	0	0	0	0	0
		Warangal South	0	0	0	0	0	0	0	0
		<b>Circle Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
6	FDPT	Achampet	0	0	0	0	0	0	0	0
		Nagarjuna Sagar	0	0	0	0	0	0	0	0
		<b>Circle Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>GRAND TOTAL</b>			<b>1054</b>	<b>87</b>	<b>36</b>	<b>1177</b>	<b>889</b>	<b>87</b>	<b>22</b>	<b>998</b>

During 2011-2012, plantations under CA covered 998 ha, of which 889 ha was achieved under CA, 87 ha under additional CA and 22 ha under safety zone. The main works under plantation activities included advance work including nursery works, raising of forest plantations and maintenance of previously raised plantations. Total plantation works carried out under CA during 2011-2012 is shown in Fig 2.1a.

**Fig 2.1a: Number of plantation works under CA in 2011-2012**



Division wise total number of plantation works under CA for the year 2011-2012 is shown in Table 2.1c.

**Table 2.1c: Division wise total plantation activities under CA by TSFD, CAMPA during 2011-2012.**

Forest Divisions	Advance Operation	Raising	Maintenance	Total
Adilabad	4	6	2	12
Bellampally	-	-	3	3
Bhadrachalam(North)	-	14	10	24
Bhadrachalam(South)	3	2	-	5
Hyderabad	-	2	-	2
Kamareddy	-	2	-	2
Karimnagar East	-	-	4	4
Khammam	5	4	-	9
Kothagudem	1	4	-	5
Mahabubnagar	-	-	5	5
Mancherial	-	2	8	10
Medak	-	-	1	1
Nagarjunasagar	1	3	1	5
Nalgonda	1	2	11	14
Nizamabad	1	1	2	4
<b>TOTAL</b>	<b>16</b>	<b>42</b>	<b>47</b>	<b>105</b>

**2.2 Net Present Value (NPV):** The components of NPV include natural forest management, forest protection, forest fire management, biodiversity conservation and development, research and development, capacity building, information communication and technology, monitoring and evaluation and office support. Each of the NPV components is described in the following sub-sections.

**2.2.1 Natural Forest Management (NFM):** The purpose of natural forest management treatments is to improve the overall stockings of the natural forests and at the same time to afforest degraded forest areas and improve the productivity of the forests on a sustained yield basis by using

appropriate silvicultural and management practices. Under the natural forest treatments, activities were proposed to improve the stockings of natural bamboo in the forests, improve the stockings of teak in the teak bearing Telangana forests and cover the barren hills with indigenous tree species. Management and silvicultural prescriptions were in accordance with the overall prescriptions of the working plan for the given division. Treatment models for improving the productivity of the natural forests for an amount of 2109.329 lakhs, including certain spillover activities of advance operations of 2010-2011 were spent during 2011-2012 under NFM component.

Targets and achievements of different types of plantation for the year 2011-2012 under NFM component are shown in table 2.2.1a.

**Table 2.2.1a: Division wise targets and achievements of plantations area (ha) undertaken under NFM component for the year 2011-2012.**

Circle	Target (ha)						Achieved (ha)				
	Division	EP	Teak	Bamboo	Mixed	Total	EP	Teak	Bamboo	Mixed	Total
Adilabad	Adilabad	50	50	10	0	110	50	50	10	0	110
	Nirmal	26	60	51	0	137	26	60	51	0	137
	WL Jannaram	0	0	10	30	40	0	0	10	30	40
	Mancherial	78	50	10	0	138	78	50	10	0	138
	Bellampally	100	100	10	0	210	100	100	10	0	210
	Kazagnagar	50	50	10	0	110	50	50	10	0	110
	<b>Circle total</b>	<b>304</b>	<b>310</b>	<b>101</b>	<b>30</b>	<b>745</b>	<b>304</b>	<b>310</b>	<b>101</b>	<b>30</b>	<b>745</b>
Hyderabad	Hyderabad	151	0	0	7	158	151	0	0	7	158
	Mahabubnagar	50	0	0	0	50	50	0	0	0	50
	Nalgonda	50	0	0	0	50	50	0	0	0	50
	<b>Circle total</b>	<b>251</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>258</b>	<b>251</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>258</b>
Khammam	Khammam	50	50	0	0	100	50	50	0	0	100
	Kothagudam	50	0	0	0	50	50	0	0	0	50
	Paloncha	50	50	0	0	100	50	50	0	0	100
	Bhadrachalam (N)	46	0	0	0	46	46	0	0	0	46
	Bhadrachalam (S)	0	100	0	0	100	0	100	0	0	100
	<b>Circle total</b>	<b>196</b>	<b>200</b>	<b>0</b>	<b>0</b>	<b>396</b>	<b>196</b>	<b>200</b>	<b>0</b>	<b>0</b>	<b>396</b>
Nizamabad	Nizamabad	0	50	0	0	50	0	50	0	0	50
	Kamareddy	0	50	0	0	50	0	50	0	0	50
	Medak	400	0	0	0	400	400	0	0	0	400
	<b>Circle total</b>	<b>400</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>500</b>	<b>400</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>500</b>
Warangal	Warangal (N)	125	0	0	0	125	125	0	0	0	125
	Warangal (S)	33	0	0	0	33	33	0	0	0	33
	Karimnagar (E)	125	0	0	0	125	125	0	0	0	125
	Karimnagar (W)	75	0	0	0	75	75	0	0	0	75
	<b>Circle total</b>	<b>358</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>358</b>	<b>358</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>358</b>
<b>GRAND TOTAL</b>	<b>1509</b>	<b>610</b>	<b>101</b>	<b>37</b>	<b>2257</b>	<b>1509</b>	<b>610</b>	<b>101</b>	<b>37</b>	<b>2257</b>	

Under NFM during 2011-2012 activities to increase the overall stocking of the natural forest through plantations of various species were undertaken by TSFD.

Division wise total number of plantation works under NFM for the year 2011-2012 is given in Table 2.2.1b.



**Table 2.2.1b: Total plantation works undertaken under NFM by TSFD, CAMPA during 2011-2012.**

Division	Advance Works	Raising	Maintenance	Total
Achampet	-	1	-	1
Adilabad	-	19	34	53
Bellampally	25	12	-	37
Bhadrachalam (North)	15	3	8	26
Bhadrachalam (South)	6	7	11	24
Hyderabad	4	46	8	58
Jannaram WL	-	1	-	1
Kaghaznagar	28	7	-	35
Kamareddy	33	3	-	36
Karimnagar East	34	22	-	56
Karimnagar West	13	14	-	27
Khammam	23	4	2	29
Kothagudem	15	6	-	21
Mahabubnagar	9	6	-	15
Mancherial	23	35	-	58
Medak	45	21	-	66
Medak WLM	-	1	-	1
Nagarjunasagar	2	-	-	2
Nalgonda	5	3	-	8
Nirmal	31	13	-	44
Nizamabad	20	4	-	24
Paloncha	43	30	36	109
SS Hyderabad	1	10	3	14
Warangal North Division	21	20	-	41
Warangal South Division	10	5	-	15
<b>Total</b>	<b>406</b>	<b>293</b>	<b>102</b>	<b>801</b>

**Table 2.2.1c: Division wise abstract of physical works (nos) and expenditure (lakhs) under NFM, 2011-2012.**

Name of the circle	Name of the division	Target		Achievement	
		Physical (nos)	Financial (lakh)	Physical (nos)	Financial (lakh)
Adilabad	Adilabad	64	47.373	64	60.372
	Nirmal	38	103.025	38	77.805
	WL Jannaram	2	6.822	2	3.855
	Mancherial	80	91.105	80	186.735
	Bellampally	85	171.49	85	328.67
	Kazagnagar	55	52.54	55	81.301
<b>Circle total</b>		<b>324</b>	<b>472.355</b>	<b>324</b>	<b>738.738</b>
Hyderabad	Hyderabad	70	167.662	70	78.159
	Mahabubnagar	22	11.337	22	20.911
	Nalgonda	13	36.5	13	26.1139
	<b>Circle total</b>	<b>105</b>	<b>215.499</b>	<b>105</b>	<b>125.1839</b>
Khammam	Khammam	87	162.118	87	147.84928
	Kothagudam	29	72.116	29	75.40898
	Paloncha	55	94.673	55	85.97259
	Bhadrachalam (N)	36	84.813	36	93.5503
	Bhadrachalam (S)	33	59.08	33	50.269
	LD Bhadrachalam	87	68	87	60
<b>Circle total</b>	<b>240</b>	<b>540.8</b>	<b>240</b>	<b>513.05015</b>	
Nizamabad	Nizamabad	46	68.132	46	63.747
	Kamareddy	40	37.264	40	52.525
	Medak	73	161.93	73	225.52831
	<b>Circle total</b>	<b>159</b>	<b>267.326</b>	<b>159</b>	<b>341.80031</b>
Warangal	Warangal (N)	53	118.413	53	87.65961
	Warangal (S)	20	69.62	20	36.95422
	Karimnagar (E)	84	98.355	84	91.88
	Karimnagar (W)	33	76.246	33	60.55386
	<b>Circle total</b>	<b>190</b>	<b>362.634</b>	<b>190</b>	<b>277.04769</b>
FDPT	Achampet	15	87.83	15	57.423
	<b>Circle total</b>	<b>15</b>	<b>87.83</b>	<b>15</b>	<b>57.423</b>
R&D	SS Hyd	4	47.5	4	31.71939
	FG WGL	4	36.9	4	24.36676
	<b>Circle total</b>	<b>8</b>	<b>84.4</b>	<b>8</b>	<b>56.08615</b>
<b>GRAND TOTAL</b>		<b>1041</b>	<b>2034.064</b>	<b>1041</b>	<b>2109.329</b>

**2.2.2 Forest Protection (FP):** Protection of forests is one of the vital responsibility of the forest department. The size of forest beats, sections and ranges have remained unchanged in the state and do not conform to national standards of forest beat, section and range sizes. To supplement the frontline field staffs in their protection efforts it was proposed to continue the existing and establish fresh base camps, strike forces, check posts and police parties. Various initiatives like maintenance and construction of quarters, forest boundaries pillars, providing arms to the frontline staff were proposed for improving the protection of the existing forests. An amount of 2677.119 lakh was spent for completing the proposed interventions, the amount also includes spillover works of the year 2010-2011. Activities carried out under FP during 2011-2012 include:

- Base Camps (81 base camps) activities with highest in Adilabad circle (30 base camps).
- Forest Strike Forces (40 nos) activities towards establishment and maintenance.
- Check posts (51 nos).
- Translation, scanning, and documentation of Reserve Forest Blocks notifications.
- Construction of protection wall in urban forest areas.
- Construction of quarters for the frontline staffs of which new quarters were sanctioned (32 Nos.) and others constructed (25 Nos.).
- Construction of 4 nos of RCC building an Bhadrachalam North.
- Improvement of the communication network and mobility for patrolling duty to frontline forest staff.
- Providing arms and ammunition to the frontline staffs.
- Legal assistance charges.
- Social Security Fund of 100.00 lakhs for payment of ex-gratia for forestry personnel

Division wise targets and achievements under FP for the year 2011-2012 is shown in Table 2.2.2.  
**Table 2.2.2: Division wise abstract of physical works (nos.) and expenditure (lakhs) under FP, 2011-2012.**

Name of the circle	Name of the division	Target		Achievement	
		Physical (nos)	Financial (lakh)	Physical (nos)	Financial (lakh)
Adilabad	Adilabad	45	207.04	45	105.846
	Nirmal	46	141.093	46	95.793
	WL Jannaram	46	88.955	46	92.833
	Mancherial	23	189.966	23	69.421
	Bellampally	27	85.879	27	85.179
	Kazagnagar	25	102.617	25	90.6601
	<b>Circle total</b>	<b>212</b>	<b>815.55</b>	<b>212</b>	<b>539.7321</b>
Hyderabad	Hyderabad	226	1057.235	226	765.764
	Mahabubnagar	50	46.134	50	81.934
	Nalgonda	24	91.87	24	84.6397
	FSP Hyderabad	3	3.58	3	4.17978
	<b>Circle total</b>	<b>303</b>	<b>1198.819</b>	<b>303</b>	<b>936.51748</b>
Khammam	Khammam	22	51.664	22	26.091
	Kothagudam	45	95.093	45	68.97185
	Paloncha	40	83.768	40	76.28449
	Bhadrachalam (N)	68	98.136	68	105.36225
	Bhadrachalam (S)	56	108.506	56	102.731
	WL Paloncha	17	50.005	17	29.24542
	<b>Circle total</b>	<b>248</b>	<b>487.172</b>	<b>248</b>	<b>408.68601</b>
Nizamabad	Nizamabad	26	40.952	26	34.788
	Kamareddy	27	35.153	27	55.90829
	Medak	28	60.534	28	51.67458
	WL Medak	6	26.32	6	16.532
	<b>Circle total</b>	<b>87</b>	<b>162.959</b>	<b>87</b>	<b>158.90287</b>
Warangal	Warangal (N)	40	81.797	40	71.17215
	Warangal (S)	34	89.315	34	69.17746
	WL Warangal	19	48.58	19	33.51065
	Karimnagar (E)	32	98.932	32	88.362

Name of the circle	Name of the division	Target		Achievement	
		Physical (nos)	Financial (lakh)	Physical (nos)	Financial (lakh)
	Karimnagar (W)	30	88.549	30	88.95471
	FSP Warangal	4	1.32	4	1.32083
	FSP Karimnagar	2	0.82	2	1.115
	<b>Circle total</b>	<b>161</b>	<b>409.313</b>	<b>161</b>	<b>353.6128</b>
FDPT	Achampet	140	138.45	140	103.556
	<b>Circle total</b>	<b>140</b>	<b>138.45</b>	<b>140</b>	<b>103.556</b>
WLM Hyd	CNP	5	89.612	5	86.5145
	D.F.O	9	8.81	9	8.33257
	<b>Circle total</b>	<b>14</b>	<b>98.422</b>	<b>14</b>	<b>94.84707</b>
R&D	SS Hyd	2	4.89	2	4.0037
	FG WGL	1	0.85	1	0.85
	<b>Circle total</b>	<b>3</b>	<b>5.74</b>	<b>3</b>	<b>4.8537</b>
Zoo Park	Zoo Park	20	76.411	20	76.411
	<b>Circle total</b>	<b>20</b>	<b>76.411</b>	<b>20</b>	<b>76.411</b>
<b>GRAND TOTAL</b>		<b>1188</b>	<b>3449.886</b>	<b>1188</b>	<b>2677.119</b>

**2.2.3 Forest Fire Management (FFM):** The forest areas in Telangana are subjected to damage due to annual ground fires in the summer season. The protection of regeneration of forest areas from fire damage is essential for improving the stocking in the forests and for providing fodder for the wild herbivores. An amount of 40.458 lakh was spent on interventions under this component. Major activities under FFM during 2011-2012 include:

- Creation of fire lines (145 km).
- Fire Watchers for maintaining the existing fire lines and control burning along extraction / bridle paths (for 5 months in fire season i.e. April and May in 2011 and January, February and March in 2012) 136 watchers.

Division wise targets and achievements under FFM for the year 2011-2012 is shown in Table 2.2.3.

**Table 2.2.3: Division wise abstract of physical works (nos) and expenditure (Lakhs) under FFM, 2011-2012.**

Name of circle	Name of division	Target		Achievement	
		Physical (nos.)	Financial (lakh)	Physical (nos.)	Financial (lakh)
Adilabad	Nirmal	11	2.5	11	2.464
	WL Jannaram	5	5.1	5	3.643
	Mancherial	7	5.75	7	5.748
	Bellampally	34	9	34	8.96
	Kazagnagar	13	5.75	13	4.458
	<b>Circle total</b>	<b>70</b>	<b>28.1</b>	<b>70</b>	<b>25.273</b>
Hyderabad	Hyderabad	12	2.6	12	2.011
	Mahabubnagar	6	0.64	6	1.44
	Nalgonda	3	1	3	0.6
	<b>Circle total</b>	<b>21</b>	<b>4.24</b>	<b>21</b>	<b>4.051</b>
Nizamabad	Nizamabad	4	0.48	4	1.17
	Kamareddy	12	1.12	12	1.055
	Medak	20	2.06	20	1.967
	WL Medak	2	1.65	2	2.244
	<b>Circle total</b>	<b>38</b>	<b>5.31</b>	<b>38</b>	<b>6.436</b>
FDPT	Achampet	10	4.53	10	3.993
	<b>Circle total</b>	<b>10</b>	<b>4.53</b>	<b>10</b>	<b>3.993</b>
WLM Hyd	CNP	1	0.705	1	0.705
	<b>Circle total</b>	<b>1</b>	<b>0.705</b>	<b>1</b>	<b>0.705</b>
<b>GRAND TOTAL</b>		<b>140</b>	<b>43.685</b>	<b>140</b>	<b>40.458</b>

**2.2.4 Biodiversity Conservation (BDC):** The Telangana state is endowed with rich flora and fauna with more than 3000 plant species, 400 bird species, 80 mammalian species and more than 50 reptilian species. Under this component during the year 2011-2012 an expenditure of 766.54728 lakhs was made by TSFD. Initiatives for the conservation of biodiversity and development in the National Parks and Protected Areas undertaken by TSFD during 2011-2012 are listed below<sup>6</sup>:

- Wildlife habitat improvement (1150 ha).
- Fringe area development (275 ha).
- Wildlife protection and anti-poaching activities (16 nos.).
- Man-animal conflict 19 numbers.
- Maintenance of deer parks & animal complex (6 nos).
- Wildlife environmental extension & education (16 nos).
- Improvement of zoo parks / Consultancy for bringing the zoos of the state of international standards / Water resource management (190 cases).

Division wise targets and achievements under BDC for the year 2011-2012 is shown in Table

2.2.4.

**Table 2.2.4: Division wise abstract of physical works (nos.) and expenditure ( ` lakhs) under BDC, 2011-2012.**

Name of the circle	Name of the division	Target		Achievement	
		Physical (nos.)	Financial (lakh)	Physical (nos.)	Financial (lakh)
Adilabad	Nirmal	21	7.107	21	6.934
	WL Jannaram	25	63.459	25	58.212
	Mancherial	0	0	3	1.44
	<b>Circle total</b>	<b>46</b>	<b>70.566</b>	<b>49</b>	<b>66.586</b>
Hyderabad	Hyderabad	24	83.5	24	64.63
	Mahabubnagar	31	36.883	31	57.9
	Nalgonda	2	0.25	0	0
	<b>Circle total</b>	<b>57</b>	<b>120.633</b>	<b>55</b>	<b>122.53</b>
Khammam	WL Paloncha	90	77.19	90	65.16793
	<b>Circle total</b>	<b>90</b>	<b>77.19</b>	<b>90</b>	<b>65.16793</b>
Nizamabad	Nizamabad	6	1.26	6	1.71
	Kamareddy	20	1.69	20	0.798
	Medak	7	0.91	7	1.8264
	WL Medak	87	103.948	87	80.068
	<b>Circle total</b>	<b>120</b>	<b>107.808</b>	<b>120</b>	<b>84.4024</b>
Warangal	Warangal (N)	32	16.021	32	10.54541
	Warangal (S)	8	1.335	8	0.325
	WL Warangal	60	112.893	60	41.54182
	Karimnagar (E)	5	3.091	0	0
	Karimnagar (W)	29	24.35	29	21.02372
	<b>Circle total</b>	<b>134</b>	<b>157.69</b>	<b>129</b>	<b>73.43595</b>
FDPT	Achampet	83	60.562	83	58.747
	<b>Circle total</b>	<b>83</b>	<b>60.562</b>	<b>83</b>	<b>58.747</b>
WLM Hyd	CNP	39	138.694	39	133.43
	D.F.O	37	45.456	37	47.252
	<b>Circle total</b>	<b>76</b>	<b>184.15</b>	<b>76</b>	<b>180.682</b>
Zoo Park	Zoo Park	100	334.724	67	114.9960
	<b>Circle total</b>	<b>100</b>	<b>334.724</b>	<b>67</b>	<b>114.9960</b>
<b>GRAND TOTAL</b>		<b>706</b>	<b>1145.307</b>	<b>669</b>	<b>766.54728</b>

<sup>6</sup>APO under CA and NPV, 2011-2012, AP State CAMPA

**2.2.5 Research and Development (R&D):** The forest department has undertaken applied forestry research in a number of fields for improving the growing stock of forests species and development of genetically superior and high yielding variety of various species. A total amount of 196.41 lakhs was spent including spillover 2010-2011 under R&D component during 2011-2012. The major interventions include

- Strengthening of existing infrastructure,
- Procurement of machinery and equipment.
- Clonal forestry research and domestication of indigenous fast-growing species,
- Production of bio-fertilizers, bio-pesticides and teak tissue culture seedlings & quality planting stock
- Improvement of nursery technology,
- Conservation of Eastern Ghats flora
- Special research topics, collaborative research, maintenance of research plots, data capture, honorarium to assistants, technicians, etc.,
- Standardization of Natural Forest Management models.

Division wise targets and achievements under R&D for the year 2011-2012 is shown in Table 2.2.5.

**Table 2.2.5: Division wise abstract of physical works (nos.) and expenditure (lakhs) under R&D, 2011-2012.**

Name of the Circle	Name of the Division	Sanctioned Cost		Expenditure	
		Physical (nos)	Financial (lakhs)	Physical (nos)	Financial (lakhs)
R&D	SS Hyd	202	103.13	202	96.15
	FG WGL	212	101.18	212	100.26
<b>Grand total</b>		<b>414</b>	<b>204.41</b>	<b>414</b>	<b>196.41</b>

**2.2.6 Capacity Building (CB):** The Forest Academy, Dullapally is the premier institute selected by the Government of India for imparting training to range officer trainees of the country. It also trains the in-service FBOs and FSOs to discharge their duties effectively. An amount of 508.73 lakhs is provided under the component for the following activities:

- New infrastructure hostel building, quarters.
- Specialized training and workshops on Research and development activities and Bio-diversity conservation & FRO Induction
- Conducting specialized training on GIS, jeep driving and weapons.
- Organizing workshops/trainings and study tours for frontline staff, other forest officers.
- Maintenance of existing infrastructure.,

Division wise targets and achievements under CB for the year 2011-2012 is shown in Table 2.2.6.

**Table 2.2.6: Division wise abstract of physical works (nos.) and expenditure (lakhs) under CB, 2011-2012.**

Name of the Circle	Name of the Division	Capacity Building			
		Sanctioned Cost		Expenditure	
		Physical (nos)	Financial (lakhs)	Physical (nos)	Financial (lakhs)
APFP Dullapally	Dullapally	133	952.57	133	508.73
<b>Grand total</b>		<b>133</b>	<b>952.57</b>	<b>133</b>	<b>508.73</b>

**2.2.7 Information Communication and Technology (IC&T):** TSFD is the pioneer in obtaining satellite data, analyzing and interpreting it and creating a database for monitoring and improving the forest cover. The information obtained from the satellite imageries are analyzed and areas prone to fire damages have been categorized as high risk and moderate zones. This base information has been utilized for laying and maintaining the fire lines in the forests. CAMPA MIS is also being developed to capture and monitor the implementation of the activities under CAMPA. An amount of 419.83751 lakhs has been spent in this component. Division wise targets and achievements are shown in Table 2.2.7. Major interventions under ICT component during 2011-2012 include:

- Assessment of trees outside forest
- Development of Web-enabled FMIS package including Website Development for GIS MIS integration
- Improvement of infrastructure.

**Table 2.2.7: Division wise abstract of physical works (nos.) and expenditure (₹ lakhs) under ICT, 2011-2012.**

Name of the circle	Name of the division	Sanctioned Cost		Expenditure	
		Physical (nos.)	Financial (lakh)	Physical (nos.)	Financial (lakh)
ICT Hyderabad	Adilabad	20	8.311	20	6.219
	Nirmal	10	7.093	10	4.12
	WL Jannaram	5	4.5525	5	4.3615
	Mancherial	5	7.243	5	5.197
	Bellampally	6	6.936	6	3.66
	Kazagnagar	9	5.571	9	2.908
	Hyderabad	129	1271.93	129	336.76134
	Mahabubnagar	10	2.25	10	3.728
	Nalgonda	5	2.745	5	1.14053
	Khammam	6	1.395	6	0.826
	Kothagudam	10	4.184	10	3.34418
	Paloncha	9	2.002	9	2.73501
	Bhadrachalam (N)	4	2.801	4	2.2232
	Bhadrachalam (S)	8	2.726	8	2.305
	WL Paloncha	3	1.83	3	1.6
	Nizamabad	7	4.819	7	4.644
	Kamareddy	6	3.9	6	4.49
	Medak	8	2.4	8	7.15261
	WL Medak	1	0.8	1	0.855
	Warangal (N)	12	6.405	12	4.32508
	Warangal (S)	8	5.49	8	3.35425
	WL Warangal	3	2.565	3	0.95
	Karimnagar (E)	11	6.975	11	5.764
Karimnagar (W)	10	5.49	10	4.86181	
Achampet	7	3.535	7	2.312	
<b>GRAND TOTAL</b>		<b>312</b>	<b>1373.9485</b>	<b>312</b>	<b>419.83751</b>

**2.2.8 Infrastructure Development and Maintenance (IDM):** CAMPA is being implemented in the state since 2009 and there is a need to monitor the implementation of the programme in the field level besides the regular supervision by the Forest Range Officers/ DFOs /Circle heads and Senior Officers from the Head Office. Considerable development, improvement and upgradation of infrastructure haven been undertaken by TSFD CAMPA during 2011-2012. An amount of 471.42757 lakhs has been spent. Division wise targets and achievements under IDM for the year 2011-2012 is shown in Table 2.10. Major IDM activities during 2011-2012 include:

- Maintenance of office building.
- Maintenance of residential quarters.

- Maintenance of Rest House for monitoring forestry works.
- Forest Department IT center and Website maintenance at Head Office.

**Table 2.2.8: Division wise abstract of physical works (nos.) and expenditure (lakhs) under IDM, 2011-2012.**

Name of the circle	Name of the division	Sanctioned Cost		Expenditure	
		Physical (nos.)	Financial ( ` lakh)	Physical (nos.)	Financial ( ` lakh)
Adilabad	Adilabad	15	5	15	1
	Nirmal	9	2	9	0.98
	WL Jannaram	7	4.7	7	4.5
	Mancherial	9	5	9	2.68
	Bellampally	12	2.5	12	2.5
	Kazagnagar	5	6.23	5	5.226
	<b>Circle total</b>	<b>57</b>	<b>25.43</b>	<b>57</b>	<b>16.886</b>
Hyderabad	Hyderabad	165	437.5	165	372.158
	Mahabubnagar	0	0	21	5.45
	Nalgonda	16	10.944	16	5.467
	FSP Hyderabad	1	0.5	0	0
	<b>Circle total</b>	<b>182</b>	<b>448.944</b>	<b>202</b>	<b>383.075</b>
Khammam	Khammam	8	1.798	8	16.918
	Kothagudam	0	1	0	0
	Paloncha	21	2.637	21	2.63669
	Bhadrachalam (N)	20	5.7	20	5.7
	Bhadrachalam (S)	24	7	24	5.971
	WL Paloncha	4	3.765	4	2
	<b>Circle total</b>	<b>77</b>	<b>21.9</b>	<b>77</b>	<b>33.22569</b>
Nizamabad	Nizamabad	19	2.49	19	2.49
	Kamareddy	0	0	17	1
	Medak	30	15.942	30	14.334
	WL Medak	0	0	5	1.745
	<b>Circle total</b>	<b>49</b>	<b>18.432</b>	<b>71</b>	<b>19.569</b>
Warangal	Warangal (N)	14	2.5	14	2.49774
	Warangal (S)	12	4.546	12	1.75
	WL Warangal	9	3.206	9	1.30364
	Karimnagar (W)	22	3.071	22	3.8205
	<b>Circle total</b>	<b>57</b>	<b>13.323</b>	<b>57</b>	<b>9.37188</b>
FDPT	Achampet	22	9.3	22	9.3
	<b>Circle total</b>	<b>22</b>	<b>9.3</b>	<b>22</b>	<b>9.3</b>
<b>GRAND TOTAL</b>		<b>444</b>	<b>537.329</b>	<b>486</b>	<b>471.42757</b>

**2.2.9 Ecotourism (ET):** Eco-tourism have been encouraged in the protected areas under Community Based Eco-Tourism (CBET) model duly following the National Eco-tourism Policy and guidelines. An amount of 6.139 lakhs have been spent in two works namely purchase of rowing boats in Manjeera and Maintenance of crocodile breeding center under WLM Medak division during the year 2011-2012.

**2.2.10 Office Support (OS):** Office support activities were undertaken for effective and proper maintenance of offices and implementation of various schemes. Contractual technical and other staff for office support, POL Charges, AMC charges, Electricity and water charges, Telephone and cell phone charges, Office stationery and other miscellaneous expense, CA audit fee are included under OC by Telangana state. An amount of 177.830 lakhs has been spent under this component. Division wise targets and achievements under O&S for the year 2011-2012 is shown in Table 2.2.9.

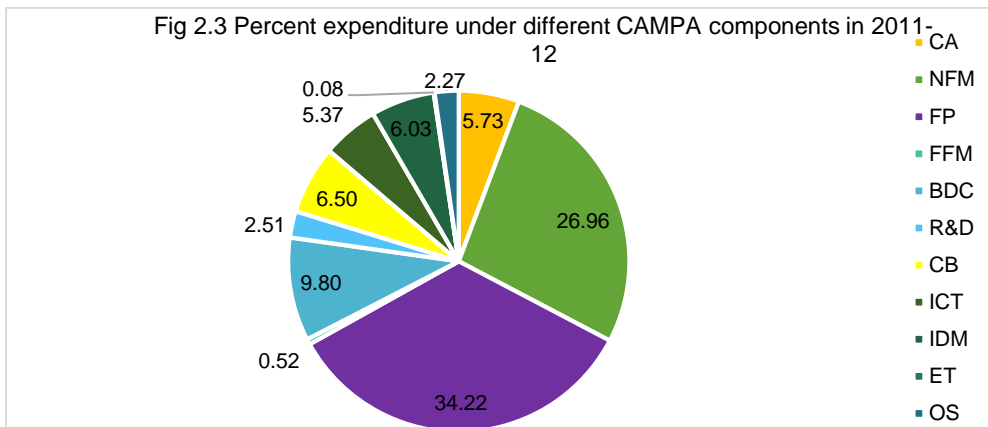
**Table 2.2.9: Division wise abstract of physical works (nos.) and expenditure (lakhs) under OS, 2011-2012.**

Name of the circle	Name of the division	Sanctioned Cost		Expenditure	
		Physical (nos.)	Financial (lakh)	Physical (nos.)	Financial (lakh)
Adilabad	Adilabad	1	6.5	1	6.89988
	Nirmal	1	4	1	4.23151
	WL Jannaram	1	3	1	2.90654
	Mancherial	1	3.5	1	3.47072
	Bellampally	1	3	1	2.82551
	Kazagnagar	1	2.5	1	2.57302
	<b>Circle total</b>	<b>6</b>	<b>22.5</b>	<b>6</b>	<b>22.90718</b>
Hyderabad	Hyderabad	2	1.275	0	0
	Mahabubnagar	1	0.55	11	0.98087
	Nalgonda	1	0.9	11	0.84257
	FSP Hyderabad	1	0.025	19	0.13788
	<b>Circle total</b>	<b>5</b>	<b>2.75</b>	<b>41</b>	<b>1.96132</b>
Khammam	Khammam	8	5.15	8	4.613
	Kothagudam	7	4.655	7	4.655
	Paloncha	4	3.77	4	3.63733
	Bhadrachalam (N)	2	3.77	2	3.6523
	Bhadrachalam (S)	3	3.77	3	3.77081
	WL Paloncha	1	2.385	1	0.03125
	<b>Circle total</b>	<b>25</b>	<b>23.5</b>	<b>25</b>	<b>20.35969</b>
Nizamabad	Nizamabad	8	7.345	8	7.01995
	Kamareddy	5	4.738	5	4.83938
	Medak	8	9.377	8	7.09778
	WL Medak	1	1	1	0.40601
	<b>Circle total</b>	<b>22</b>	<b>22.46</b>	<b>22</b>	<b>19.36312</b>
Warangal	Warangal (N)	5	12.645	5	12.3407
	Warangal (S)	1	1.501	1	1.51312
	WL Warangal	1	1.718	1	1.59506
	Karimnagar (E)	3	2.475	3	2.23771
	Karimnagar (W)	3	5.032	3	4.22067
	FSP Warangal	1	0.125	1	0.12528
	<b>Circle total</b>	<b>14</b>	<b>23.496</b>	<b>14</b>	<b>22.03254</b>
FDPT	Achampet	2	0.195	2	0.19884
	<b>Circle total</b>	<b>2</b>	<b>0.195</b>	<b>2</b>	<b>0.19884</b>
WLM Hyd	CNP	1	2	1	1.94877
	D.F.O	2	7	2	6.545
	<b>Circle total</b>	<b>3</b>	<b>9</b>	<b>3</b>	<b>8.49377</b>
Zoo Park	Zoo Park	1	0	1	0.0023
	<b>Circle total</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0.0023</b>
AO IV	AO IV	40	98.05	-	82.51138
	<b>Circle total</b>	<b>50</b>	<b>98.05</b>	<b>-</b>	<b>82.51138</b>
<b>GRAND TOTAL</b>		<b>128</b>	<b>201.951</b>	<b>118</b>	<b>177.830</b>

### 2.3 Targets and Achievements of CAMPA components during 2011-2012:

The Government of India, Ministry of Environment and Forests communicated guidelines that prescribe the preparation of an annual plan of operations for utilizing funds received towards Compensatory Afforestation, Net Present Value etc., currently available with the Ad-hoc CAMPA. Accordingly, keeping in view the GOI guidelines, an Annual Plan of Operation (APO) for utilization of amounts realized under Compensatory Afforestation (CA) and Net Present Value (NPV) have been prepared by the TSFD for the year 2011-12 under A.P. State CAMPA, as Telangana state was a part of AP state in 2011-2012. Component wise detail target and achievements are shown in table 2.3. Percent expenditure of funds under different components are shown in Figure 2.3.





The target through APO was prepared to keep in view the following broad objectives:

- Compensatory Afforestation in lieu of diverted forest areas,
- Conservation, protection, regeneration, and management of existing natural forests,
- Biodiversity Conservation and management of Protected forest areas and wildlife habitats,
- Research, training and capacity building.

**Table 2.3: Summary\* of targets and achievements of TSFD, CAMPA components during 2011-2012.**

CAMPA Components	Targets		Achievements	
	Physical (Nos)	Financial (₹ lakhs)	Physical (Nos)	Financial (₹ lakhs)
Compensatory Afforestation (CA)	0	421.549	274	448.55204
Natural Forest Management (NFM)	1041	2034.064	1041	2109.329
Forest Protection (FP)	1188	3449.886	1188	2677.119
Forest Fire Management (FFM)	140	43.685	140	40.458
Biodiversity Conservation and Development (BDC)	706	1145.307	669	779.13668
Research & Development (R&D)	414	204.41	414	196.41
Capacity Building (CB)	133	952.57	133	508.73
Information & Communication Technology (ICT)	312	1373.9485	312	419.83751
Infrastructure Development and Maintenance (IDM)	444	540.329	486	471.42757
Ecotourism	0	0	2	6.614
Office Support (OS)	128	203.451	118	177.830
<b>TOTAL</b>	<b>4506</b>	<b>10369.2</b>	<b>4777</b>	<b>7822.85512</b>

\* The above table is excluding the social security fund of 100 lakhs.

**2.4 Implementing mechanism:** The TSFD was the implementing agency. The works were executed through the departmental personnel. In activities like nursery raising, raising of plantations, maintenance of plantations, SMC works, creation and maintenance of fire lines and other activities with wage component, the programme was implemented following the guidelines of NREGA scheme by employing the rural unemployed people with job cards, maintenance of muster rolls and payment of wages into the bank account of job card holders.<sup>7</sup>

<sup>7</sup>AP State CAMPA, APO for the year 2011-2012, pp 9.

## Chapter 3

### EVALUATION SCOPE AND OBJECTIVES

As Telangana State Forest Department (TSFD) is implementing CAMPA activities in the state of Telangana since 2009-2010, there is a felt need to technically evaluate these ongoing efforts, and based on the learnings, plan the way forward. Also, the State CAMPA guidelines stipulate that an evaluation methodology of the works implemented has to be evolved and implemented to ensure effective and proper utilization of the fund for which funds are also earmarked. In this regard, IORA Ecological Solutions Pvt. Ltd. is engaged as the 'Third party' to evaluate and monitor CAMPA works implemented in the State of Telangana yearly for the period 2009-10 to 2015-16. Evaluation of activities under all the CAMPA components was conducted. Two-stage random sampling strategy has been adopted.<sup>8</sup> Of all the activities, firstly 10% of works for each year were randomly sampled. For plantations activities, the basis for selecting 10% of the samples is adhering the National Evaluation Manual for CAMPA Projects when the survival percentage for different plantation sites is not available. Secondly, from the selected plantation sites, randomly a plot of 0.1 ha was laid for field enumeration adhering NWPC-2014<sup>9</sup> guidelines. For other activities, works carried out were randomly sampled and 10% of the activities were selected every year. Records maintained for the activities was checked and in the case where civil or other physical works were carried out, the inspection was conducted during the evaluation process to check from variation as reported in the records and that exists on the field. It was ensured that the random sample covers maximum forest divisions of the state.

#### 3.1 Evaluation scope

IORA Ecological Solutions Pvt. Ltd. has been assigned to conduct 3<sup>rd</sup> party evaluation of CAMPA works implemented in the State of Telangana.

#### 3.2 Objectives of the study

1. To physically monitor and document the status of plantations of the selected sample from the plantation carried out under the CAMPA Scheme in Telangana State Forest department for the year 2011-2012.
2. To evaluate the survival and health of plantations carried out under the CAMPA Scheme in Telangana State Forest department for the year 2011-2012 with photographic evidence.
3. To evaluate the other activities carried out by Telangana State Forest Department for the year 2011-2012 with photographic evidence.

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<sup>8</sup>National Evaluation Manual for CAMPA Projects (2016) CEAMT, IIFM Bhopal, 25 pages

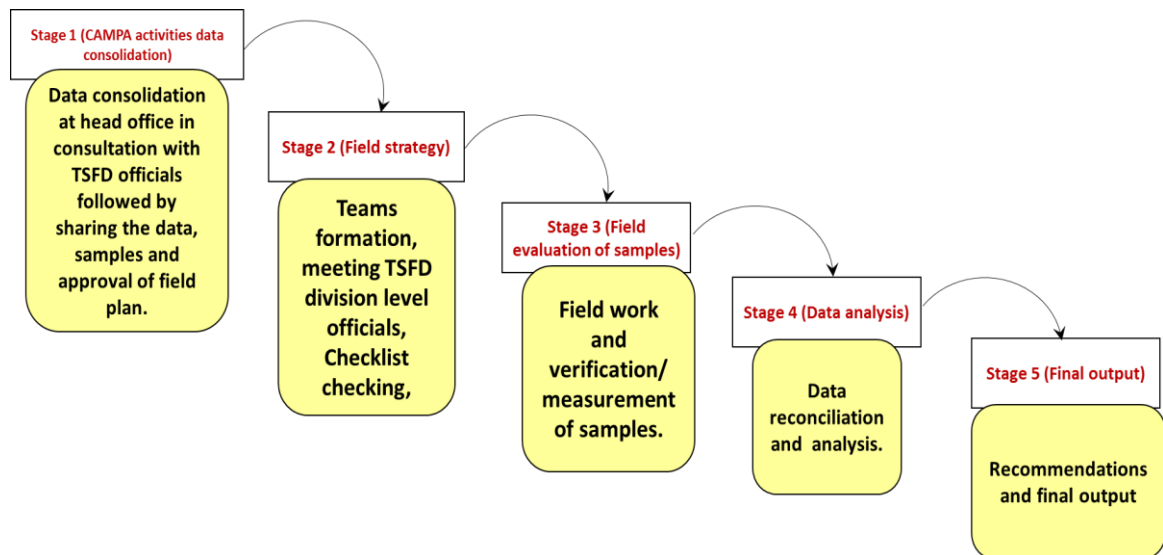
<sup>9</sup>National Working Plan Code – For Sustainable Management of Forests & Biodiversity in India (2014), MoEFCC, 91p.

# Chapter 4

## EVALUATION APPROACH AND METHODS

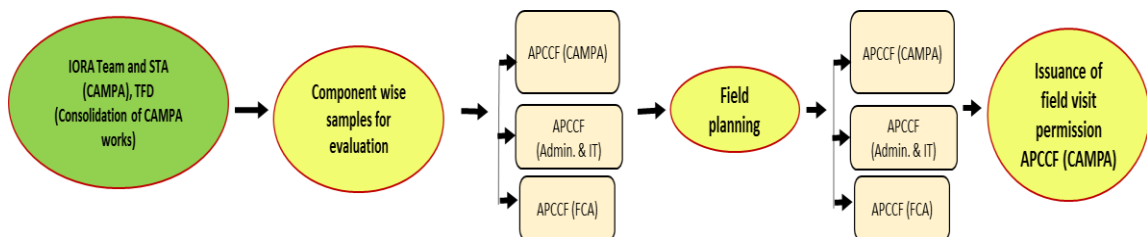
### 4.1 Evaluation Methodology

The process flow that was adopted during the third party CAMPA evaluation exercise is shown through a flowchart in Fig 4.1. The evaluation methodology was conducted in five stages. Each of these stages is elaborated in this chapter under five sub-sections.



**Fig 4.1: Process flow of third party CAMPA evaluation.**

**4.1.1 Stage 1 - CAMPA activities data consolidation:** The first stage i.e. CAMPA Activities Data Consolidation (see Fig 4.1.1) consisted of four major activities namely data collection, sampling, field planning and issuance of field visit permission from APCCF (CAMPA).



**Fig 4.1.1: Flow chart of Stage 1 - CAMPA activities data consolidation.**

TSFD officials were contacted at the TSFD, Head Office, Hyderabad to collect the total list of works under different CAMPA components undertaken by TSFD CAMPA for the year 2011-2012. The list of data sources reviewed for consolidation of CAMPA list of works for 2011-2012 is shown in List 4.1.1.

**List 4.1.1: List of data sources for third-party CAMPA evaluation.**

- (A) TSFD Data sources (files, excels) reviewed with support from STA CAMPA
- 1) TSFD circles, divisions together with AP order
  - 2) TSFD circles, divisions before bifurcation list
  - 3) TSFD circles, divisions after reconciliation list
  - 4) CAMPA Annual Plan report 2011-2012
  - 5) List of works 2011-2012 excel
- (B) Information on GIS with support from DCF (FCA) and RFO (Geomatics)
- 1) List of divisions
  - 2) List of ranges

**4.1.1.1 Component wise samples for evaluation:** The consolidated list of CAMPA works under different CAMPA components undertaken by TSFD, CAMPA for the year 2011-2012 was collected. A total of 4777 works (*Part B*) were undertaken in the state of Telangana under CAMPA during 2011-2012. The total list of CAMPA works was sorted into two categories i.e. Plantation Activities and Other Activities. The list of samples prepared was presented to the CAMPA Monitoring Committee (CMC) consisting of the APCCF (CAMPA), APCCF (Admin & IT) and APCCF (FCA) through an inception workshop. Suggestions received from the CMC during the inception workshop was incorporated and the final inception report submitted to TSFD for approval. Detail sampling design adopted is described under the following two sub-sections.

**4.1.1.1.1 Sampling of plantation activities:** For direct field evaluation of plantation, the two-stage random sampling strategy was applied.

The list of plantation activities namely advance works, raising of forest plantations, maintenance of plantations and raising of planting stocks undertaken under CA and NPV was sorted for the year 2011-2012. The sorted list was then ably formatted using MS Excel software and the file was converted to a comma separated values (CSV) to plot them into the geo-spatial domain. The CSV values were plotted geo-spatially in ArcGIS Version 10.3 software and segregated into plantations undertaken under CA and NFM. Sampling design tool, an add-on of ArcGIS 10.3 software was run to generate random samples keeping sampling intensity of 10%.

Of all the total plantation taken up by TSFD, firstly 10% of plantations were randomly sampled. The basis for selecting 10% of the sample is adhering the National Evaluation Manual for CAMPA Projects when the survival percentage for different plantation sites is not available<sup>10</sup>.

Secondly, an iterative method was used to get the appropriate distribution of samples in the divisions. Telangana forest division boundary was taken as a sample frame to decide the extent of samples. From the selected plantation sites, a random point was generated to lay plot for direct

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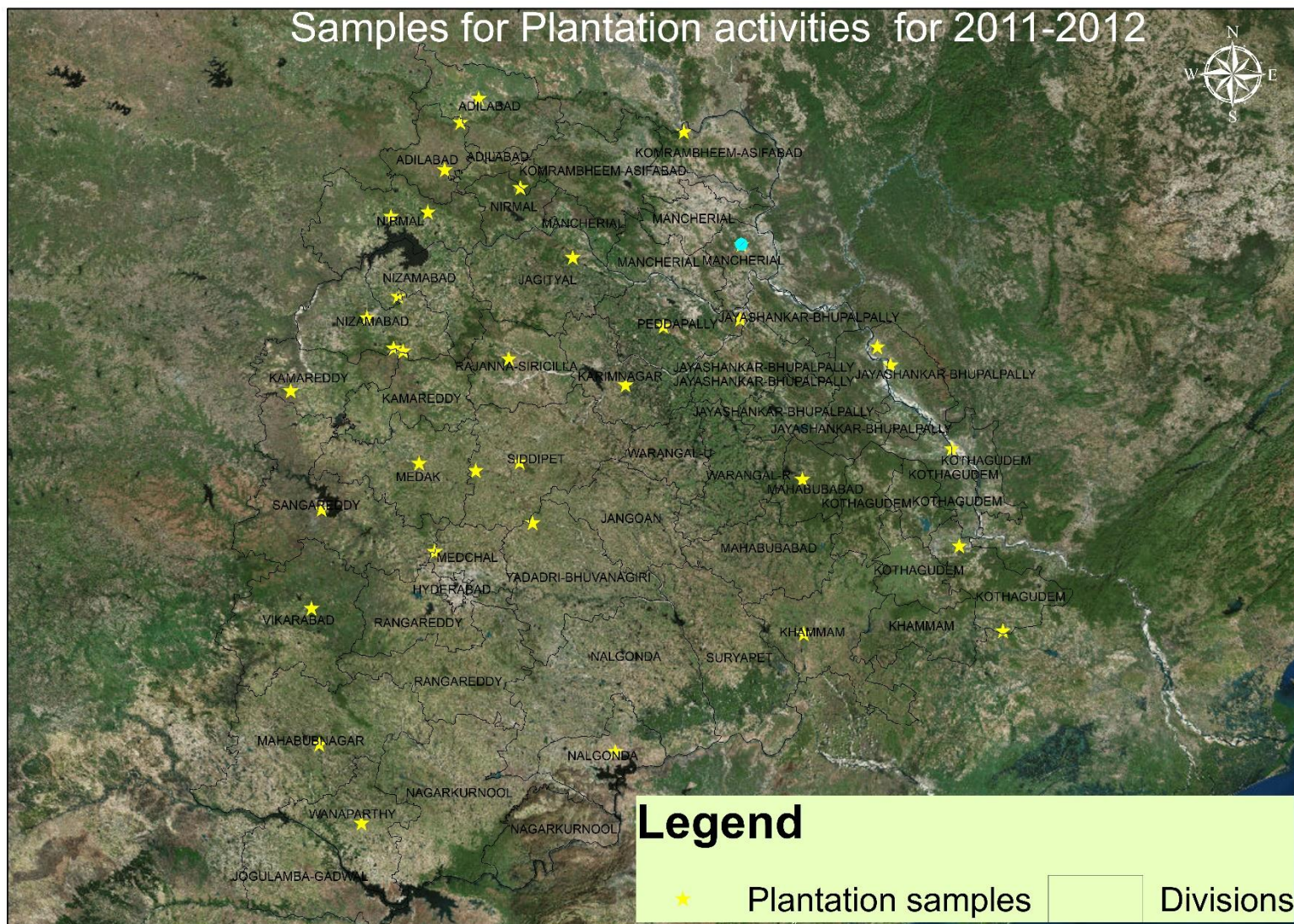
<sup>10</sup>National Evaluation Manual for CAMPA Projects (2016) CEAMT, IIFM Bhopal, 25 pages

field enumeration adhering NWPC-2014 guidelines. The detail sample list (92 nos) of plantation activities is given in Annexure IV. Division wise number of plantation samples for evaluation under CA and NPV is shown in table 4.1.1a and Map 4.1.1.

**Table 4.1.1a: Division wise number of plantation samples for different CAMPA components (2011-2012) for 3<sup>rd</sup> party evaluation.**

Forest Divisions	Advance Operation		Raising		Maintenance		Total
	CA	NFM	CA	NFM	CA	NFM	
Achampet	-	-	-	-	1	1	2
Adilabad	-	1	-	1	1	1	4
Armoor	-	2	-	-	-	-	2
Banswada	-	3	-	1	-	-	4
Bhadrachalam	-	1	-	-	-	1	2
Echoda	-	2	-	-	-	-	2
FG Warangal	-	2	-	1	-	-	3
Jagitial	-	2	-	2	-	1	5
Jannaram	-	-	-	1	-	-	1
Kaghaznagar	1	1	-	-	-	-	2
Kothagudem	-	-	-	1	-	-	1
Kamareddy	-	1	1	-	-	-	2
Khammam	-	3	-	-	-	-	3
Khanapur	-	2	-	-	-	-	2
Mahabubnagar	-	1	-	-	-	-	1
Mahbubabad	-	1	-	1	-	-	2
Medak	-	1	-	2	-	1	4
Nagarujan Sagar WLM	-	1	-	-	-	-	1
Nalgonda	1	-	-	2	1	1	5
Nirmal	-	3	-	2	-	-	5
Nizamabad	-	2	-	-	-	-	2
Paloncha	-	1	-	-	-	-	1
Peddapally	-	2	-	3	1	1	7
Sangareddy	-	3	-	-	-	-	3
Sathupally	-	1	1	1	-	-	3
Siddipet	-	1	-	1	-	-	2
Sircilla	-	2	-	2	-	-	4
SS Hyderabad	-	2	-	3	-	2	7
Utnoor	-	-	-	3	-	-	3
Vikarabad	-	-	-	-	1	-	2
Wanaparthy	-	-	-	1	-	-	1
Yadadri	-	-	-	1	-	1	2
Yellandu	-	-	1	1	-	-	2
<b>TOTAL</b>	<b>2</b>	<b>41</b>	<b>4</b>	<b>30</b>	<b>5</b>	<b>10</b>	<b>92</b>

**Map 4.1.1a: Map showing plantation activities samples evaluated for 3<sup>rd</sup> party evaluation.**

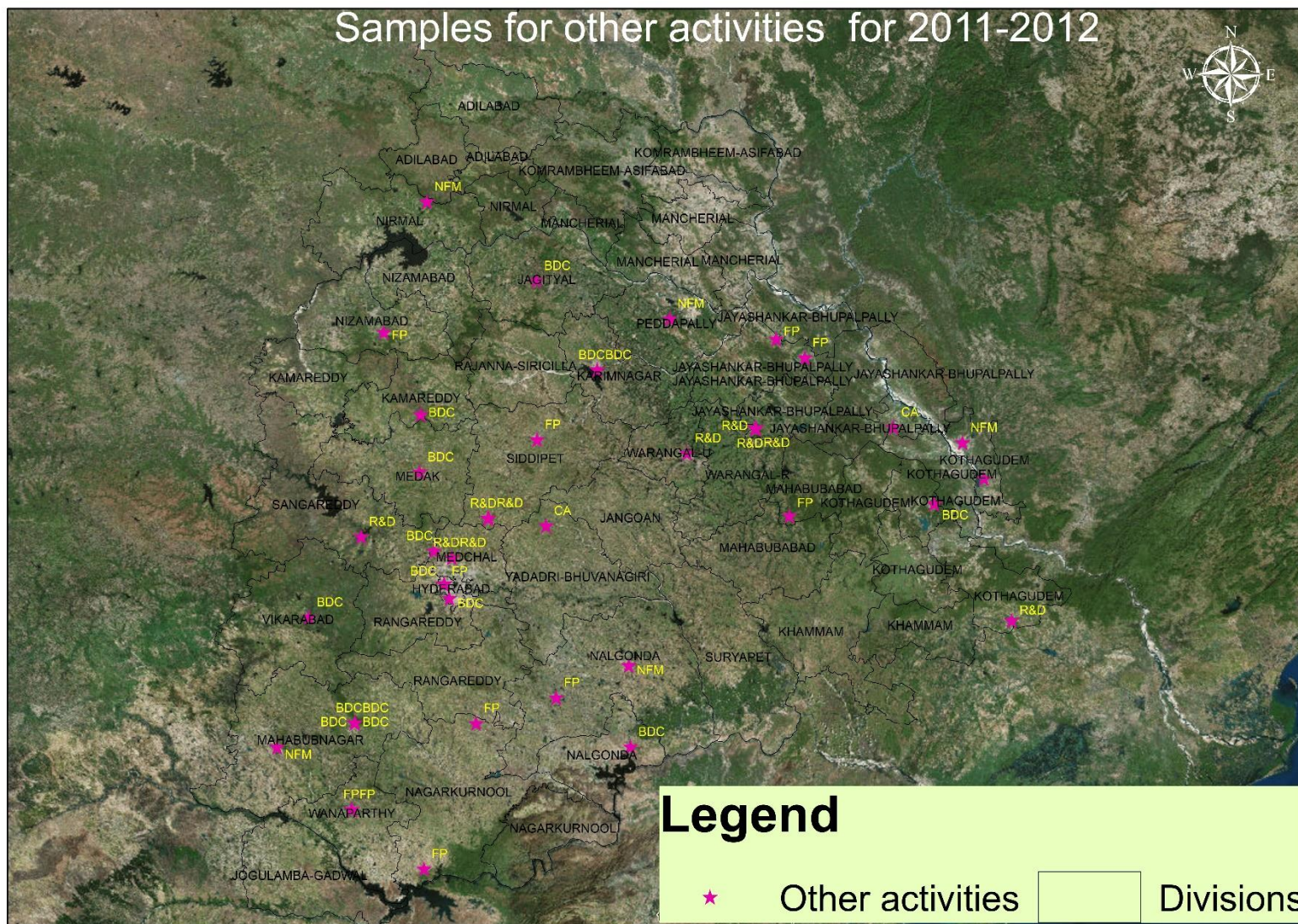


**4.1.1.1.2 Sampling of other activities:** For sampling other activities, the consolidated list of works of all the other activities undertaken by TSFD CAMPA during the year 2011-2012 was sorted. The sorted list was segregated into different CAMPA components. Sampling design tool, an add-on of ArcGIS 10.3 software was run to generate random samples keeping sampling intensity of 10%. An iterative method was used to get the appropriate distribution of samples in the divisions. The detail sample list (365 nos) of other activities is given in Annexure V. Division wise number of samples of other activities under different CAMPA components namely, CA, NFM, FP, FFM, IDM, ICT, BDC, M&E, R&D, and OC is shown in table 4.1.1b and map 4.1.1.b.

**Table 4.1.1b: Division wise number of samples for 3<sup>rd</sup> party evaluation of other activities under different CAMPA components for the year 2011-2012.**

Division	CA	NFM	FP	FFM	BDC	ICT	R&D	CB	IDM	ET	OS	Total
Achampet	1	2	7	-	2	2	-	-	1	-	1	16
Adilabad	3	1	7	1	-	2	-	-	4	-	1	19
Amrabad	-	-	8	2	11	2	-	-	4	-	-	27
Armoor	1	-	-	-	-	-	-	-	-	-	-	1
Asifabad	-	-	-	1	-	1	-	-	-	-	-	2
Banswada	-	-	1	-	-	-	-	-	-	-	-	1
Bellampally	-	-	-	1	1	-	-	-	-	-	-	2
Bhadrachalam	-	1	6	-	-	1	-	-	3	-	-	11
Bhupalpally	-	1	6	-	-	2	-	-	2	-	-	11
Echoda	-	1	7	-	-	1	-	-	-	-	1	10
FG Warangal	-	-	-	-	-	-	-	-	-	-	-	0
Hyderabad	-	-	-	-	-	-	-	-	-	-	-	0
ICT Hyderabad	-	-	-	-	-	-	-	-	-	-	-	0
Jagtial	-	-	-	-	-	1	-	-	1	-	-	2
Jannaram	5	-	2	1	2	1	-	-	1	-	1	13
Kaghnagar	-	2	-	-	-	-	-	-	-	-	-	2
Kamareddy	-	-	14	-	4	2	-	-	6	-	-	26
Karimnagar	-	2	4	-	2	1	-	-	1	-	1	11
Karimnagar West	1	-	1	-	2	-	-	-	-	-	-	4
KBR National park	-	-	-	-	-	-	-	-	-	-	-	0
Khammam	-	1	7	-	-	-	-	-	-	-	-	8
Khanapur	-	-	-	2	-	-	-	-	-	-	-	2
Kinnarsani WLM	-	-	4	-	6	-	-	-	1	-	-	11
Kothaggudem	-	1	3	-	-	-	-	-	-	-	-	4
Mahabubnagar	-	-	5	-	12	-	-	-	1	-	-	18
Mahbubabad	-	-	2	-	-	2	-	-	-	-	-	4
Mancherla	-	5	3	3	-	2	-	-	1	-	1	15
Manuguru	-	-	-	-	-	-	-	-	1	-	-	1
Medchal	-	-	1	-	-	-	-	-	-	-	-	1
Nagarjunasagar	1	-	-	-	1	1	-	-	2	-	1	6
Nalgonda	-	1	3	-	-	-	-	-	4	-	1	9
Nirmal	-	-	-	-	1	2	-	-	-	-	1	4
Nizamabad	-	-	5	-	-	-	-	-	-	-	-	5
NZP, Hyderabad	-	-	-	-	22	-	-	-	-	-	1	23
Paloncha	2	1	-	-	-	-	-	-	-	-	-	3
Peddapally	1	-	2	-	-	2	-	-	-	-	-	5
Shamshabad	-	-	1	-	-	-	-	-	-	-	-	1
Sangareddy	-	-	1	-	-	-	-	-	1	-	-	2
Sathupally	-	-	4	-	-	-	-	-	1	-	-	5
Siddipet	1	1	1	1	-	1	-	-	2	-	-	7
Sircilla	-	-	-	-	1	1	-	-	-	-	1	3
SS Hyderabad	-	-	-	-	-	-	12	-	-	-	-	12
TSFA, Dullapally	-	-	-	-	-	-	-	13	6	-	-	19
Utnoor	-	1	5	-	-	2	-	-	-	-	-	8
Venkatapuram	-	1	1	-	-	-	-	-	-	-	-	2
Wanaparthy	-	1	1	1	-	-	-	-	1	-	-	4
Vikarabad	-	-	2	-	-	-	-	-	-	-	-	2
Warangal FG	-	-	-	-	-	-	29	-	-	-	-	29
Warangal (R)	-	-	1	-	-	-	-	-	-	-	-	1
WLM Medak	-	-	-	-	-	-	-	-	-	1	-	1
Yadadri Bhuvangiri	-	-	3	1	-	2	-	-	4	-	1	11
Yellandu	1	1	1	-	-	1	-	-	1	-	-	5
<b>Grand Total</b>	<b>17</b>	<b>24</b>	<b>119</b>	<b>14</b>	<b>67</b>	<b>32</b>	<b>41</b>	<b>13</b>	<b>49</b>	<b>1</b>	<b>12</b>	<b>389</b>

**Map 4.1.1b: Map showing plantation activities samples evaluated for 3<sup>rd</sup> party evaluation.**

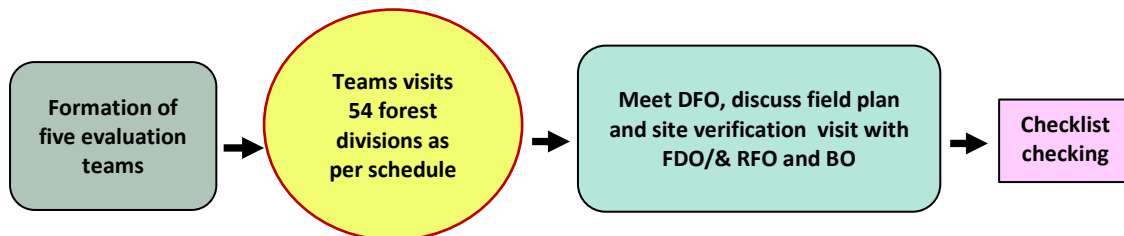




**4.1.1.3 Field plan:** Proposed field visit dates was prepared in consultation with DFO, Hyderabad and shared with CMC for comments. Suggestions received were incorporated and the draft field plan was submitted to APCCF (CAMPA) for its approval. The division-wise details of field visits are given in Annexure I.

**4.1.1.4 Issuance of field permission:** Proposed field visit dates, records and other information to be furnished were circulated from the O/o PCCF & HoFF, TSFD to all DFO/FDO of the territorial and wildlife forest divisions of Telangana state (*Annexure II*). Field staff of the forest divisions to be visited were requested to be present during evaluation along with Measurement Book, Plantation Journal, CAMPA works register, and other information to facilitate smooth completion of the evaluation. As per the Rc.No.3037/2017/CAMPA dated 30.05.2017 issued by PCCF, TSFD the DFOs/FDOs (*Annexure III*) shall ensure concern field staff should be present and show the plantation site or other works taken up for CAMPA. The plantation journal, measurement books, estimate, list of works in Division/Range should be made available to the evaluation team.

**4.1.2 Stage 2 - Field Strategy:** In the second stage (*see Fig 4.1.2 for the flow chart*) of third-party field evaluation field strategy was developed. This stage started with the formation of evaluation teams, team visits to fifty-four forest divisions team visits.



**Fig 4.1.2: Flow chart of Stage 2 - Field strategy.**

This stage started with the formation of five evaluation teams, each team comprising of Field lead, field associate, and back support analyst. Names and qualifications of the team members are shown in Annexure III.

As per the field visit schedule, each team met DFO and discussed field plan with DFO, FDO, and RFO. The following checklist was checked: a) CAMPA Works Register, b) Confirmation of Samples, c) Plantation Sites, d) Measurement Books, e) Plantation Journals and f) Vouchers, were requested from the forest division/range visited for conducting site verification. Visit to the site was with FDO/& RFO and BO.

**4.1.3 Stage 3 - Field evaluation of samples:** Field evaluation of samples was conducted by first checking CAMPA works register in the division to reconfirm plantation activities samples drawn under CA and NPV and after confirmation based on the geo coordinate the evaluation team visited the sites with the TSFD division level officials and data was collected adhering the forms (*Appendix I*).

#### 4.1.3.1 Meeting TSFD officials

- 1) Met DFO followed by a meeting with FDO, RFO and FBOs in each division/ranges visited.
- 2) Collected list of works carried out under TSFD, CAMPA.
- 3) Matched each sample with the CAMPA works register list.
- 4) After confirmation ensured a forest department officials presence in each of the samples locations.
- 5) Physical verification and geotagging. This is elaborated under sub-section 4.2.

**4.1.3.2 Build capacity:** During field evaluation efforts was laid also to build the capacity of the front line TSFD officials present during evaluation on how to lay sample plots and use, hands-on different forest inventory instruments like GPS, compass, densitometer, Hypsometer.

**4.1.4 Stage 4 - Data analysis:** This stage consisted of activities (see Fig 4.1.4) pertaining to data digitization, data reconciliation, and data analysis data analysis.



Fig 4.1.4: Flow chart of Stage 4 – Data Analysis.

**4.1.4.1 Data digitization:** The primary activities conducted for digitizing the data are as follows:

- a) Allocation of a place at Aranya Bhavan.
- b) Data of plantation activities and other activities were digitized through MS Excel.
- c) Data consolidated at the division level.

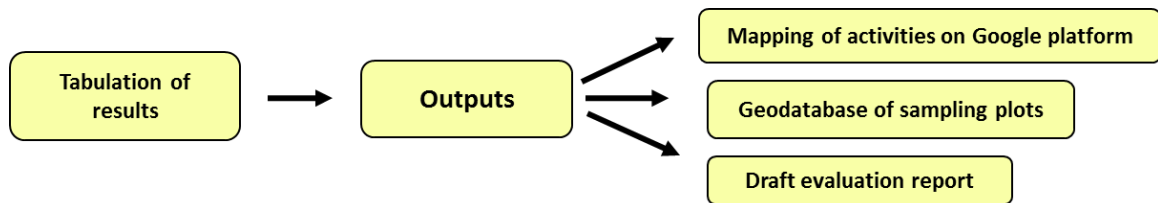
#### 4.1.4.2 Data reconciliation

- a) Reconciliation of the field data with the spending records.
- b) Verified works with audited reports and FA 9 for each CAMPA activities at Aranya Bhavan with support from STA CAMPA. The verified CAMPA works list as per the audited reports was used.
- c) Collation of Field data collated.

**4.1.4.3 Data analysis:** Data analysis as per the methodologies approved in the inception workshop using MS Excel. For the purpose of reporting, the survival percent was weighted by net

area planted in the same model. The percentage was reported separately for plantation type, plantation method, protection status of the plantation and different species.

**4.1.5 Stage 5 - Final output:** The final stage of evaluation constituted tabulation of results and production of outputs (see fig 4.1.5).



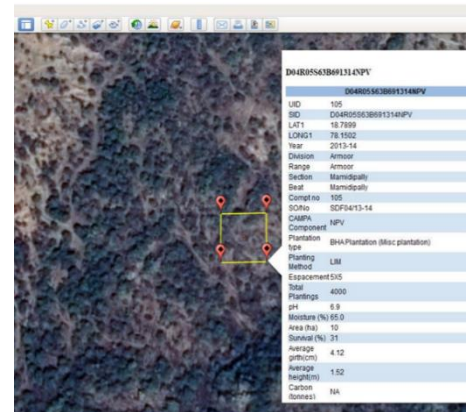
**Fig 4.1.5: Flow chart of Stage 5 – Final output.**

**4.1.5.1 Tabulation of results**

- a) Analyzed results were tabulated separately for divisions, species, plantation types, activities.
- b) Matched field data collected and data digitized.
- c) Field data digitization and consolidated at the division level for 2011-2012.

**4.1.5.2 Outputs**

a) Geodatabase created of all sampled plantation plots (file *CAMPA\_2011\_2012\_field\_plantation\_samples.kmz*)



b) All activities mapped using Arc GIS and exported to Google earth platform (file *CAMPA other activities samples\_2011-2012.kmz*)



c) Development of draft evaluation report.

## 4.2 Field evaluation and data collection

### (A) Plantation activities:

- 1) Based on the measurement books (MB), where all the works executed and amounts paid written by officer executing the work, check measured by R.O. and test checked by DFO/Sub DFO or any other higher authority are maintained, physical verification of MB, collection of GPS coordinates from registers and other records available in the concerned forest offices followed by field visit to the project area for its field verification. For evaluation plantation (raising) samples, sample plots were laid. Evaluation of other plantation activities namely, advance operations including nursery works of planting stocks; maintenance (1<sup>st</sup> year, 2<sup>nd</sup> year and 3<sup>rd</sup> year) was based on scrutinization of information available on measurement books/plantation journals/expenditure vouchers since these type of plantation activities had completed at least a year before the evaluation team visited the field.

- 2) For laying sample plot, Garmin GPS used to navigate to reach the randomly generated sample geocoordinate. A square plot of 0.1 ha<sup>11</sup> (Fig 4.1.3.2) was laid out by measuring 22.5 m horizontal distance i.e., half of the diagonal in all the four directions at 45<sup>o</sup> in north-east, at 135<sup>o</sup> in the south-east, at 225<sup>o</sup> in the south-west, and at 315<sup>o</sup> in north-west corners of the plot from true north. The dimensions of the plot, i.e. one side measured 31.62 m horizontal distance. Latitude and longitude of all the sample plots of plantations are shown in Annexure VII.

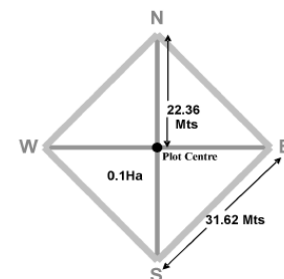


Fig 4.1.3.2: Sample plot layout.

- 3) After laying the sample plot, plots, the parameters evaluated is shown in table 4.1.3.2.a.

**Table 4.1.3.2b: List of evaluation parameters for plantations.**

Evaluation Parameters	Field Recordings to be made
Survival percentage	Plants surviving in the sample plot counted and recorded.
Growth of trees	Diameter and height of each tree inside the plots were recorded.
Habitat Improvement	Presence of wildlife, good growth of grasses, soil erosion, water sources if any observed recorded. Plantation watchman, officials, VSS members, if present were interviewed to record their qualitative perception of CAMPA plantations on habitat improvement.
Canopy density	Canopy density recorded using a densiometer. Number of plants wounded, stressed, wilt, diseased recorded.
Soil salinity and moisture status	Soil salinity and soil moisture estimated using a portable soil pH and soil moisture meter.
Carbon content of plantations	The carbon content of the plantations estimated based on allometric equations as given by Forest Survey of India. <sup>12</sup>

<sup>11</sup>National Working Plan Code — For Sustainable Management of Forests & Biodiversity in India (2014), MoEFCC, 91p.

<sup>12</sup>FSI (2015) Carbon Stocks in India's Forest, 164p

- 4) For assessing mortality, every tree growing inside the plot were counted. Diameter for every tree growing inside the plot was measured 50 cm above the ground level for up to 3 years old plantation and 100 cm above ground level for up to 5 years plantations as mentioned in NEM CAMPA, 2016<sup>13</sup> using a tape.
- 5) For calculating the carbon content trees with girth above 30cm was taken to apply the allometric equations as developed by FSI<sup>10</sup> for calculating tree carbon. Accordingly, the carbon content per tree was calculated.
- 6) Data observed were recorded in Form B (Appendix I). Evaluated samples detail of plantation activities is shown in Annexure V.

**(B) Other activities:**

- 7) For evaluation of other activities, from a total of the activities under each component, 10% of activity were randomly selected. Activities that were physically visible like RCC pillars, beat office, quarters, etc. field evaluation on work status was conducted and geotagged pictures were taken. Evaluations of samples of other activities like fuel charges, POL charges, payments, etc. were based on the information made available through measurement books / CAMPA register/vouchers / FA 9, since the activities had been completed five years before the field evaluation visited the sites.
- 8) Field observations were recorded in different forms namely Form A to Form L (*Appendix 1*). Form number with the activities information recorded during the field evaluation exercise is shown in table 4.1.3.2a.

**Table 4.1.3.2a: List of Forms with the information of activities to be recorded during CAMPA field evaluation exercise.**

S. No.	Form No.	Activities
1.	Form A	Summary
2.	Form B	Plantation Activities (CA / NFM)
3.	Form C	Soil & Water Conservation activities (CA-CAT, FWM, BDC)
4.	Form D	Forest Protection Activities
5.	Form E	Forest Fire Management Activities
6.	Form F	Biodiversity Conservation & Ecotourism Activities
7.	Form G	Infrastructure Development & Maintenance
8.	Form H	Research & Development
9.	Form I	Information & Communication technology Activities
10.	Form J	Capacity Building and Office Support Activities
11.	Form K	Monitoring & Evaluation Activities
12.	Form M	Third-party comments

The evaluated samples detail of other activities is shown in Annexure VI.

<sup>13</sup>National Evaluation Manual for CAMPA Projects (2016) CEAMT, IIFM Bhopal, 25 pages

### **4.3 Evaluation scoring**

#### **(A) Quantitative aspects**

Quantitative evaluation score for different plantation activities and other activities under different CAMPA components are elaborated below

##### **i) Plantation activities:**

a) For raising of plantations, scoring of each sample was carried out on a scale of 0 to 300. Scoring for evaluating the field plantation samples was based on mortality. Sample plantation plots with mortality less than 10% was scored 300 points, for mortality 11% to 20% = 240 points, 21% to 30% = 180 points, 31% to 40% = 120 points, 41% to 50% = 60 points and for mortality of plantations above 50% = 0 points was given.

b) For advance works and maintenance of plantations, scoring was done on a scale of 0 to 100 based on the percent variations. For deviations less than 10% = 100 points, 11% to 20% = 80 points, 21% to 30% = 60 points, 31% to 40% = 40 points, 41% to 50% = 20 points and for mortality above 50% = 0 points was assigned.

c) Total score allotted to plantation activity for the year is the average score of the total plantation activities evaluated.

##### **ii) Other activities:**

a) For recording Soil and Water Conservation, the scoring was done in a scale of 0 to 100. Scoring to evaluated works was based on the deviations observed in between the records and in the field. For deviations less than 10% = 100 points, 11% to 20% = 80 points, 21% to 30% = 60 points, 31% to 40% = 40 points, 41% to 50% = 20 points and for deviations above 50% = 0 points was given.

b) Other activities under NFM, FP, FFM, BDC, ICT, R&D, M&E and OS the scoring was done in a scale of 0 to 10. Scoring to evaluated works was based on the deviations observed in between the records and in the field. For deviations less than 10% = 10 points, 11% to 20% = 8 points, 21% to 30% = 6 points, 31% to 40% = 4 points, 41% to 50% = 2 points and for deviations above 50% = 0 points was given.

#### **(B) Qualitative aspects**

Qualitative evaluation scoring for different plantation and other activities carried out under TSFD CAMPA are elaborated below

a) Impact awareness generation campaign is based on any evidence during evaluation on conducting of regular CAMPA campaigns by the forest department.

- b) Identification of approved site for plantation were based on checking the availability of treatment plan on measurement books/ plantation journals.
- c) Improvement in quality of wildlife habitat are based on the impact of different plantation raised under CAMPA on the wildlife.
- d) CAMPA benefits was based on a number of persons from BPL/SC/ST communities engaged for CAMPA activities.
- e) Project awareness CAMPA is based on discussion with local people and forest officials about CAMPA.
- f) Transparency maintenance and payment was based on the availability of matching CAMPA works at the division and at the head office.
- g) Maintenance of assets created was based on the state of the physical assets created and plantations raised.

**4.3.1 Evaluation scoring total:** The total score of a component is the total of the average score of the points scored under each sub-component. The total score of evaluation was recorded in the overall site assessment sheet as shown in table 4.3.1 for the year evaluated.

**Table 4.3.1: Overall site assessment sample sheet<sup>14</sup>.**

Quantitative Aspects (A)				Qualitative Aspects (B)			
SNo.	Main Heading	Score	Total	SNo.	Main Heading	Score	Total
I.	Plantation Activities (Compensatory Afforestation and Natural Forest Management)		500	I.	Impact of awareness Generation campaign		5
II.	Soil and Water Conservation Measures		300	II.	Identification of approved Site for plantation		5
III.	Forest Protection		100	III.	Improvement in quality of wildlife habitat		5
IV.	Forest Fire Management		10	IV.	CAMPA benefits		10
V.	Biodiversity Conservation and Development		100	V.	Project Awareness		5
VI.	Research & Development		10	VI.	Transparency, maintenance And payments		5
VII.	Capacity Building		10	VII.	Maintenance of assets Created		10
VIII.	Information Communication & Technology		10				
IX.	Infrastructure Development and Maintenance		10				

<sup>14</sup> The total score assigned to the components were done as per the percentage expenditure under the various sub-components of CAMPA

X	Ecotourism		5			
XI	Office support		5			
<b>Total (A)</b>			<b>1060</b>	<b>Total (B)</b>		<b>45</b>
<b>GRAND TOTAL (A+B)</b>						<b>1105</b>

The total figure under each main heading of quantitative aspect in the above table is based on the number of sub-components under the components evaluated.

Percent of the total score obtained is used to rank the performance<sup>15</sup> based on the following table.

<b>Percent score</b>	<b>Performance</b>
90 - 100	Highly satisfactory
80 - 90	Satisfactory
60 - 80	Moderately Satisfactory
40 - 60	Unsatisfactory
Below 40	Highly unsatisfactory

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<sup>15</sup>National Evaluation Manual for CAMPA Projects (2016) CEAMT, IIFM Bhopal, 25 pages

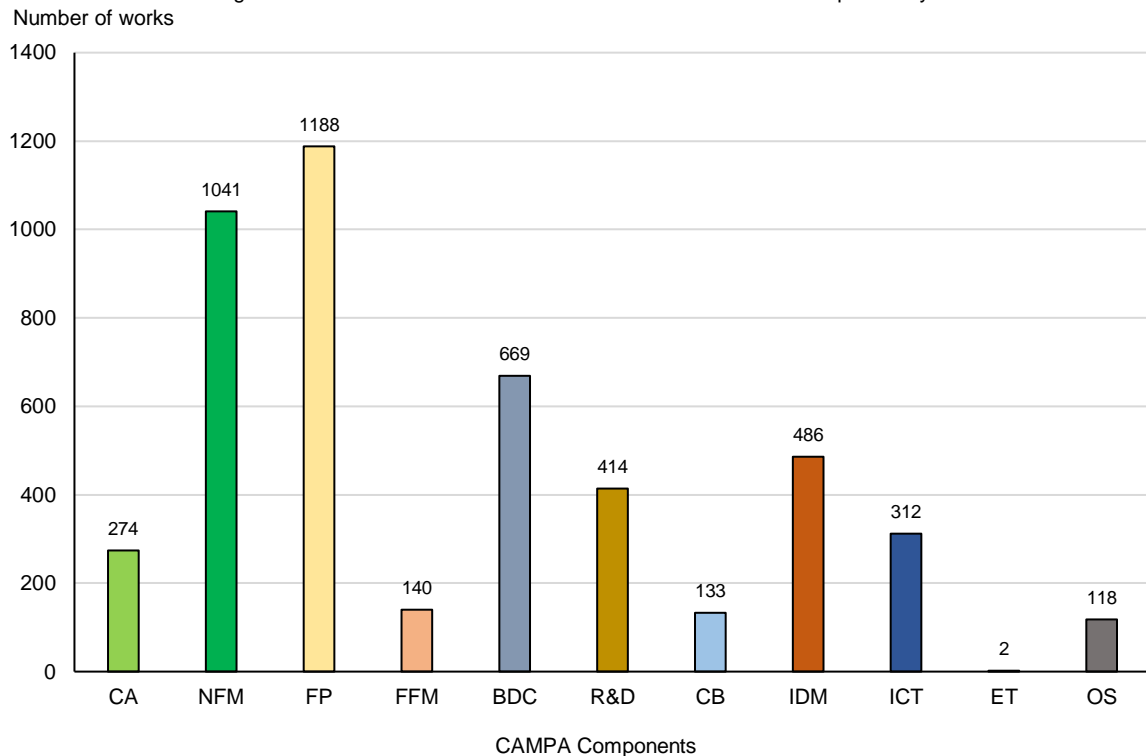


## Chapter 5

### DATA ANALYSIS

The total number of activities undertaken by TSFD under different CAMPA components during 2011-2012 is shown in Figure 5.0.

Fig 5.0: Total number of works under different TSFD CAMPA components year 2011-12



A total of 4777 works were undertaken in the state of Telangana during 2011-2012 under different CAMPA components. The highest number of works were undertaken under FP followed by NFM, BDC, IDM, R&D, ICT, CA, FFM, CB, OS and ET. Division wise details of total works are shown in table 5.0. CA was undertaken by 19 divisions under 6 circles. The highest number of CA works was undertaken by Paloncha division. NFM activities were undertaken in 22 divisions under 6 circles, Karimnagar (E) undertook the highest number of NFM activities. FP works were carried out in 31 divisions of the state, among which Hyderabad had undertaken the maximum number of forest protection works. FFM works were undertaken by 16 divisions, maximum number of FFM activities was undertaken under Bellampally division. BDC works were undertaken by 18 divisions with Medak WL undertaking maximum number of BDC activities. IDM and ICT works were undertaken by 25 divisions and highest number of activities under both the components were undertaken under Hyderabad division

**Table 5.0: Division wise total number of works under different components of CAMPA for the year 2011-2012 (division list as per before bifurcation).**

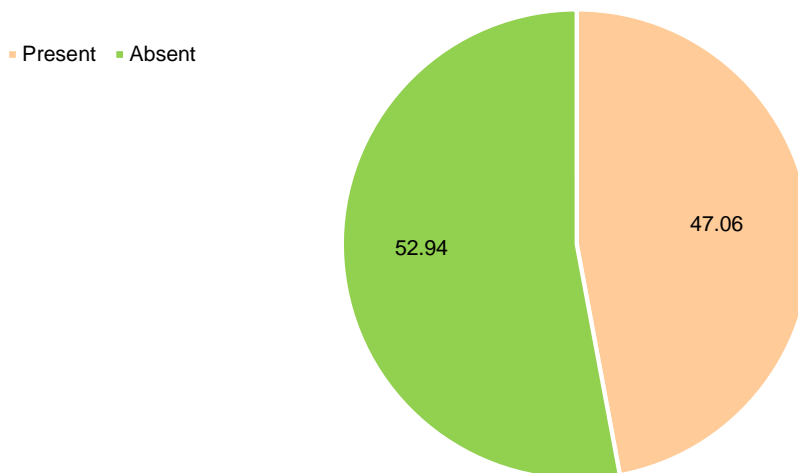
Circle	Division	CA	NFM	FP	FFM	BDC	R&D	CB	IDM	ICT	ET	OS	Total Works
Adilabad	Adilabad	18	64	45	1	-	-	-	15	20	-	-	163
	Nirmal	-	38	46	11	21	-	-	9	10	-	-	135
	Jannaram WL	-	-	46	4	25	-	-	7	5	-	4	91
	Mancherla	11	82	23	7	3	-	-	9	5	-	-	140
	Bellampally	4	85	27	34	-	-	-	12	6	-	-	168
	Kaghnagar	-	55	25	13	-	-	-	5	9	-	-	107
	<b>Circle total</b>	<b>33</b>	<b>324</b>	<b>212</b>	<b>70</b>	<b>49</b>	<b>0</b>	<b>0</b>	<b>57</b>	<b>55</b>	<b>0</b>	<b>4</b>	<b>804</b>
Hyderabad	Hyderabad	3	78	229	12	24	-	-	165	129	-	74	714
	Mahabubnagar	17	22	50	6	31	-	-	21	10	-	-	157
	Nalgonda	15	13	24	3	-	-	-	16	5	-	-	76
	FSP Hyderabad	-	-	3	-	-	-	-	-	-	-	-	3
	<b>Circle total</b>	<b>35</b>	<b>113</b>	<b>306</b>	<b>21</b>	<b>55</b>	<b>0</b>	<b>0</b>	<b>202</b>	<b>144</b>	<b>0</b>	<b>74</b>	<b>950</b>
Khammam	Khammam	9	87	22	-	-	-	-	-	6	-	21	145
	Kothagudem	7	29	45	-	-	-	-	8	10	-	-	99
	Paloncha	86	55	40	-	-	-	-	21	9	-	4	215
	Bhadrachalam (N)	25	36	68	-	-	-	-	20	4	-	-	153
	Bhadrachalam (S)	25	33	56	-	-	-	-	24	8	-	-	146
	WLM Paloncha	-	-	17	-	90	-	-	4	3	-	-	114
	Bhadrachalam (L)	10	-	-	-	-	-	-	-	-	-	-	10
	<b>Circle total</b>	<b>162</b>	<b>240</b>	<b>248</b>	<b>0</b>	<b>90</b>	<b>0</b>	<b>0</b>	<b>77</b>	<b>40</b>	<b>0</b>	<b>25</b>	<b>882</b>
Nizamabad	Nizamabad	13	46	26	4	6	-	-	19	7	-	-	121
	Kamareddy	5	40	27	12	20	-	-	17	6	-	-	127
	Medak	5	73	28	20	7	-	-	30	8	-	6	177
	Medak WLM	-	-	6	2	87	-	-	5	1	2	-	103
	<b>Circle total</b>	<b>23</b>	<b>159</b>	<b>87</b>	<b>38</b>	<b>120</b>	<b>0</b>	<b>0</b>	<b>71</b>	<b>22</b>	<b>2</b>	<b>6</b>	<b>528</b>
Warangal	Warangal (N)	1	53	40	-	32	-	-	14	12	-	2	154
	Warangal (S)	-	20	34	-	8	-	-	12	8	-	2	84
	Warangal WLM	-	-	19	-	60	-	-	9	3	-	-	91
	Karimnagar (E)	4	84	32	-	-	-	-	4	11	-	-	135
	Karimnagar (W)	1	33	30	-	29	-	-	18	10	-	-	121
	FSP Karimnagar	-	-	4	-	-	-	-	-	-	-	-	4
	FSP Warangal	-	-	2	-	-	-	-	-	-	-	-	2
	<b>Circle total</b>	<b>6</b>	<b>190</b>	<b>161</b>	<b>0</b>	<b>129</b>	<b>0</b>	<b>0</b>	<b>57</b>	<b>44</b>	<b>0</b>	<b>4</b>	<b>591</b>
FDPT	Achampet	2	14	66	6	60	-	-	10	7	-	-	165
	Nagarjunasagar	13	1	74	4	23	-	-	12	-	-	4	131
	<b>Circle total</b>	<b>15</b>	<b>15</b>	<b>140</b>	<b>10</b>	<b>83</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>7</b>	<b>0</b>	<b>4</b>	<b>296</b>
APFA Dullapally	APFA Dullapally	-	-	-	-	-	-	133	-	-	-	-	133
	<b>Circle total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>133</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>133</b>
R & D Circle, Hyderabad	SS Hyderabad	-	-	-	-	-	202	-	-	-	-	-	202
	FG Warangal	-	-	-	-	-	212	-	-	-	-	-	212
	<b>Circle total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>414</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>414</b>
WLM Hyderabad	CNP	-	-	5	1	39	-	-	-	-	-	1	46
	WLM Hyderabad	-	-	29	-	37	-	-	-	-	-	-	66
	<b>Circle total</b>	<b>0</b>	<b>0</b>	<b>34</b>	<b>1</b>	<b>76</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>112</b>
Director ZP Hyderabad	NZP Hyderabad	-	-	-	-	67	-	-	-	-	-	-	67
	<b>Circle total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>67</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>67</b>
<b>Total</b>		<b>274</b>	<b>1041</b>	<b>1188</b>	<b>140</b>	<b>669</b>	<b>414</b>	<b>133</b>	<b>486</b>	<b>312</b>	<b>2</b>	<b>118</b>	<b>4777</b>

**5.1 Data Analysis of CAMPA Plantation activities:** Data collected for plantation activities and other activities during field evaluation of the sample CAMPA activities for the year 2011-2012 were digitized, collated and checked as per the audited records available at the O/o PCCF, TSFD, Aranya Bhavan. Thereafter, the data was analyzed to understand the status, performance of plantations, quantity and quality of other activities and any other critical issues on the CAMPA activities for the state of Telangana.

**5.2 Maintenance of Records:** Records were categorized as measurement books (estimates), plantation registers (treatment maps) and CAMPA schedule of works registers, vouchers, etc.

**5.2.1 Measurement Books (MB) and Plantation journals (PJs):** Section wise detail of works executed with estimates, amount disbursed, a period of works, is mentioned in MB. Plantation journals contains all the information of the site, plantation map, sanctioned order, soil characteristics and records of activities, monitoring and evaluation and any other information, all updated on the plantation. It has been observed that out of 34 plantations samples, MBs and Plantation Journals of 14 plantations were made available. Fig 5.2.1 shows the percent of MBs available during evaluation.

**Fig 5.2.1:Percent availability of MBs/PJs for plantation during evaluation.**



**5.2.2 CAMPA works register (CWR):** CAMPA works register contains an index of work and summarized details of expenditure with the Schedule of Order. All the works entered in CWR are signed by the DFO. This information helps to authenticate whether works have been carried out. During field evaluation, it was observed that all the works were mentioned in the CWR.

**Findings:** Measurement Book (MB) could be examined for forty-one percent of the activities evaluated. Respective range level/ beat level officials during the evaluation time revealed that due to bifurcation of the Telangana state from erstwhile Andhra Pradesh and after further reconciliation of the divisions, documents have been kept at different places and therefore there were unable to produce during evaluation. It indicates that less attention is given to MBs which otherwise is a very important document. Irrespective of the situation MBs should always be kept with care in the range where plantation has been carried out. Further in all the available MBs for other activities, grid-wise details on volume of works undertaken is lacking. Lack of grid wise details makes it very

difficult to quantify the works carried out. All the MBs that were made available during evaluation had the signature of RFOs indicating that RFOs have checked the works before making payments.

For plantations, PJs is one of the most important document. Irrespective of any situation PJs should always be kept with care in the range offices where plantation has been carried out. All the MBs that were available had the signature of RFOs indicating that RFOs have checked the works before making payments. Treatment plan and grid wise details of plantations are available in the examined PJs. All the examined PJs had the signature of RFOs indicating that proper methods have been adopted for conducting plantations.

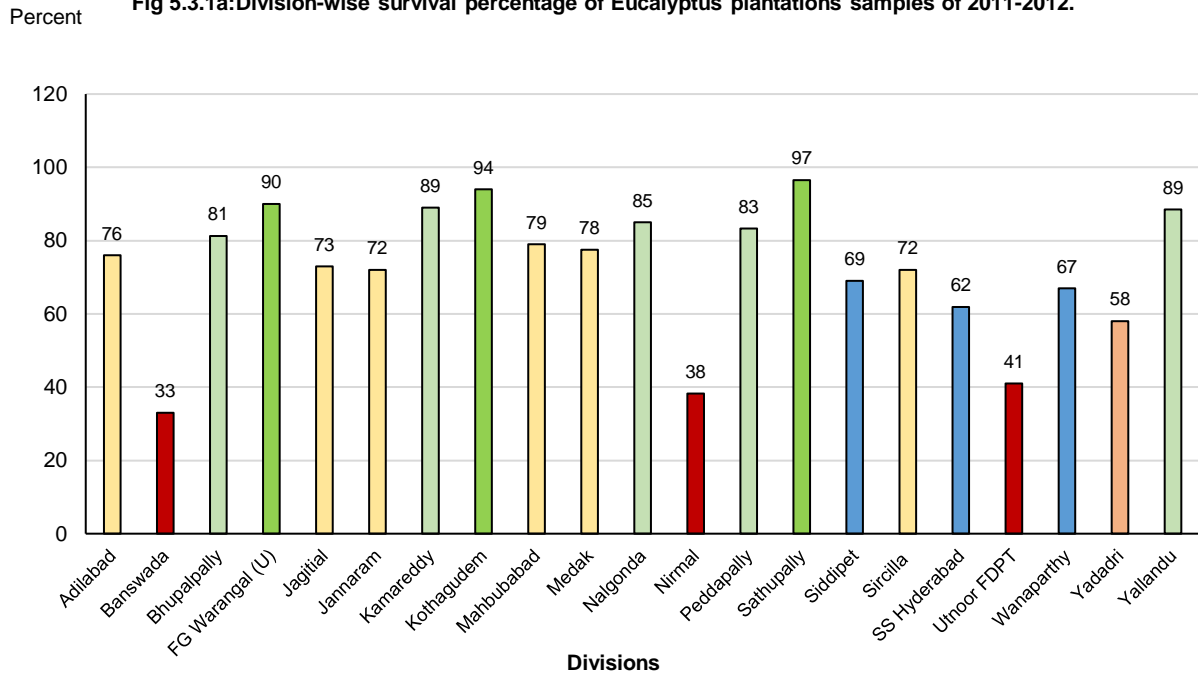
CAMPA works register (CWR) a record-keeping document was found in all the sites of evaluation. Works register hardcopy and softcopy were maintained at the division office. It contains an index of works based on Schedule of Order (SO) with the name of works/activity, site, and the summary of expenditure. All the activities entered in CWR was found to be signed by the DFO. The CWR maintained in the divisions and the final list of works as audited and maintained at the H/o does not totally tally.

**5.3 Survival percentage:** Survival percentage of plantations is one of the vital parameter evaluated. It reflects the overall performance of plantations. Analysis of the survival percentage of the plantations was analyzed from different aspects namely methods of plantations, CAMPA components, species, divisions and existence of protections measures to get a clear understanding on the plantations.

**5.3.1 Division wise plantation survival percentages:** Division wise survival percentage of eucalyptus, NTHS and teak plantations is shown in fig 5.3.1 to Fig 5.3.7.

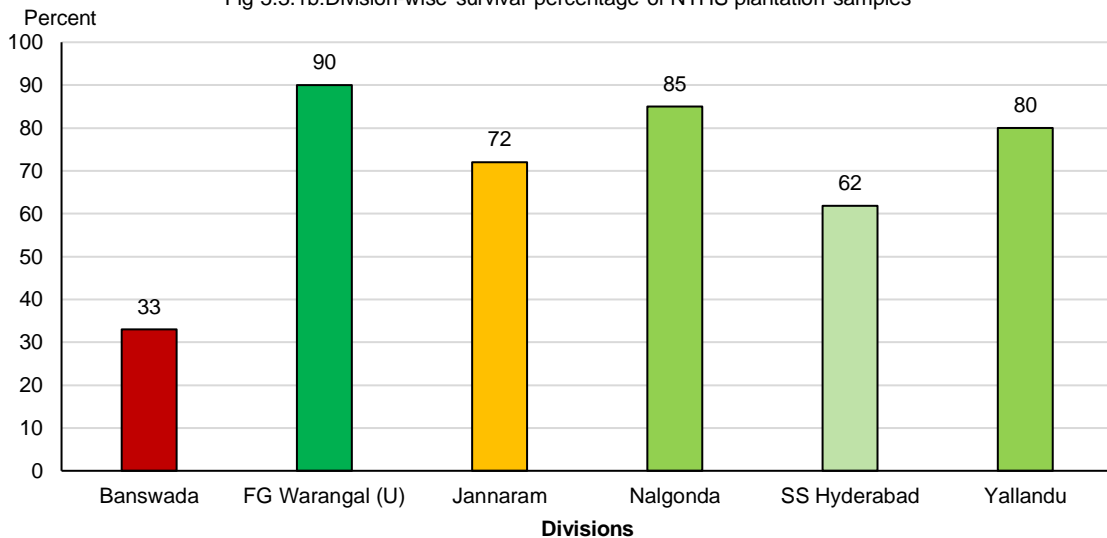
Eucalyptus plantations were raised by 21 divisions under CAMPA in 2011-2012. Average survival percentage of eucalyptus raised under TSFD CAMPA across the divisions ranged from 33% to 97%. Comparison of survival of plantations across the divisions (see Fig 5.3.1a) revealed that Sathupally had the highest survival percentage of eucalyptus followed by Kothagudem, FG Warangal, Kamareddy, Yellandu, Nalgonda, Peddapally, Bhupalpally, Mahbubabad, Medak, Adilabad, Jagitial, Jannaram, Sircilla, Siddipet, Wanaparthy, SS Hyderabad, Yadadri. Utnoor, Nirmal and Banswada divisions reported the significantly lower survival percentage of eucalyptus.

**Fig 5.3.1a: Division-wise survival percentage of Eucalyptus plantations samples of 2011-2012.**



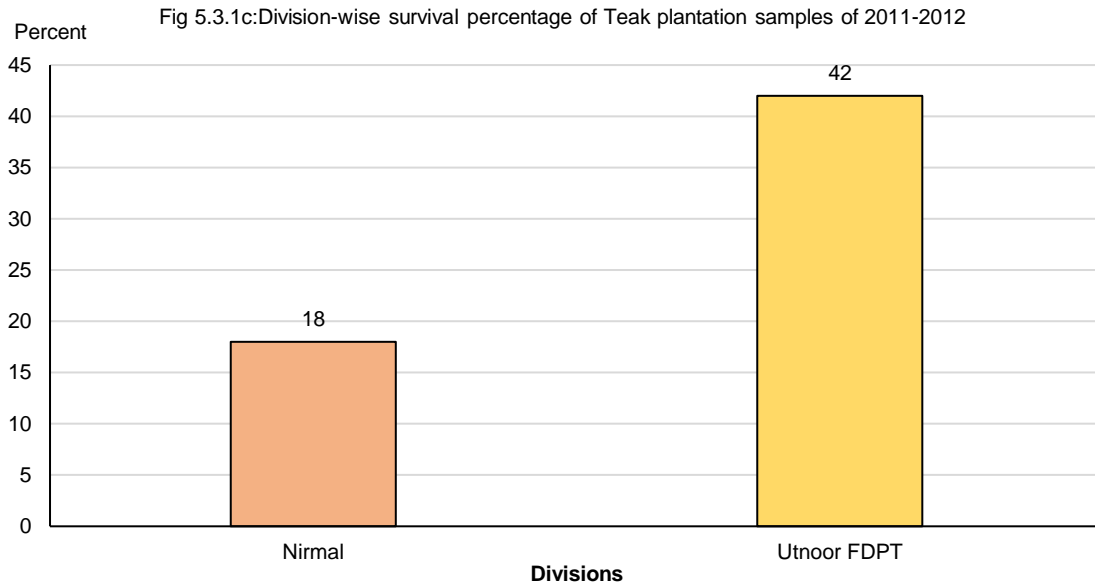
Samples of NTHS plantations raised under CAMPA during 2011-2012 was sampled from six divisions. Average survival percentage of NTHS raised under TSFD CAMPA across the divisions ranged from 33% to 90%. Comparison of NTHS plantations survival across the divisions (see Fig 5.3.1b) revealed that FG Warrangal had the highest survival percentages followed by Nalgonda, Yallandu, Jannaram, SS Hyderabad. Banswada reported the lowest survival of NTHS plantations raised under TSFA CAMPA during 2011-2012.

**Fig 5.3.1b: Division-wise survival percentage of NTHS plantation samples**



Teak plantations raised in 2 divisions under TSFD CAMPA during 2011-2012 was drawn as samples. Average survival percentage of the teak plantations under TSFD CAMPA across the

divisions sampled ranged from 18% to 42%. Comparison of teak plantations survival across the sampled divisions (see Fig 5.3.1c) revealed that mortality of teak plantations in both the samples was very high.



**Findings:** The plantations under TSFD CAMPA during 2011-2012 were raised under four different plantations types namely, Eucalyptus plantation, NTSH plantation and Teak plantations. Scoring was done as mentioned earlier on a scale of 300 based on the mortality of the plants during field evaluation. Among the different plantation types, Eucalyptus plantation raised with a spacing of 3m x 2m scored highest points. Not a single total failure of eucalyptus plantations raised during 2011-2012 under TSFD CAMPA was recorded during the evaluation. The average score of NTSH plantation was 188 followed by Eucalyptus plantations with an average score of 183. Teak plantations raised during 2011-2012 scored 0.

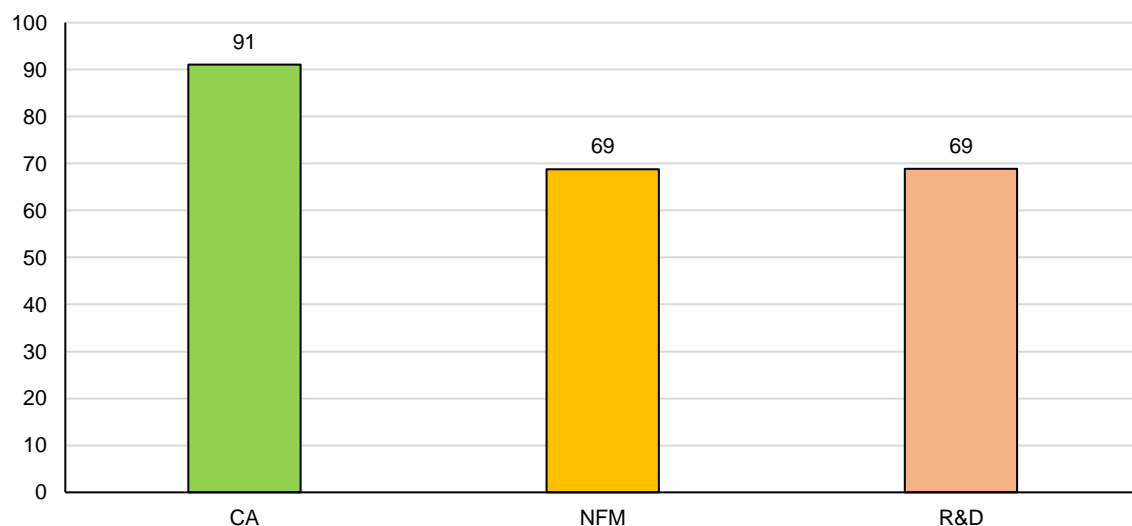
Eucalyptus an introduced species exhibited well in the areas planted. Although there were signs of biotic interferences such as cut marks, loping, fire, in almost all the plantation, eucalyptus has established. Even in places like the plantation site at Sathupally with lack of adequate soil moisture with heavy biotic pressure, accidental fire incidents in summer due to accumulation of dry biomass/ litter plantations the survival percentage of eucalyptus was very high (97%) indicating that this species have the ability to establish in degraded areas. However, the species as revealed by the local people is not preferred as firewood for cooking due to the presence of a strong aroma. And also during evaluation, not a single nest of birds was recorded in the eucalyptus plantations reflecting that this plantation type is not preferred as a nesting habitat for birds. Only wild boar, peacocks and few common snakes were found moving in and out of the Eucalyptus plantations.

Species namely *Terminalia arjuna*, *Terminalia tomentosa*, *Terminalia chebula*, *Gmelia arborea*, *Pongamia pinnata*, *Azadirachta indica*, *Emblica officinalis*, *Simarouba glauca*, *Azadirachta indica*, *Hardwickia binnata*, *Sterculia urens*, *Mitragyna spp* and *Buchania lanzan* were raised under NTSH plantation during 2011-2012. *Sterculia urens* recorded 100% survival and *Buchania lanzan* plantations totally failed.

Information received during field visits revealed that heavy biotic pressure is one of the prime reason for very less survival of teak plantations in the divisions. Additionally, it was also learned through discussions with forest officials, watchman, and other available local people during the evaluation that lack of rains after plantation of teak seedlings significantly reduce teak germination. Suitable soil, soil with good depth and ability to retain water is necessary for the survival of teak plants.

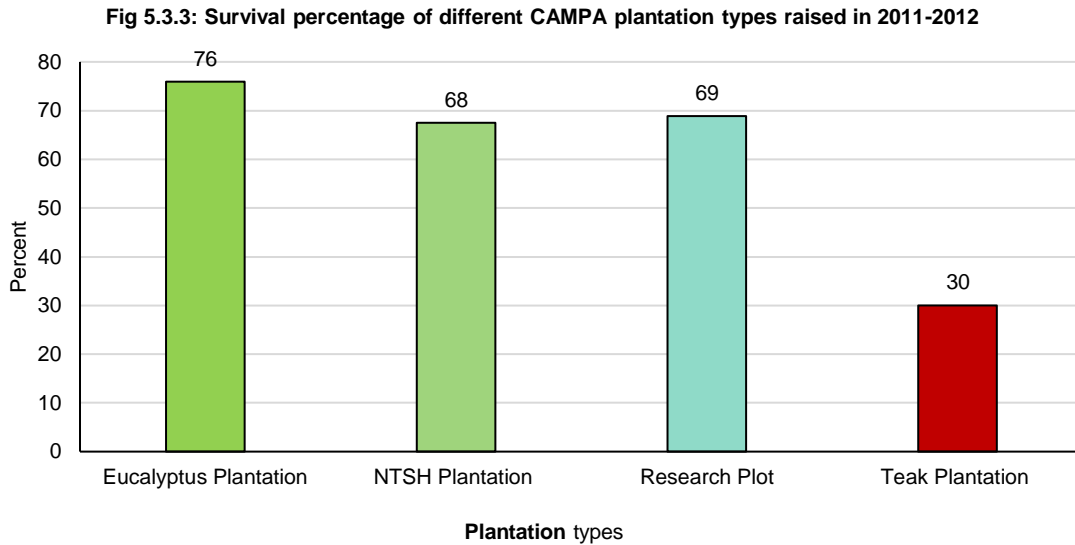
**5.3.2 Survival percentage of plantations under different CAMPA components:** Plantations activities was carried out under three CAMPA components namely CA, NFM and R&D in the state of Telangana during 2011-2012. Comparison of average survival percentages of plantations raised under the different CAMPA components is shown in Fig 5.3.2. It shows that average survival percentage of plantations raised under CA was highest (91%) followed by plantations raised under NFM (69%) and R&D (69%).

Fig 5.3.2: Average survival percentage of plantations raised under different CAMPA components in 2011-2012



**Findings:** Analysis of field evaluation revealed that plantations raised under CA performed better than those raised under NFM and R&D. **Average scores obtained by the plantation raised under different CAMPA components namely CA, NFM, and R&D are 270, 152 and 210, respectively.**

**5.3.3 Survival percentage of plantations raised under different plantation type:** Survival percentage different CAMPA plantation types raised by TSFD CAMPA during 2011-2012 is shown in figure 5.3.3.



**Findings** Four different plantation types were recorded, namely Eucalyptus plantation, NTSH plantation, plantations under research plots and teak plantations. Eucalyptus had the highest survival percentage followed by research plots and NTHS. Teak showed the lowest survival percentage. **Average scores obtained by different plantation types namely Eucalyptus, NTSH, Research plots and Teak during 2011-2012 are 182.5, 165, 210, and 0, respectively.**

**5.3.4 Survival percentage of plantations under different planting methods:** Two planting methods, namely Labour Intensive Management (LIM) and Semi Mechanical Management (SMM) were adopted for raising plantations under TSFD, CAMPA during 2011-2012. Survival of

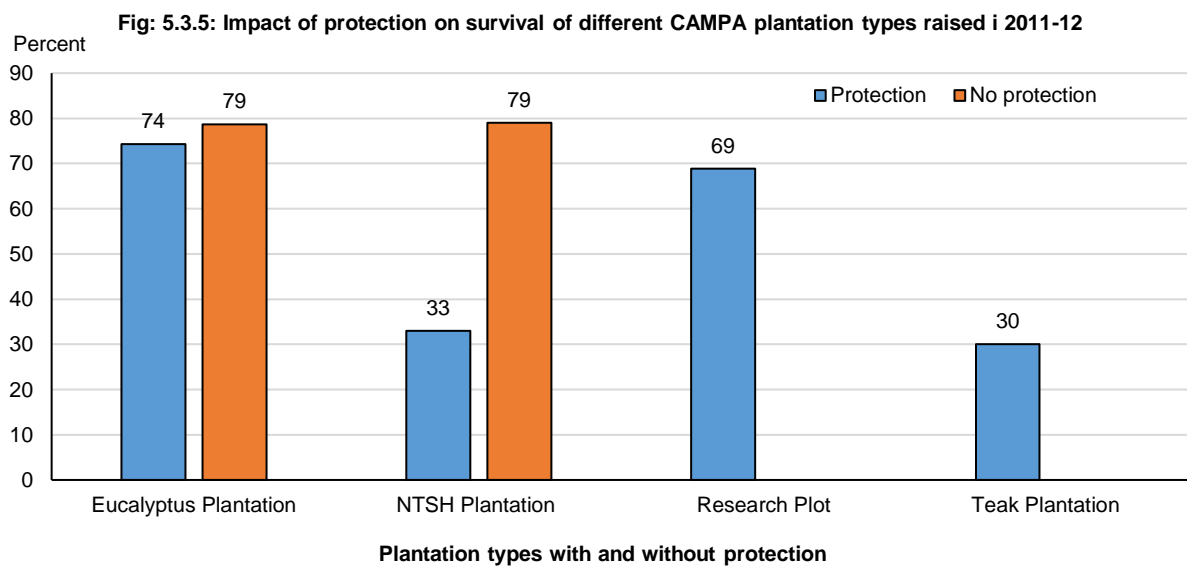




plantations (Fig 5.3.4) was significantly higher (75%) under SMM method. Average survival percentage of plantations raised under LIM was found to be 53 percent.

**Findings:** On the basis of scores, survival percentage of plantation raised under LIM was much lower than that of plantations raised under SMM. **The average score obtained by SMM was 184 and LIM was 120.**

**5.3.5 Survival percentage of plantations with protection and without protection:** Comparison survival of different plantation types with protection and without protection is shown in Fig 5.2.5. It reveals that survival of Eucalyptus plantations was slightly more (79%) in areas without protection and lower (74%) in areas with protection. Similarly, survival of plants raised under NTSH was higher in areas without protection (79%) from the protected ones (33%). Plantations under R&D and teak were raised without protection.

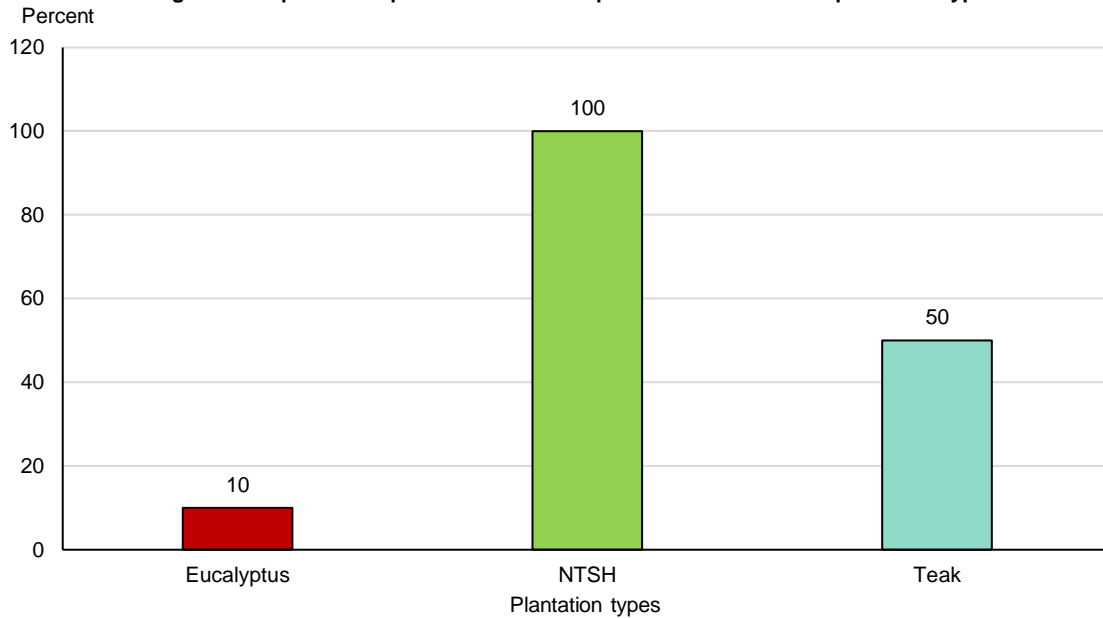


**Findings:** In both eucalyptus plantations and NTSH plantations, survival percentages of plantation were higher in the sites without protection from the sites that were protected. This is perhaps due to the reason that the sites were earlier encroached and plantations were carried out after the eviction, etc. There are high biotic interferences including grazing pressure in areas where protection measures were recorded.

**5.4 Habitat improvement:** Comparison of plantations on habitat improvement under different plantation type raised during 2011-2012 is shown in Fig 5.4. Presence of wildlife, its indications like observing scat/dung during evaluation were recorded. Percent record of indicators was used to score habitat improvement.

Presence of wildlife was recorded in hundred percent of NTSH plantations raised under TSFD, CAMPA, followed by teak plantations. Presence of wildlife was recorded in 50% of the teak plantations. Presence of wildlife was observed only in 10% of the sites under eucalyptus

**Fig 5.4: Comparison of percent HI indicator present under different plantation type**



plantations.

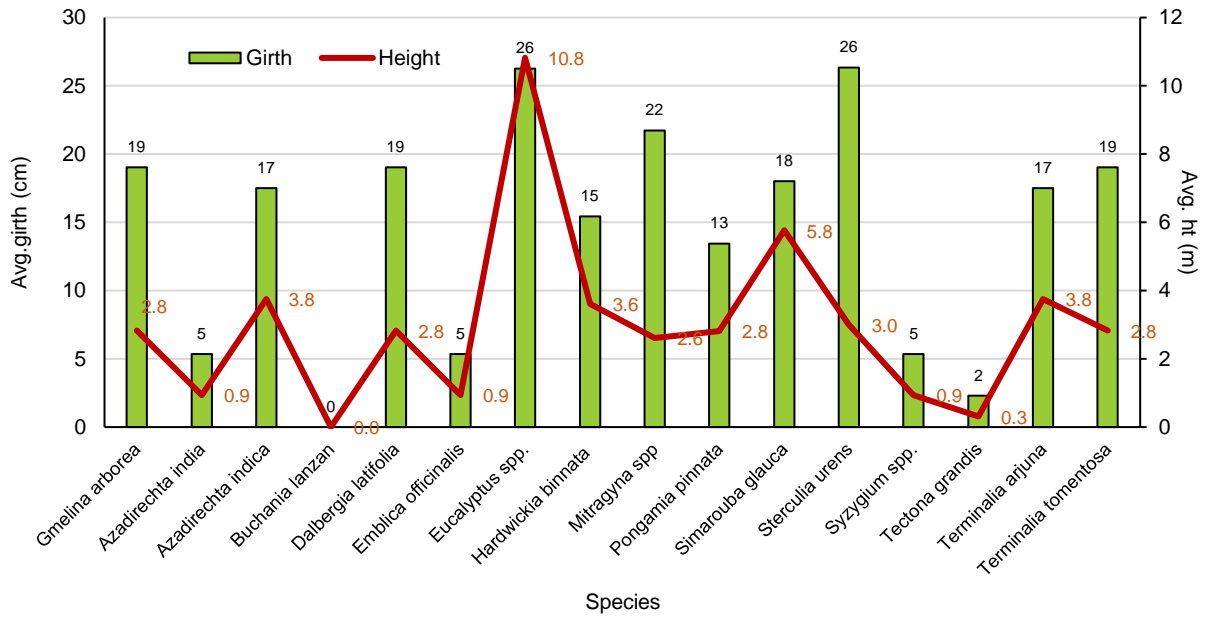
**Findings:** Wildlife presence was recorded in hundred percent of NTSH plantations raised under TSFD, CAMPA. Although survival of teak was considerably less, yet 50% of teak sites showed presence of wildlife. On the other hand, although the survival of eucalyptus was high, yet only 10% of the eucalyptus sites indicated signs of wildlife. Indicated. It indicates that although the survival percentage of NTSH plantations and teak plantations are lower in comparison to that of eucalyptus plantation yet wildlife species prefers NTSH plantations and teak sites as their habitat.

**5.5 Growth of trees:** Comparison of average height and average girth of different tree species raised under TSFD CAMPA during 2011-2012 is shown in Figure 5.5.1. Eucalyptus plantations exhibited faster growth in terms of height and girth in comparison to the other species planted under CAMPA during 2011-2012. The average height and average girth recorded during the evaluation was 10.8 m and 26 cm, respectively.

The average girth and average height of NTSH species ranged from 5 cm to 26 cm and 0.9 m to 5.8 m, respectively. *Sterculia urens*, exhibited highest girth (26 cm) followed by *Mitragyna spp* (22 cm). Among the NTSH species planted under CAMPA during 2011-2012, *Simarouba glauca* was found to be the tallest NTSH species with an average height of 5.8 m, followed by *Terminalia arjuna* with 3.8 m. On the other hand, *Emblica officinalis* and *Azadiractha indica* were found to be

the slow growing NTSH species raised during 2011-2012 both with an average girth and average height of 5 cm and 0.9 m, respectively.

Fig 5.5.1: Comparison of average height and girth of different species raised under TSFD CAMPA during 2011-2012.



Division wise average girth and average height of Eucalyptus, NTSH and Teak is shown in Fig 5.5.2 to Fig 5.5.4.

Fig 5.5.2: Division wise details for girth and height of Eucalyptus species 2011-2012

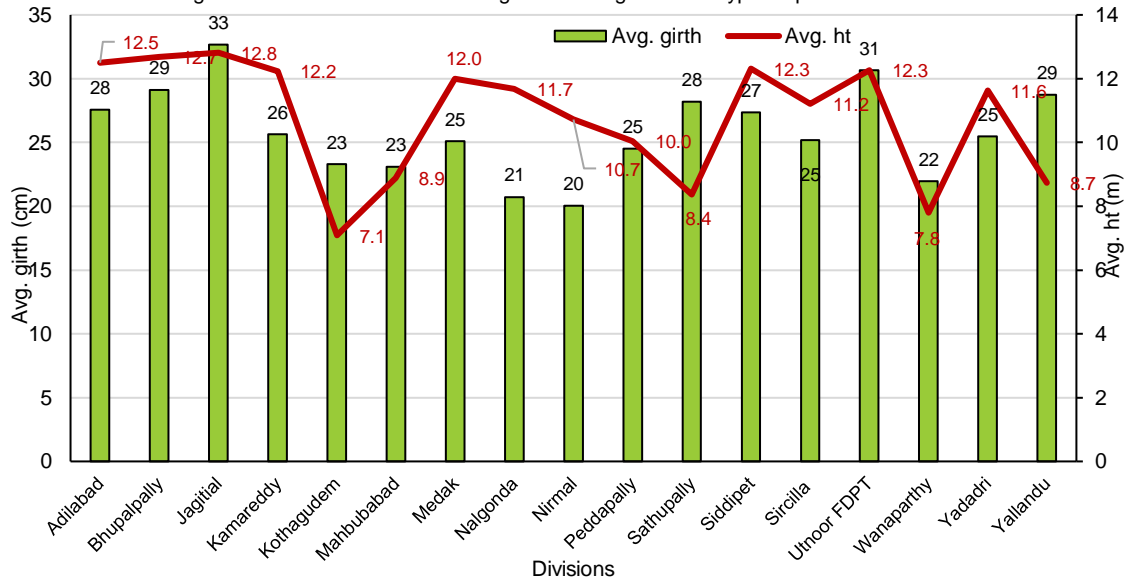


Fig. 5.5.3: Division wise details for girth and height parameters for NTSH plantation 2011-2012

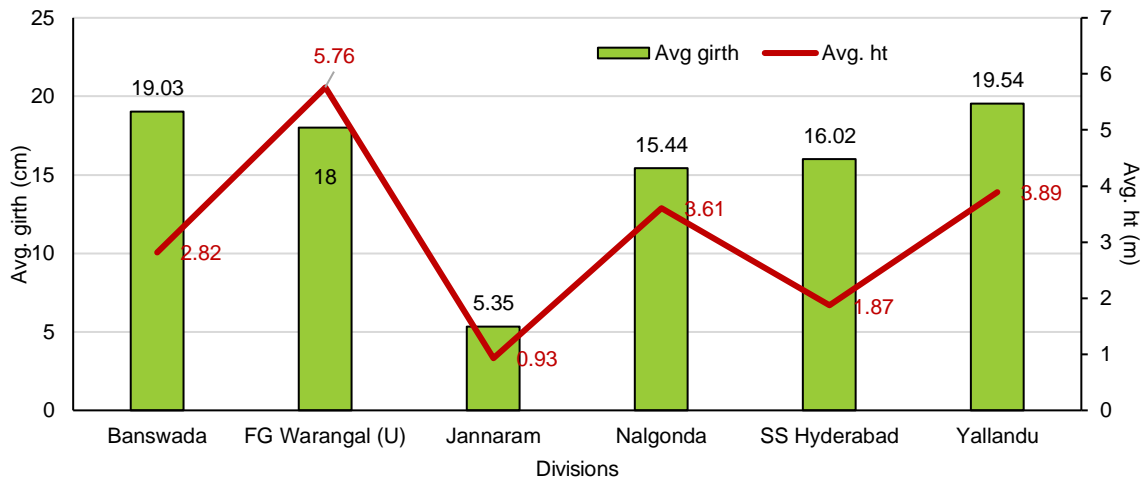
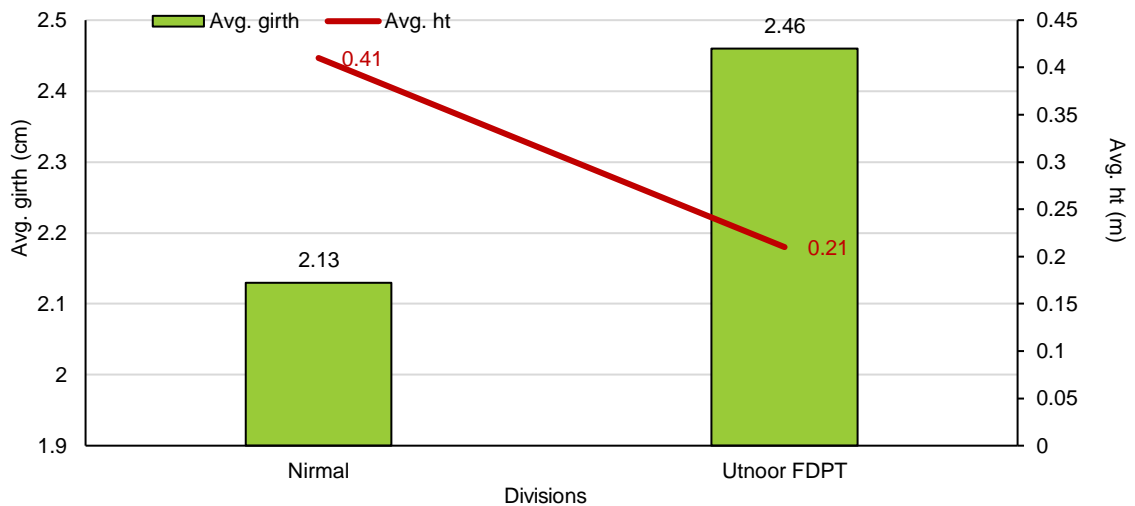


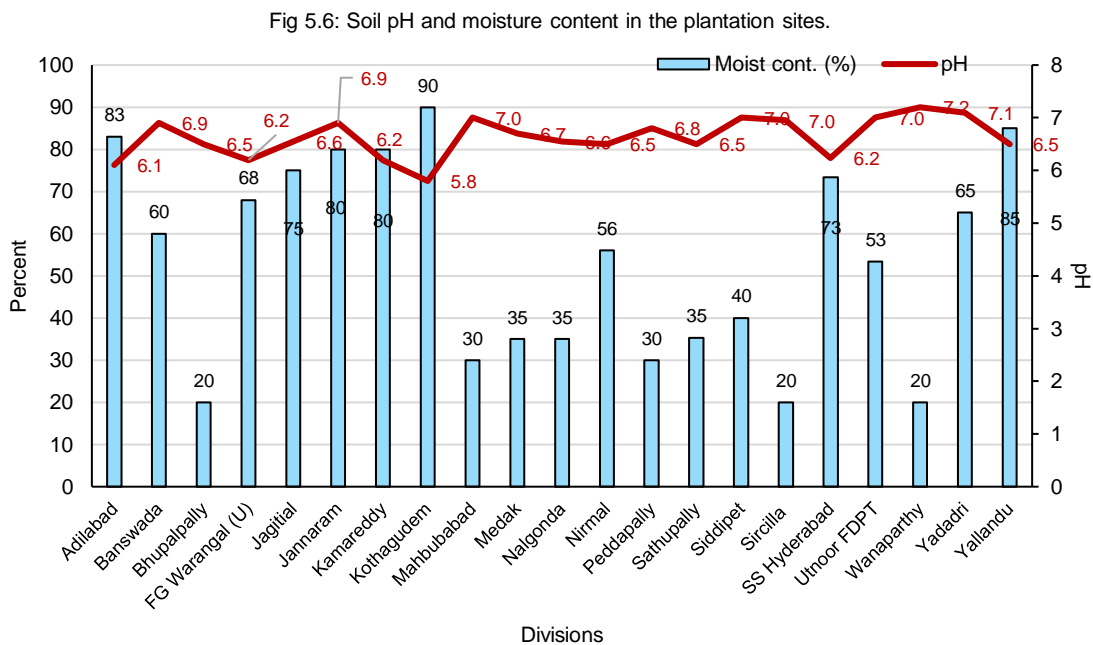
Fig 5.5.4: Division wise details for girth and height parameters for Teak plantation 2011-2012



**Findings:** Eucalyptus species exhibited fast growth, in terms of height and girth in comparison to other species, except *Sterculia urens*, that exhibited similar girth (26 cm) with eucalyptus species. Other species grown during 2011-2012 exhibited relatively slower growth. Among the NTSH species planted during 2012-2012, height of *Simarouba galuca* was highest (5.8 m) while the average girth of *Sterculia urens* was highest (26 cm). *Buchnanian lanzan* raised during 2011-2012 were a failure. The average height and average girth of *Tectona grandis* was significantly lower than the other species. Teak is not a good performer under TSFD CAMPA plantation in all the sites. It reflects the fact that, teak being a microsite specific species requires proper site selection and silvicultural operations for establishment and growth. Choosing mother trees for seed collection and stumps preparation, is a vital factor for producing quality planting stock of teak. Teak

plantlets raised in nursery needs to be acclimatized properly till the sapling stage for field transplantation. Teak also requires sufficient moisture for retaining its faster growth in the initial years. Proper synchronization of the onset of monsoon and teak plantation is vital for best field performance of this species.

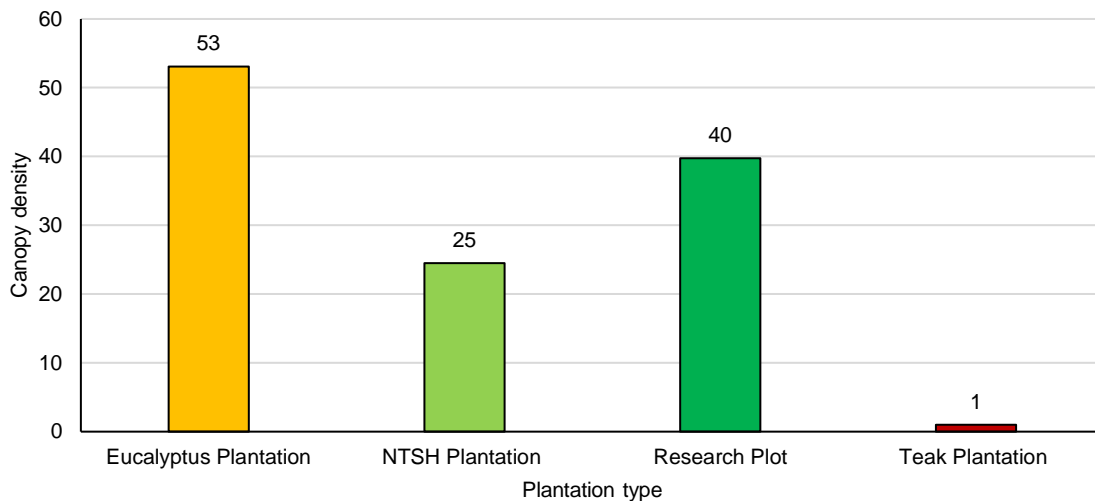
**5.6 Soil salinity and moisture status:** Soil pH and soil moisture content recorded during the evaluation is shown in Fig 5.6. Soil pH ranged from very acidic 5.8 at Kothagudem to saline 7.2 at Yadadri. Percent soil moisture content varied widely across the divisions. It varied from 20% to 90%.



**Findings:** Soil pH and soil moisture content are vital factors for establishment of plantations. Soil pH ranged from acidic to slightly saline across the plantation sites, indicating that soil pH amelioration practices are necessary for better performance of plantations across the sites. Percent soil moisture content varied widely across the divisions. It varied from 20% to 90%. Higher soil moisture content recorded was perhaps due to the rains during the evaluation period. Soil crumbs indicating drought like conditions were observed in many places. It indicates that average soil moisture content is relatively on a lower side, stressing plantations especially during the period of establishment unless artificial irrigation practices are adopted.

**5.7 Canopy density:** Average canopy density (shown in fig 5.7) under different was found to be highest (53) in eucalyptus plantation followed by research plots. Average canopy density of NTSH plantations was found to be 25 and that plantations raised under research and development was found to be 40. The lowest canopy density (1) was found for the teak plots.

Fig: 5.7: Average canopy density under different plantation types undertaken during 2011-2012



**Findings:** Average canopy density highest in eucalyptus plantation due to its attainment of faster growth. Average canopy density of NTSH plantations raised under research plots were higher than those raised by the various divisions. Perhaps less biotic interferences and more care was carried out on the research plots in comparison to those raised by the other divisions. Performance of teak plantations was significantly lower than those of other species and this resulted in a very low canopy cover. It indicates necessity of regular silvicultural practices for raising NTSH and Teak plantations in the state in blocks on scrub, open, and degraded areas.

**5.8 Forest carbon:** Forest carbon (shown in fig 5.8) was estimated using the standard methodology adopting allometric equations (see Box) as given by FSI.<sup>16</sup> Allometric equations are applied only on those species that are above 10 cm in diameter. Average per hectare forest carbon varied from 0.03 tonnes per hectare to 0.36 tonnes per hectare. Eucalyptus plantations raised under Jagitial division exhibited highest forest carbon i.e. 0.36 tonnes per hectare followed by Utnoor FDPT (0.23 tonnes per hectare). Lowest

**South Deccan**

S.No.	Species Name	Volume Equation
1	<i>Acacia auriculiformis</i>	$\sqrt{V} = -0,00142 + 2,61911 D - 0,54703 D^2$
2	<i>Albizia amara</i>	$\sqrt{V} = -0,07109 + 2,99732 D - 0,26953 D^2$
3	<i>Anogeissus latifolia</i>	$V = 0,289 - 2,653 D + 11,771 D^3$
4	<i>*Butea monosperma(Old) Butea frondosa</i>	$V = 0,088183 - 1,490948 D + 8,984266 D^3$
5	<i>Chloroxylon swietenia</i>	$V = -0,0532 D + 3,2378 D^3$
6	<i>Dalbergia paniculata</i>	$V = 0,18945 - 2,46215 D + 10,54462 D^3$
7	<i>Eucalyptus species</i>	$V = 0,02894 - 0,89284 D + 8,72416 D^3$
8	<i>Hardwickia binata</i>	$V = 0,063632 + 5,355486 D^3$
9	<i>Lagerstroemia parviflora</i>	$V = 0,066188 - 1,334512 D + 9,403257 D^3$
10	<i>Lannea coromandelica/lannea grandis/odina wodier</i>	$V = 0,091153 - 1,66153 D + 10,24624 D^3$
11	<i>*Syzygium cumini/jambolanum (Old) Eugenia jambolana</i>	$V = 0,088183 - 1,490948 D + 8,984266 D^3$
12	<i>Tectona grandis</i>	$V = -0,2414 + 2,8458 D - 5,5816 D^3 + 14,816 D^4$
13	<i>Terminalia crenulata/tomentosa</i>	$V = 0,051812 - 1,076790 D + 7,991280 D^3$
14	<i>Terminalia paniculata</i>	$V = 0,13100 - 1,87132 D + 9,47861 D^3$
15	<i>Wrightia tinctoria</i>	$\sqrt{V} = 0,050294 + 3,115497 D - 0,687813 \sqrt{D}$

\* For these species, Rest of species's Volume Equation is used.

<sup>16</sup> FSI (2011) Carbon Stocks of India's Forest.

average forest carbon per hectare in plantations raised under TSFD CAMPA during 2011-2012 was observed in Nirmal (0.03 tonnes per hectare).

Fig 5.8a: Division wise Carbon content of Eucalyptus plantation in 2011-2012

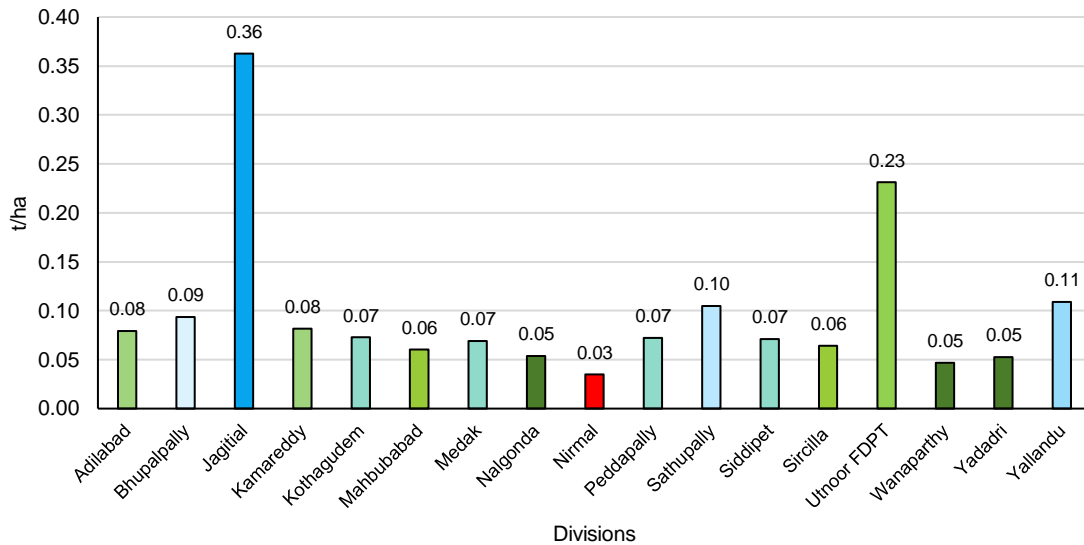
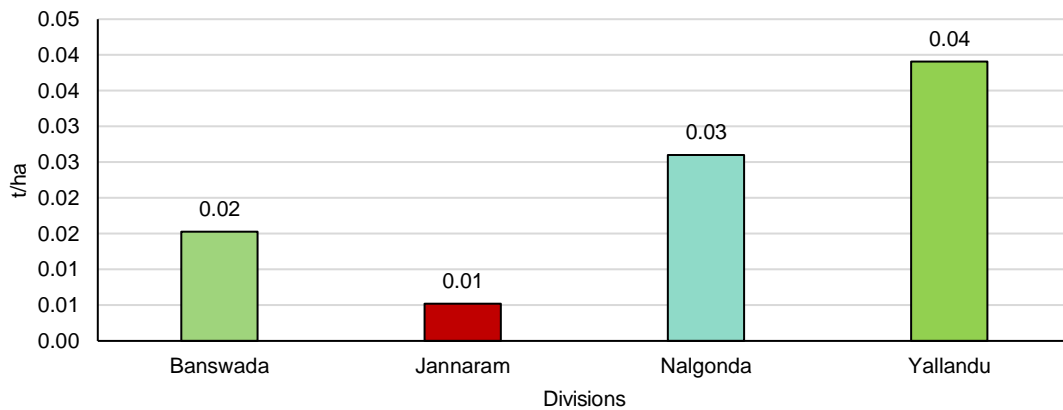


Fig 5.8b: Division wise carbon content of NTSH plantation in 2011-2012



Average forest carbon in tons per hectare of NTSH plantations raised during 2011-2012 (Fig 5.8b) varied from 0.01 tonnes per hectare in Banswada to 0.04 tonnes per hectare in Yallandu.

**Findings:** Per hectare average carbon varied from 0.03 tonnes to 0.36 tonnes in Eucalyptus plantations and 0.01 tonnes to 0.04 tonnes in NTSH plantations raised by TSFD CAMPA during 2011-2012.

**5.9 Data analysis of CAMPA Other Activities:** Data collected for CAMPA other activities during field evaluation of the sample CAMPA activities for the year 2011-2012 were digitized, collated and checked as per the audited records available at the O/o PCCF, TSFD, Aranya Bhavan. Thereafter, the data was analysed to understand the deviation with that of field and any other critical issues on the CAMPA activities for the state of Telangana.

**5.9.1 Soil and Water Conservation Measures:** Different soil and water conservation activities (SWC) were undertaken under TSFD CAMPA during 2011-2012. The random samples evaluated comprised of repair works of check dams, desilting of check dams, and other SMC activities. Summary of the evaluated samples is provided in table. 5.9.1. Details of sample evaluation details are provided in Annexure V.

**Table 5.9.1: Summary of 3<sup>rd</sup> party CAMPA evaluation score of SWC samples for 2011-2012.**

S. No.	Division	Remarks	Avg. score
1.	Jannaram	Repairs to check dam in Chintaguda beat of Chintaguda section of range Jannaram	80
2.	Jannaram	Repairs to check dam at Paidipalli beat of Chintaguda section.	
3.	Jannaram	Repairs to check dam at Tummalonka shivaru of Dongapalli beat in Jannaram range	
4.	Jannaram	Repairs to check dam at Tummalonka shivaru of Dongapalli beat in Jannaram range	
5.	Achampet	Repair to existing check dam at Chinthachettu for the year 2011-12	
6.	Jannaram	Desilting of check dam in Chintaguda section of Jannaram range.	100
7.	Paloncha	SMC works VSS Puttathogu	80

**Findings:** Soil and water conservation measures undertaken by TSFD CAMPA is able to retain water for a two to a maximum of about four months. Siltation and presence of rocks, debris was observed on the evaluation sites. **The total score of the SMC activity based on the samples for the 2011-2012 is 260.**

**5.9.2 Other activities under CA and NFM:** A total of 409 other activities under CA (169) and NFM (240) were undertaken by TSFD CAMPA during 2011-2012. Forty one samples (*under CA 17, of which 7 samples are evaluated under SMC and under NFM 24*) were evaluated. Sample evaluation details is provided in Annexure V.

**Findings:** **The total score obtained by CA and NFM other activities is 9.23 out of 10.**

**5.9.3 Forest Protection:** A total of 1188 different forest protection activities (FP) were undertaken by TSFD CAMPA during 2011-2012. One hundred and nineteen samples were evaluated under eight sub-components of FP. Sample evaluation details is provided in Annexure IV. Average score based on the percent variation obtained by each FP sub-component is shown in Table 5.9.3.

**Table 5.9.3: Score of samples evaluated under different sub-components of FP.**

No.	Forest Protection (FP) sub components	Score
A	Chain link fences	6
B	Check post	9.14
C	Base camp	7.84
D	Communication charges	7
E	Watch towers	10
F	Boundary pillars	9.6
G	Strike forces and protection watchers	8.7
H	Other activities	8.5
	<b>Total score Forest Protection (FP)</b>	<b>67</b>



**Findings:** Of eight FP sub-components evaluated, maximum variation was observed in chain link fences. Regular maintenance of chain link fences could not be ascertained. Watch towers scored full score. **The total score obtained by forest protection is 67 out of 100.**

**5.9.4 Forest Fire Management:** A total of 140 different forest fire management (FFM) works were undertaken by TSFD CAMPA during 2011-2012. 10% sample, i.e. 14 samples all falling under one sub-component namely fires watchers were evaluated. Scores obtained during field evaluation is provided in table. 5.9.4. Sample evaluation details is provided in Annexure V.

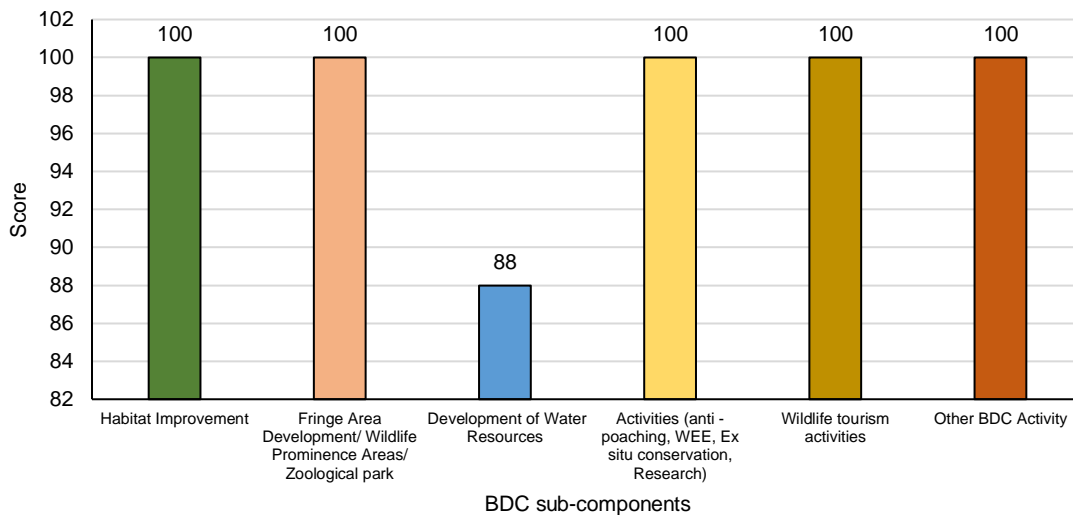
**Table 5.9.4: Evaluation summary of FFM samples.**

S. No.	Division	Range	Activity	Score	Average score
1	Adilabad	Adilabad	Fire tracing along existing, new fire lines and RF boundaries at Mavala RF	10	<b>10</b>
2	Jannaram	Indanpally	Creation of fire lines in Indanpalli range along the path ways and cart tracks	10	
3	Khanapur	Khanapur	Wages to fire watcher in Rajura section	10	
4	Khanapur	Khanapur	Wages to fire watcher in Sathanpally section	10	
5	Mancherial	Mancherial	Payment to Forest fire watchers	10	
6	Mancherial	Mancherial	Forest fire control management of VSS jaipur	10	
7	Mancherial	Mancherial	Wages to forest fire protection watchers	10	
8	Asifabad	Asifabad	Fire terracing operation in compt. 117 and 118	10	
9	Bellampally	Bellampally	Estimate for fire terracing operation in tharrakalpally Section	10	
10	Siddipet	Siddipet	Formation of Fire Tracing Operation at VSS Chintamadka	10	
11	Wanaparthy	Wanaparthy	Wages to fire watcher in Jangamiapally	10	
12	Yadadri Bhuvangiri	Choutupal	Payment of firewatchers salary for protection in Choutuppall range during 2011-12	10	
13	Amrabad	Amrabad	Maintenanace of fire line 5mtrs width at Vatvarlapally (N) beat Pathoorbata to thouspenta	10	
14	Amrabad	Mannanur	Wages to Fire Watchers in Mannanur Range 2 months 4/11, 5/11	10	

**Findings:** Highest FFM works were undertaken in Bellampally followed by Medak divisions. Evaluation of fire lines made at least two years back cannot be evaluated on the field. Evaluation was done on the basis of the available records. **The average score obtained by forest protection is 10 out of 10.**

**5.9.5 Biodiversity Conservation and Development (BDC):** A total of 669 different biodiversity conservation and development activities (BDC) were undertaken by TSFD CAMPA during 2011-2012. Sixty seven were evaluated under six sub-components of BDC (*table 5.9.5*). Sample evaluation details is provided in Annexure V. Average score based on the percent variation obtained by each BDC sub-component is shown in Figure 5.9.5.

Fig 5.9.5: Summary score of evaluated samples under different BDC sub-components



**Table 5.9.5: Number of samples evaluated under different sub-components of BDC.**

No.	BDC sub components	Samples
A	Habitat Improvement	10
B	Fringe Area Development	1
C	Development of water sources	7
D	Activities (anti - poaching, WEE, Ex situ conservation, Research)	4
E	Wildlife Tourism Activities	37
F	Other BDC activities	8
<b>Total</b>		<b>67</b>

**Findings:** There were 669 works under BDC component undertaken in TSFD CAMPA. Highest activities were undertaken in NZP Hyderabad, followed by Mahabubnagar and Amrabad. Except for development of water resources which scored 88 out of 100, all the other sub components scored full points. **The total score obtained by biodiversity conservation and development scored 98 out of 100.**

No.	BDC sub components	Samples
A	Habitat Improvement	100
B	Fringe Area Development	100
C	Development of water sources	88
D	Activities (anti - poaching, WEE, Ex situ conservation, Research)	100
E	Wildlife Tourism Activities	100
F	Other BDC activities	100
<b>Total</b>		<b>98</b>

**5.9.6 Research & Development (R&D):** The total number of different works under CAMPA NPV component research and development undertaken by TSFD CAMPA during 2011-2012 is 414. 10% of the total works, 41 samples of R&D were evaluated. Details of evaluated samples is provided in Annexure V. The activities were undertaken under FG Warangal and SS Hyderabad divisions.

**Findings:** FG Warangal having four centers across the state and SS Hyderabad undertook 414 R&D activities under TSFD CAMPA during 2011-2012. **The average score obtained by Research and Development is 9.76 out of 10.**

**5.9.7 Capacity Building:** CB activities were undertaken in Telangana State Forest Academy under CAMPA NPV component during the year 2011-2012. The total number of different works under CB component undertaken by TSFD CAMPA during 2011-2012 is 133. 10% of the total works, 13 samples of CB were evaluated. Details of evaluated samples is provided in Annexure V.

**Findings:** All the CB activities was undertaken in Telangana State Forest Academy, Dullapally. CB activities obtained full points during evaluation, the activities were evaluated based on the documents made available by TSFA, Dullapally. **The total score obtained by CB is 10 out of 10.**

**5.9.8 Infrastructure Development and Maintenance (IDM):** A total of 486 activities were undertaken under IDM component during the year 2011-2012. 10% of the total works, 49 samples of IDM were evaluated. Details of evaluated samples is provided in Annexure V.

**Findings:** All the CB activities was undertaken in Telangana State Forest Academy, Dullapally. CB samples were evaluated based on the documents made available by TSFA, Dullapally. **The total score obtained by CB is 9.35 out of 10.**

**5.9.9 Information Communication and Technology (ICT):** The total number of different works under ICT component undertaken by TSFD CAMPA during 2011-2012 was 312. 10% of the total works, 31 samples of ICT were evaluated. Details of evaluated samples is provided in Annexure V.

**Findings:** ICT works were carried out under 25 divisions and was shown in the table under ICT Circle, Head Office. **The total score obtained by ICT is 9.5 out of 10.**

**5.9.10 Ecotourism (ET):** Only two activities under ET component was undertaken by TSFD CAMPA during 2011-2012. Both the activities were carried out in WLM Medak division. One of the activity was drawn randomly and evaluated based on the documents made available by the division. Details of evaluated sample is provided in Annexure V.

**Findings:** The total score obtained by ET is 9.76 out of 10.

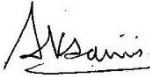



**5.9.11 Office Support (OS):** The total number of different works under OS component undertaken by TSFD CAMPA during 2011-2012 is 118. 10% of the total works i.e. 12 samples were evaluated. Details of the evaluated sample is provided in Annexure V.



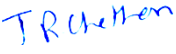



**Findings:** There were a total of 118 activities under OS undertaken in 2011-2012 in seven divisions. OS activities were evaluated based on the available records. **Total score based on the percent variation of the OS activity evaluated on the basis of the available documents is 10 out of 10.**

**5.11 Over all evaluation score:** Scores obtained by different plantation activities and other activities under different CAMPA components is shown in Table 5.11. The total score obtained for the 2011-2012 CAMPA activities is **889.86** out of **1105** i.e. **80.53%** indicating “satisfactory performance”.

**Table 5.11: Overall scoring of TSFD CAMPA undertaken during 2011-2012.**

Quantitative Aspects (A)				Qualitative Aspects (B)			
S.	Main heading	Score	Total	S.	Main heading	Score	Total
I.	Plantation activities (CA and NPV)	358.27	500	I.	Impact of awareness generation campaign	0.85	5
II	Soil and Water Conservation Measures (CA)	260	300	II.	Identification of approved site for plantation	3	5
II.	Other activities (CA & NFM)	9.23	10	III.	Improvement in quality of wildlife habitat	2.7	5
III.	Forest Protection	67	80	IV.	CAMPA benefits (SC/ST/BPL households)	10	10
IV	Forest Fire Management	10	10	V.	Project Awareness	2	5
V	Biodiversity Conservation	98	100	VI.	Transparency, maintenance and payments	2.5	5
VI	Research & Development	9.76	10	VII.	Maintenance of assets created	7.7	10
VII	Capacity Building	10	10				
VIII	Infrastructure Development & Maintenance	9.35	10				
IX	ICT	9.5	10				
X	Ecotourism	10	10				
XI	Office Support	10	10				
<b>Total (A)</b>		<b>861.11</b>	<b>1060</b>	<b>Total (B)</b>		<b>28.75</b>	<b>45.00</b>
<b>Grand Total (A+B)</b>				<b>889.86 1105.00</b>			

Name of evaluators	Signatures	Name of evaluators	Signatures
Dr. Satvant K Saini		Dr. Saurindra Nr Goswami	
Akhilesh Singh		Amit Ashok Singhe	

Ankit Rawat		Aniket Choudhury	
Chetan TR		Rohit Kumar	
Raj Kumar Arya		Neeraj Agrawal	

### 5.9.11 Third party critical comments

#### 1. Project constraints/limitations

What were the constraints /limitations faced by the project authority based on evaluator? Specify

- a) Lack of community participation in CAMPA activities.
- b) Lack of readily available quality planting materials of Teak and NTSH species.
- c) Lack of proven nursery practices for developing quality saplings within the state.
- d) Severe pressure on lands from encroachments.
- e) Lack of sufficient time for site preparation in the degraded lands before plantation.
- f) Lack of sufficient manpower to conduct regular maintenance of plantation and structures.
- g) Lack of holistic understanding on CAMPA components, reporting amongst forest department staffs.
- h) Poorly organized record

#### 2. Suggestions for improvement

Areas of improving the project output? Specify

- a) Involvement of local stakeholders from site selection to maintenance of activities.
- b) Identification of mother trees bearing areas for teak and NTSH species.
- c) Training on forest trees nursery practices for producing quality planting stocks.
- d) Planting of saplings to be synchronized with meteorological conditions (forecasting).
- e) Site - species relationships needs consideration for raising plantation.
- f) Adoption of innovative solutions (*wadi*, etc) for soil and water on degraded areas.
- g) Emphasize on developing short rotation forest plantations as carbon sinks.
- h) Emphasize on wildlife habitat improvement including improvement of the hydrological regime.
- i) Updated CAMPA works to be made available on E-green watch and TGFIMS.

#### 3. Whether the project authorities have felt any need of improving upon any particular activity on methodology? Specify.

Stakeholders' participation in all the project activities from planning to implementation needs to be initiated. Development of ecosystem based site quality indices including key considerations of community preference, biodiversity conservation, soil and water conservation and carbon sequestration should be included

#### 4. Whether the people of the project area feel any need to improve any particular aspects of the project? Specify.

Presently few people from the project area were associated during implementation of activities as daily wage labour. Unless local people are totally aware of the benefits of CAMPA project and they actively participate, it is difficult to get reflections from them on the project.

#### 5. Whether the project should be continued on the same lines or some modifications are necessary. Specify.

The project should seriously make modifications by adopting ecosystem approach to ensure ecological security of the affected areas and the livelihoods of the communities affected by forest diversions. Plantation of local species with multiple benefits instead of planting exotic monoculture like eucalyptus is necessary to improve wildlife habitat and also distribute benefits for the affected people. Project activity should aim at rejuvenation of ecological goods and services like rebuilding soil fertility, pollination, seed dispersal, perennial stream flow, availability of fuelwood, fodder, fruits for the local people. Mechanism for ecological monitoring should be employed for observations, estimation and forecast of the environmental conditions, defining the degree of factors influence resulting in ecosystem changes and estimation of anthropogenic influence resulting in deterioration of the environment. The monitoring should help in the evaluation of biodiversity conservation, climate change and other ecological aspects of CAMPA activities. A system for ecological monitoring should be devised and developed at different tiers of TSFD.

## Chapter 6

### RECOMMENDATIONS

#### Plantation activities

1. Development of Telangana State Site Quality Index (TSQX) based on climate variable, soil parameters, topography, land tenure, and degradation status for plantations.
2. Although from survival point of view, eucalyptus plantations obtained a better score yet avoidance of eucalyptus plantations as habitats by wildlife is a serious concern. It is recommended raising of local fast growing non timber forest products (NTFP) species for deriving multiple benefits for wildlife, human beings and rejuvenation of ecosystem services.
3. For raising teak plantation, planting stock of teak needs to be made from selected mother trees followed by proper root training of teak seedlings and acclimatization of the saplings before field transplantation with a ball of earth. Plantations to synchronize with the onset of monsoon. Sapling not less than 6ft in height should be field planted.
4. Keep updated plantation journals of all the CAMPA plantation activities in every ranges.
5. Eucalyptus not to replace natural teak growing areas.
6. Regular silvicultural practices for NTFP/NTSH and teak plantations to enhance the forest canopy.
7. Fast growing native NTFP/NTSH plantations should be raised for developing forest carbon sink.

#### Other activities

1. Plantation of native NTFP trees to join fragmented reserve forests for improving wildlife habitat and ensure ecosystem continuity.
2. Regular maintenance operations of soil and water conservation structures is necessary. Innovative low cost water harvesting structures like staggered trenches, *jaal kund* is better for treating catchments.
3. In areas frequented by wild herbivores, CPT be avoided to reduce the risk of wildlife accidents.
4. Maintenance of forest protection measures like chain link fencing in areas susceptible to severe grazing pressure is necessary.

5. Building trust among the forest fringe population on the benefits of stall-feeding for ecological benefits is a better way to reduce the grazing pressure.
6. Awareness programme for communities on the need for biodiversity conservation to enhance the perennial flow of ecosystem services is necessary.
7. All the activities undertaken under CAMPA is to be updated regularly in E-green watch for ease in conducting google earth based regular monitoring of activities.
8. Ecological monitoring of all the works on an annual basis is necessary.

### **General activities**

1. Each division to update CAMPA list of works under each component as presently done for the year 2016-2017 in the FAMIS portal.
2. Training of officials on CAMPA components/sub-components for correct booking of works under the appropriate head/sub-head. A web based toolkit support system if available will assist forest officials to correctly book CAMPA works under the appropriate components.
3. Maintenance of record for all the activities is vital for proper monitoring of works. Irrespective of any situation measurement books / plantations journals should always be kept with care in the ranges where CAMPA works (*plantation and other activities*) have been carried out.
4. Adoption of recording CAMPA activities details grid wise. This is vital for ease in evaluating quantification of works.
5. Participatory selection of sites for CA plantations and CAMPA other activities in degraded lands with stakeholders for developing enhanced climate change resilient forests.