

DRAFT REPORT
on
Evaluation Study of Forestry Works
for the period 2009- 2013

CAMPA: UNIT - III



Submitted to:
Forest Department, Government of Karnataka



NABARD Consultancy Services (NABCONS)

Wisdom beyond Business

Wholly owned subsidiary of NABARD

NABCONS, Karnataka Regional Office

NABARD Towers, 46 Kempe Gowda Road, Bangalore - 560 009

Evaluation of Forestry Works

CAMPA: UNIT - III

Index

Chapter No.	Content	Page No.
I	Executive Summary	1 - 10
II	Introduction	11 - 13
III	Sample Work	14 - 15
IV	Material and Methods	16 - 18
V	Analysis and Evaluation Results	19 - 43
VI	Observations and Impact Analysis	44
VII	Recommendations	45
	Annexure	

CHAPTER - I

EXECUTIVE SUMMARY

A. Introduction

The CAMPA program is formulated with an objective of raising alternative plantation to compensate the loss of forest area diverted for the purpose of developmental programs under the Forest conservation Act-1980. The program and activities is completely founded from the fees collected from the project proponents as NPV and plantation cost, the main objective of CAMPA is to create additional plantations on the non-forest land acquired from the project proponents or on the degraded forest lands identified for the compensatory plantations. The guidelines to use the CAMPA funds are issued by the Ministry of Environment and Forests from time to time. The Governing council created in the state headed by Chief Secretary is responsible for proper utilization of funds according to the guidelines.

B. Objectives of CAMPA.

1. The objectives of CAPMA are to raise the plantations on the non-forests and degraded forests lands to compensate the forests lost due to diversion of forests lands.
2. To take-up departmental works to promote the forest conservation and protection using CAMPA funds.
3. To take-up capacity building works that would contribute for the forest conservation and development.

C. Founding sources.

The scheme is provided by the CAMPA funds consolidated by Government of India from the NPV and charges collected from the project proponents for diversion of forests lands for the non-forestry purpose. The funds released year wise to Karnataka forest department is as follows.

D. Models of the CAMPA works.

Under CAMPA the following programs and activities are undertaken:

1. **Compensatory plantations:** The compensatory plantation is raised on the non-forest lands as well as degraded forests to compensate the forest area lost due to diversion of the forests lands. The fees collected from the project proponents are used for the purpose of raising and maintaining the plantations. The size of the plantations raised under this program varies from 1-10 ha.
2. **General plantations.** The funds have been used to raise the plantations in the fresh area independent of the compensatory plantations as part of the general Afforestation work.

3. **Afforestation on degraded sites.** The plantations have been raised on the degraded forests lands which are assigned against the diversion of forests lands to compensate the area lost by rising one and half a time the area diverted.
4. **Boundary consolidation and soil moisture conservation work:** Under CAMPA the funds are used for taking up the boundary consolidation works of the natural forests. The forest area vulnerable for the encroachments are is identified and the boundary consolidation work is being taken-up.
5. **Fire protection and fire line formation:** Fire protection is a very important work of the forests conservation and development. The CAMPA funds have been used to meet the additional requirement of the fire protection work.
6. **Building works and maintenance:** It is observed that the substantial funds of CAMPA fund has been utilized for the creation of infrastructure including construction of new buildings and the maintenance of the old buildings.
7. **Vehicles and Equipments:** It is also observed that, CAMPA funds have been used for the vehicles purchases and equipments purchases.
8. **Wildlife works:** The CAMPA funds has been utilized for the protection of wild life by undertaking works like desilting of tanks, salt lick creation, Soil and moisture conservation works, Elephant depredation camps and similar Habitat improvement works.
9. **Production of Quality seedlings:** CAMPA funds have been used substantially for the production of quality seedlings at nursery and research stations.

2. Results and Analysis of Evaluation

The field data collected through questionnaires were tabulated and analysed to arrive at the success of the plantations on parameters like survival rate, height and collar diameter. The age of the plantation being very small (1-3 years) the productivity estimation was not attempted, however some rough calculations have been made and discussed in the main part of the report.

2.1 CAMPA Plantation Evaluation

The plantations selected on the randomized basis were assessed by measuring the growth parameters along with the survival counts. The results are tabulated to estimate the survival percentage for each division. Further the weighted average for the circle was estimated. The plantations were ranked as very good (80% and above), good (60-80%) and average (40-60%). Survival rate less than 40% was grouped as failed and poor. The following results were obtained for different category of the plantations.

In the present report, three circles - Dharwad, Belgaum and Gulbarga - have been covered.

2.1.1 Survival rate rankings:

The following table gives the rankings of plantation in each circle. The overall survival rate was around 78% for all the plantations under CAMPA in Belgaum, Dharwad and Gulbarga circles. As the plantations were very young the success rate was good. However the success rate was relatively low in the third year plantations as compared to first year plantations. The performance of the plantations has been graded according to the success rate showing the following table gives the rankings circle wise.

Table showing circle wise success ranking of plantations

Circle	Very Good	Good	Average	Failed
Belgaum	2	3	1	0
Gulbarga	2	7	4	0
Dharwad	1	3	2	0
% rankings	20	52	28	

Grading of plantations: In all the circles, 20% of the plantations were rated as very good; 52% as good; and 28% as average where the survival rate is less than 50%. Out of 13 plantations evaluated in Gulbarga, it had two very good plantations, 7 good plantations and 4 average plantations. Similarly of 6 plantations evaluated 2 were very good followed by 3 as good and one as average. Dharwad had one very good plantation followed by three good and two as average.

Fig. showing the circle wise success ranking of plantations



2.1.2 Species survival:

The analysis of species survival rate showed significant difference from species to species. The most common species planted in Gulbarga were Pongamia and Glyricidia and Cassia siamea which have shown more than 75% survival indicating more a good success rate. In Belgaum the most common species planted are Pongamia followed by Holoptelia and Acacia. All have shown more than 75% survival. Dharwad also has shown good survival rate of 75% and the species mix includes Pongamia and cassia and Acacia auriculiformis and *Azadirachtaindica*..

2.1.3 Height growth:

The height was measured and tabulated to estimate the growth potential and to project the productivity. The mean height though varied from species to species the mean annual increment was around 0.8 meter for all the species in the high rainfall areas like Belgam and Dharwad. Similarly in the low rainfall areas like Gulbarga, Bagalkot it was slightly lower than 80 cm per year. The slow growing species in the high rainfall areas were comparable with the fast growing species in the low rainfall areas with regard to the height increment. The graph below represents the growth pattern of different species in different divisions.

2.1.4 Collar diameter:

The collar diameter MAI was estimated to project the productivity. The mean collar diameter is 3.3 cm per annum in the high rainfall areas and 2 cm in the low rainfall areas. The increments were varying from species to species and from site to site due to many locality factors.

Species wise survival in different divisions

The species wise survival in different models has been represented circle wise for illustration.

a) Dharwad circle

In Dharwad circle *Pongamiapinnata* was shown 81.67% survival followed by *Meliadubia* with 77.50 survivals. The weighted average is 76.70%.

Table showing survival Rate of different species in Dharwad circle

Species	Division			Mean
	Dharwad	Gadag	Haveri	
<i>Pongamiapinnata</i>	75.00	80.00	90.00	81.67
<i>Holoptelicintegrefolia</i>	59.00	82.00	80.00	73.67
<i>Meliadubia</i>	70.00	85.00	77.50	77.50
<i>Tectonagrandis</i>	70.00	90.00	70.00	76.67
<i>Embelicaofficinalis</i>	60.00	72.00	90.00	74.00
Mean	66.80	81.80	81.50	76.70
Sem±				
Cd@5%				

Fig. showing the survival Rate of different species in Dharwad circle

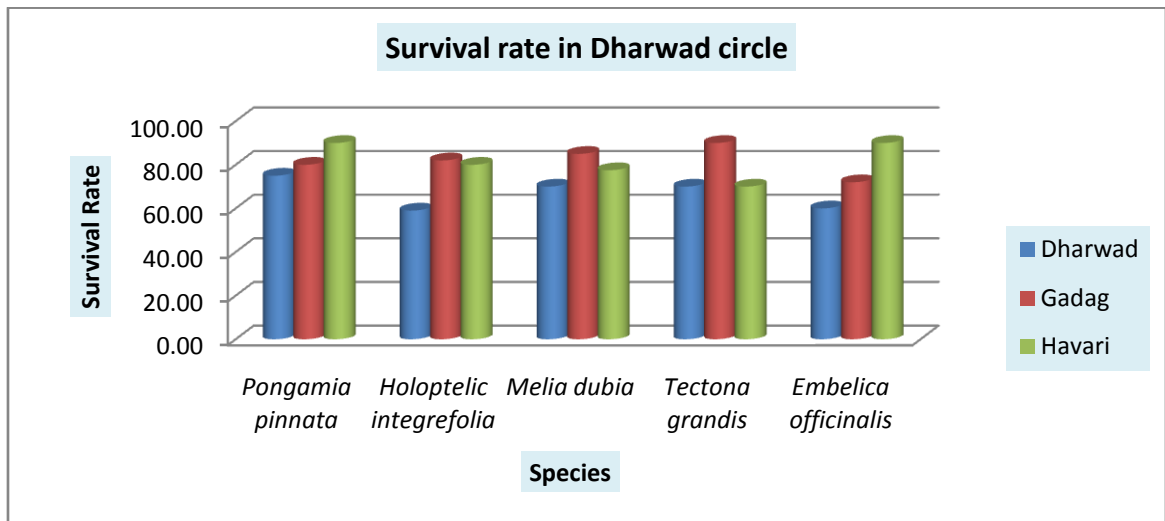


Table showing survival Rate of different species in Gulburgcircle

Species	Divisions				Mean
	Gulbarga	Raichur	Bidar	Yadgir	
<i>Pongamiapinnata</i>	85.00	85.00	74.00	85.00	82.25
Glyricidia	80.00	85.00	80.00	82.00	81.75
Cassia siamea	68.20	80.00	85.00	80.00	78.30
<i>Anacardiumoccidentale</i>	72.00	80.00	75.00	60.00	71.75
<i>Simaroubaglauca</i>	72.00	85.00	85.00	78.00	80.00
Mean	75.44	83.00	79.80	77.00	78.81
Sem±					
Cd@5%					

In Gulbarga circle the most common species planted are Glyricidia, Pongamia, *cassia siamea* and Simaruba. In few plantations *Hardwickiabinata* and *Azadirachtaindicahave* also been planted. The species wise survival analysis was done through two wayANOVA and the results are presented in the table above.

It is found that Pongamia was found to have highest survival rate of 82.25 % across divisions followed by Glyricidia with 81.7%. Simaruba was found to have the survival rate of 80%.

Overall mean survival was 78.81 for all the species across all division indicating good success of the plantations in the initial years.

Fig.showing the survival Rate of different species in Gulburga circle

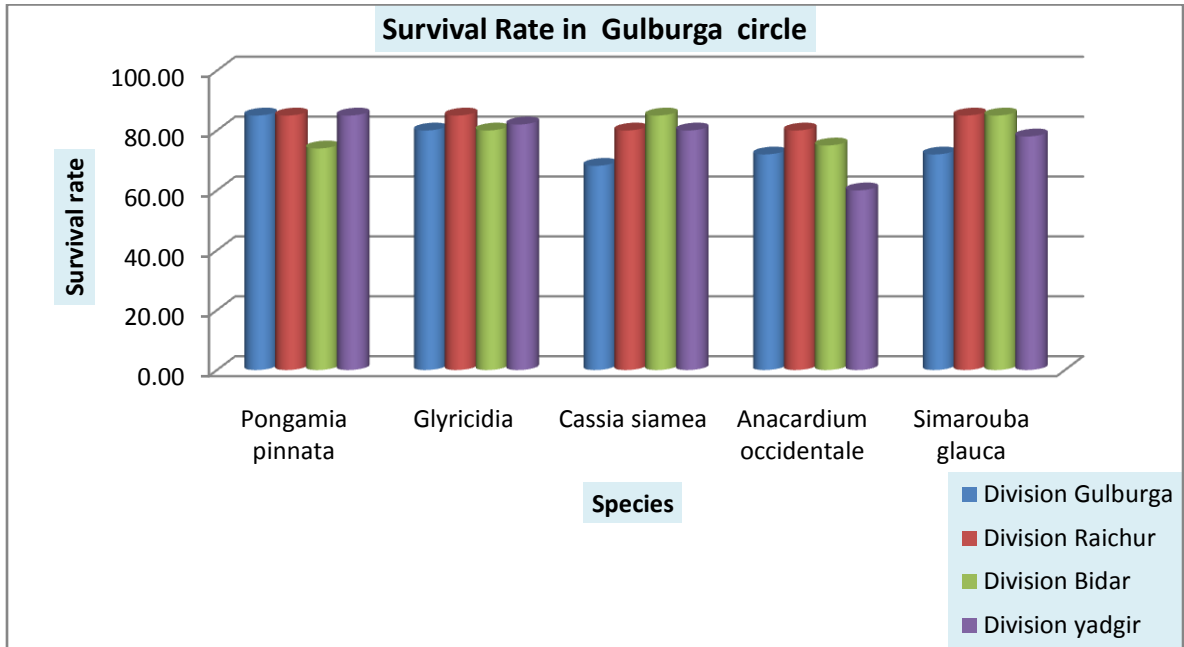
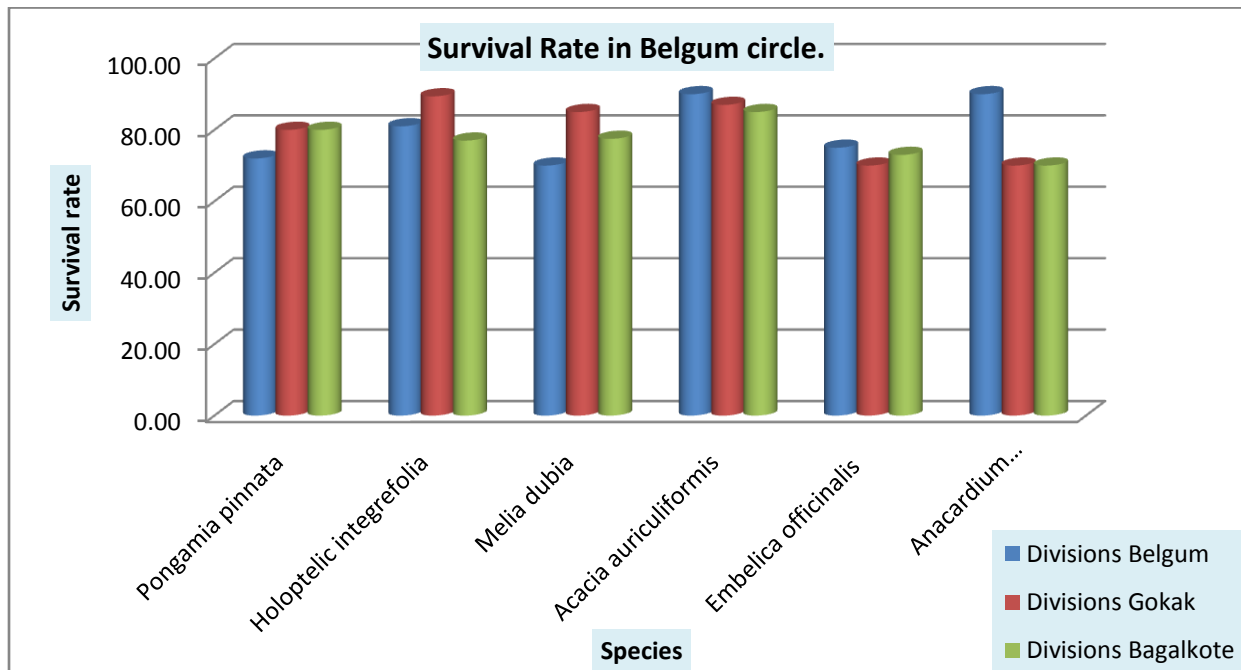


Table showing survival Rate of different species in Belgumcircle

Species	Divisions			Mean
	Belgaum	Gokak	Bagalkote	
<i>Pongamiapinnata</i>	72.00	80.00	80.00	77.33
<i>Holoptelicintegrefolia</i>	81.00	89.40	77.00	82.47
<i>Meliadubia</i>	70.00	85.00	77.50	77.50
<i>Acacia auriculiformis</i>	90.00	87.00	85.00	87.33
<i>Embelicaofficinalis</i>	75.00	70.00	73.00	72.67
<i>Anacardiumoccidentale</i>	90.00	70.00	70.00	76.67
Mean	79.67	80.23	77.08	78.99
Sem±				
Cd@5%				

In Belgaum the most common species planted are Pongamiapinnata followed by *Holoptelicintegrefolia* and *Acacia auriculiformis*. The other common species planted are *Cassia siamea*, *Anacardium occidentals* and *Azdirachtaindica*. When the survival rates were analyzed through ANOVA it was found that *Acacia auriculiformis* had 87.33% survival followed by *Holoptelic* with 82.47%.

Fig. showing the survival Rate of different species in Belgaum circle



2.2 Productivity projection:

The productivity projection was attempted to assess the future potential growth of the plantations. The mean annual increment of the diameter was found to vary between species to species and division to division.

Acacia auriculiformis: The diameter increment was 3.3 cm/year in Belgaum and Yadgir. This indicates a possibility of trees attaining 30 cm diameter at the end of 10 years. The basal area of 7-10 m²/ha/ at 10 year rotation. The height increment is 1 meter per year. At the age of 10, the mean height would be varying between 7-8 meter. The expected biomass would be 70-80 cum/ha. This is the most conservative estimate. Using Acacia as an indicator species the mean productivity of slow growing species could be in the range of 5-6 cum/year.

Holoptelic integrifolia: This is a native species which has been taken as indicator species to project the productivity. The mean annual increment of the diameter is 3.3cm/year. The mean height is 0.8 cm/year. The volume production would be in the range of 5-8 cum/year.

2.3 Fire protection and fire line formations

The works were assessed through verification of records and other proxy evidences. The works were found executed as per the Range records. However their quality and the site specific needs were not assessed which may be necessary as there are sudden increases in the investment on the fire protection from CAMPA.

2.4 Wildlife works

Wildlife works including salt licks, de-silting of water holes, anti-poaching and Elephant depredation camps were assessed and the results are discussed in the main report.

2.5 Building works

New construction of buildings and the maintenance works of older buildings has been done under CAMPA. The evaluations findings are discussed in the main report.

2.6 Vehicles and maintenance

Vehicles purchase and their maintenance has been assessed and the results are tabulated in the main report.

3. Impact Analysis of Campa Scheme

The overall performance of the scheme and its impact on the objectives of the programs were assessed based on the survey results. The results are discussed here against objectives.

1. **Compensatory Afforestation.** The compensatory plantation objective is to raise the plantation on the non-forest lands equivalent to the area diverted for the developmental projects and to establish the forests to derive similar forests ecosystem function. The raising of plantation though may not replace the bio-diversity value of the forests that is lost; the man-made forests will meet the other functional requirement of the forests like green cover, carbon sequestration and soil and water conservation etc. Thus the compensatory plantation primary objectives have been served.
2. **Bio-diversity value.** The species chosen in each plantation are limited to very few (less than 10) and therefore there is a limitation of the plantations in achieving the objectives.
3. **Productivity of the plantations.** The productivity has been assessed by measuring the growth parameters. The overall increment in the height is around 0.75 meter/annum and the collar diameter is about 1 cm which is moderate as compared to the growth rates on better soils and high rainfall areas. The extrapolation of the growth parameter will give us approximately 8 cm diameter (DBH) and 6 meter height at the end of 8 years for the fast growing species. The mean basal area will be around 10 m²/ha/ at 10 year. And it may take 40 years to cover the canopy.
4. **Climate change mitigation.** The productivity of the plantation at the rate of 10 m² /basal area with a mean height of 6 to 7 meter will give approximately 5 to 6 m³/year in the drier areas and 10 to 12 m³ /ha/year in high rainfall areas. This rate of productivity can sequester on an average 2 tons of carbon/ha/year.

5. **Employment generation.** The investment on compensatory plantation has generated (70% plantation cost is labor cost) employment in the rural areas. The 70% of cost of raising plantation goes for employment.
6. **Investment on non-plantation works.** More than 40% of the funds under this scheme has been done on the infrastructure like buildings, Roads, and equipments to strengthen the departmental capacity. This has been difficult to relate to the benefits.

4. Recommendations

1. The activities under CAMPA are too many resulting in very thin spread of investment which may not have desirable impact on the departmental programs. It should focus much on the compensatory plantations by spending 70% investment and rest on the natural forests management.
2. Expenditure on the building maintenance and vehicles should not be a major activity.
3. The investment on the research and wildlife is inadequate needs to be balanced.
4. The natural forests, bio-diversity conservation, enrichment planting and research programs needs to be given priority.
5. **Plantation size:** Many compensatory plantations have been raised are very small in size (less than 5 ha). This may not be viable to maintain and protect. It is better to aggregate the smaller units into a viable size of at least 10 ha to raise plantations.
6. The plantation on degraded sites must be well defined as in many places well stocked areas have been planted up.
7. The site clearance for raising plantation was noticed in some areas which need to be avoided.
8. **Choice of species:** The species choice was very mechanical and there was no effort to match the sites.
9. *Acacia auriculiformis* is planted as core species in many compensatory plantations in high rainfall areas which may be completely avoided. Native species mix is the best option.
10. The SMC works are done very unscientifically. A guideline may be necessary to design and structure the works by estimating the quantum of water that could be impounded is to be

done. The contour maps are to be used to locate the structure. The planning processes to regulate the SMC works are necessary.

11. The protection measures were not effective in many places. It is essential to provide maintenance provisions for five years so that the purpose is well achieved.
12. **Plantation care:** The plantation care and maintenance needs to be done for minimum five years. The investment must be done to ensure success of the plantations.
13. CAMPA must set a very successful model of plantation through innovations and higher investment as there is no cap on the unit cost.
14. Three year assessment is too early to judge the success. There should be five years interval evaluation twice to make a meaningful evaluation.
15. **Internal evaluation:** The internal evaluation needs to be strengthened and the database must be established to monitor the changes.

CHAPTER - II

INTRODUCTION

The CAMPA program is formulated with an objective of raising alternative plantation to compensate the loss of forest area diverted for the purpose of developmental programs under the Forest conservation Act-1980. The program and activities is completely founded from the fees collected from the project proponents as NPV and plantation cost, the main objective of CAMP A is to create additional plantations on the non-forest land acquired from the project proponents or on the degraded forest lands identified for the compensatory plantations. The guidelines to use the CAMPA funds are issued by the Ministry of Environment and Forests from time to time. The Governing council created in the state headed by Chief Secretary is responsible for proper utilization of funds according to the guidelines.

1.1 Objectives of CAMPA

4. The objectives of CAPMA are to raise the plantations on the non-forests and degraded forests lands to compensate the forests lost due to diversion of forests lands.
5. To take-up departmental works to promote the forest conservation and protection using CAMPA funds.
6. To take-up capacity building works that would contribute for the forest conservation and development.

1.2. Funding sources

The scheme is provided by the CAMPA funds consolidated by Government of India from the NPV and charges collected from the project proponents for diversion of forests lands for the non-forestry purpose. The funds released year wise to Karnataka forest department is as follows.

1.3 Models of the CAMPA works

Under CAMPA the following programs and activities are undertaken.

1.3.1 Compensatory plantations

The compensatory plantation is raised on the non-forest lands as well as degraded forests to compensate the forest area lost due to diversion of the forests lands. The fees collected from the project proponents are used for the purpose of raising and maintaining the plantations. The size of the plantations raised under this program varies from One to Ten Ha, and many a times on the highly degraded sites. However from raising the plantations the CAMPA funds also is used for the Boundary consolidation and infrastructure development works.

1.3.2 General plantations

The funds have been used to raise the plantations in the fresh area independent of the compensatory plantations.

1.3.3 Afforestation on degraded sites

The plantations have been raised on the degraded forests lands which are assigned against the diversion of forests lands to compensate the area lost by rising one and half a time the area diverted.

1.3.4 Boundary consolidation and soil moisture conservation work

Under CAMPA the funds are used for taking up the boundary consolidation works of the natural forests. The forest vulnerable for the encroachments are identified and the boundary consolidation work is taken-up.

1.3.5 Fire protection and fire line formation

Fire protection is a very important work of the forests conservation and development. The CAMPA funds have been used to meet the additional requirement of the fire protection work.

1.3.6 Building works and maintenance

It is noticed that the substantial funds of CAMPA fund has been utilized for the creation of infrastructure including construction of new buildings and the maintenance of the old buildings.

1.3.7 Vehicles and Equipments

It is also observed that, CAMPA funds have been used for the vehicles purchases and equipments purchases.

1.3.8 Wildlife works

The CAMPA funds has been utilized for the protection of wild life by undertaking works like desilting of tanks, salt lick creation, soil and moisture conservation works, elephant depredation camps and similar habitat improvement works.

1.3.9 Production of Quality seedlings

CAMPA funds have been used substantially for the production of quality seedlings at nursery and research stations.

1.4 Evaluation Objectives of CAMPA

The CAMPA work has been awarded for the evaluation work in two units of the State. Each unit is composed of group of circles comprising of 11 divisions in each Unit. The following objectives have been listed as the Terms of Reference.

A) Physical verification

- To measure the extent to which the works were carried out for each of the schemes.

B) Impact assessment

- To measure the efficiency and effectiveness of the schemes

C) Gaps in implementations

- To identify the key issues and gaps in implementation and recommendations which could improve the quality of implementations

CHAPTER - III
SAMPLE DETAILS

The data was grouped into activities like plantation, Fire protection, Building maintenance, Survey and Demarcation, Equipments and vehicles, Re-vitalization of VFC which includes supply of energy saving devices. In each year the data was sorted out into divisions. Using probabilistic sampling method 10% sampling was done. It was further ensured to cover at least one activity in each Range.

Table showing the number of samples selected for evaluation under CAMPA unit III

Sl. No.	Activities	Total No. of activities					No. of Samples selected				
		09-10	10-11	11-12	12-13	Total	09-10	10-11	11-12	12-13	Total
1	Plantations	0	142	231	123	496	0	14	23	13	50
2	Building Construction & Maintenance	93	90	9	15	207	10	9	1	2	22
3	Survey & Demarcation	127	85	39	28	279	13	9	4	3	29
4	Vehicles & Equipments	105	64	17	0	186	11	7	2	0	20
5	Fire Protection	78	174	0	0	252	8	18	0	0	26
6	Revitalization of old defunct VFC	76	35	0	0	111	8	4	0	0	12
7	Wild life Protection	29	54	24	38	145	3	6	3	4	16
	Total	508	644	320	204	1676	53	67	33	22	175

Fig. showing number of activities 2009-10 to 2012-13 in CAMPA Unit

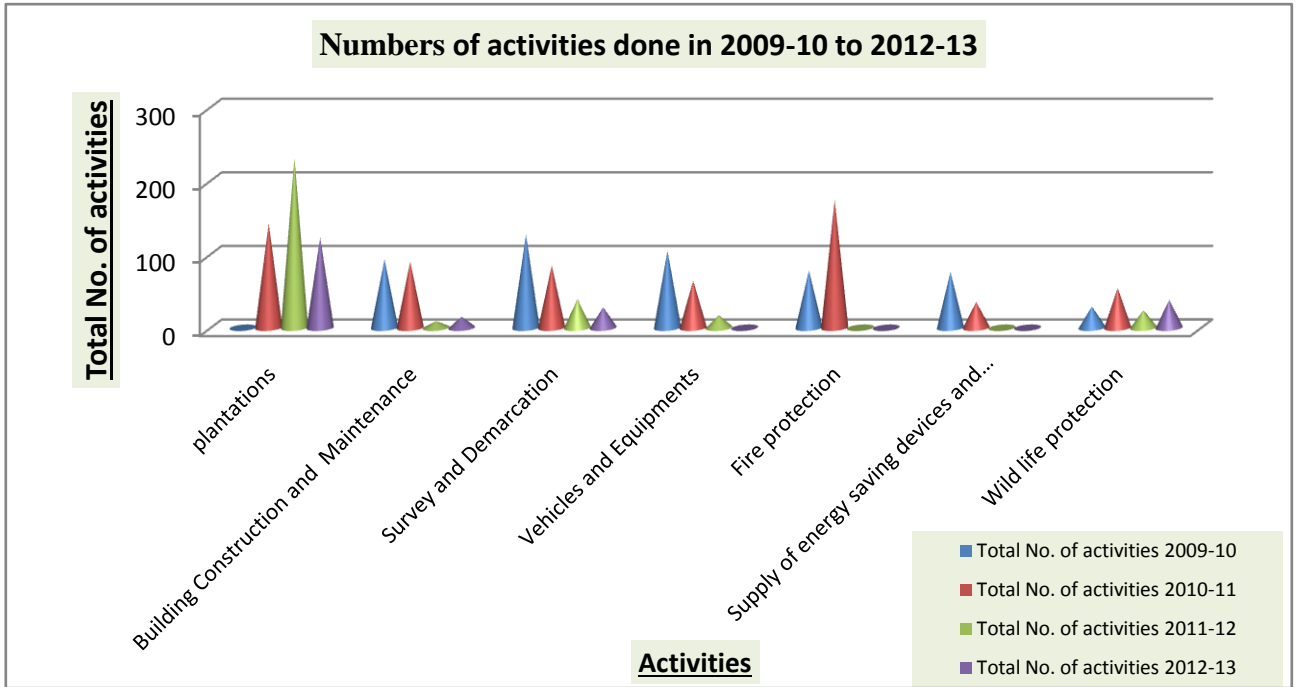
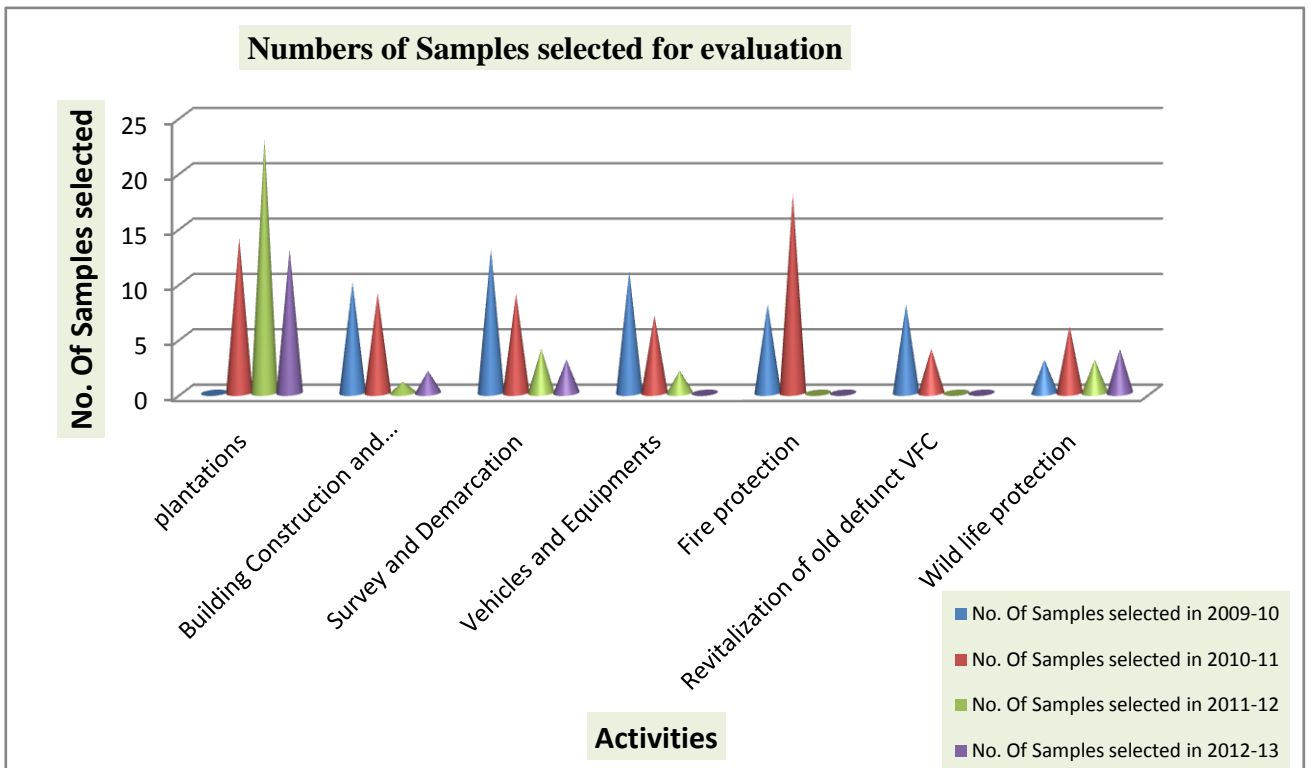


Fig showing number of Samples selected for evaluation in CAMPA Unit 3



CHAPTER – IV

MATERIAL AND METHODS

The present work was carried out to evaluate the forestry work done under CAMPA, during the year 2009-10 to 2012-13 in Unit - 3 (Shimoga, Bellary, Hassan, Chikmagalur circles). Details of material used and methodology followed and observations recorded during the course of investigation are detailed here under.

3.2 Evaluation methods and techniques

3.2.1 Plantations

Evaluation method: as per the terms of reference, 10 % of total numbers of plantations were randomly selected from each division and in each year. The selected samples were later evaluated with 2% intensity. For every 5 ha of plantation one sample plot of 0.1 ha was randomly selected using GPS to measure parameters like height survival rate, collar diameter and vigor of the plantations. The general observations were also selected with respect to biodiversity, soil moisture conservation work ext

Procurer to select plots in plantations

The plantations were divided in to 5 ha gird on the map. Depending on the size of the plantation the number of sample plots was selected as follows.

- (1) <5 Ha - one sample plot
- (2) <10 Ha - two sample plot
- (3) <15 Ha - three sample plot
- (4) < 20 Ha - four sample plot
- (5) >20 Ha – one sample plot for every 5 Ha
- (6) Sample plot size – 1000 m² (31.62 m × 31.62 m)
- (7) GPS point: please record the GPS point.

Selecting 0.1 ha in 5 ha gird: in a 5 ha gird the plots are divided into 7*7 rows and columns .as shown in fig below. Further the procedure to select plots for deferent size plantation is given well in advance as shown in below.

1	2	3	4	5	6	7
2						
3						
4						
5						
6						
7						

- | | | |
|----------|----------------------|--|
| 1) 5 ha | -4 th row | 6 th Colum - (1 sample plot) |
| 2) 10 ha | -3 rd row | 7 th Colum – (1 and 2 sample plot) |
| 3) 15ha | -2 nd row | 2 nd Colum (1, 2 and 3 sample plot) |
| 4) 20 ha | -5 th row | 4 th Colum (1,2, 3and 4 sample plot) |
| 5) 25 ha | -1 st row | 6 th Colum (1,2,3,4 and 5 sample plot) |
| 6) 30 ha | 6 th row | 3 rd Colum (1,2, 3,4,5 and 6 sample plot) |

(e) Regarding virtual demarcation of sub plots of 0.1 Ha. One need not physically divide the subplots on the ground. For example 4th row 6th Colum means we take 31 × 4 meters (124 meters) from the corner main plot to the point on 4th row and then from the marked point, measure 6×31 meters to reach the 6th Colum (horizontally) . Follow same procedure for all other rows and columns.

Measurements

a) Survival counts: The total number of plants planted in the sample plot of 0.1 ha was manually counted by counting the pits/trenches. Later the plants surviving were counted to calculate the survival %.

b) Height: In each sample plot height was measured for 2% of the total plants using the calibrated pole or the tape.

c) Collar diameter: The collar diameter was measured for those plants which were measured for the height in cm. (girth was measured and converted to diameter).

d) Counting the natural plants in the area: The plants that were found naturally were counted for the purpose of bio-diversity.

3.2.2 Fire protection

Fire line Formations was physically checked and Fire Protection work is difficult to verify. But using proxy methods like alter Fire protections were effective or not. (The questioner is appended in the annexure)

3.2.3 Boundary consolidation

The GPS was used to record the perimeter. Randomly the measurements can be recorded. The quality of the work regarding the effectiveness may be recorded as Good. Satisfactory, Poor with any other field observations.

3.2.4 Vehicles and Equipments

Vehicles and equipments verified through frequency of use, checking the stock book, brand/company, Check log book.

3.2.5 Wildlife works

The quality of the work for its effective use or abandoned and its impact on the objective was recorded. Verification of the wildlife crimes caught by the camp personnel in the corresponding year, Increase or decrease in the crimes in the corresponding year was recorded and Salt licks are difficult to verify but use proxy indicators if any like pits or animal sighting records if available as they are maintained in the parks.

3.2.6 Building works and maintenance

The quality and usefulness was the criteria to judge the work of building maintenance and for the roads physical quantity like length, width and depth at random places was measured.

CHAPTER – V
ANALYSIS AND EVALUATION RESULTS

The results of the CAMPA works evaluated *viz.*, plantation, Fire protection, Building maintenance, Survey and Demarcation, Equipments and vehicles evaluated in unit 3 are presented in this chapter.

4.1 Model-1 raising plantations on degraded sites under CAMPA

Under CAMPA different models of plantations are raised to compensate the forests area lost due to diversion of forests lands.

The department has been raising miscellaneous plantations on the degraded sites (both on non-forests and degraded forests land) in the Forest areas by planting native species under different agro-climatic conditions. The objective of the scheme is mainly to create man-made forests on the non-forest lands to compensate the forests lost due to their diversion for the developmental projects. Similarly on the degraded forests also the compensatory plantations are raised to compensate the forests lost due to diversion of the forests lands by collecting double the cost of plantations in cases when the alternative land is not provided. For the purpose of evaluation the following three different types of plantations raised under CAMPA are grouped and assessed for the purpose of evaluation.

Table showing the plantations raised under CAMPA during 2010-13 of different models

Year	Compensatory Plantation	Plantation on Degraded Sites	General Plantations
2009-10	-	-	-
2010-11	-	60	50
2011-12	40	70	160
2012-13	-	-	130

1. Plantations raised under CAMPA

To meet the Afforestation objectives of the Forest department the plantations have been raised under CAMPA scheme in different forest divisions. For the purpose of evaluation the following samples were assessed for the survival and the growth by selecting the plantations on random basis. The results are presented in the following tables (Table No 3, 4).

- (a) **Survival assessment:** The survival of plants has been assessed by selecting the sample
- (b) Plots randomly and the results are indicated in the table (Table No 3.4).

Table showing the survival rate and growth parameters of the plantations raised under CAMPA between 2010-11

Division	Location	Extent (in ha)	Species	Survival %	Mean Height	Mean Diameter
Bhadravathi	Kottadal	19.60	Melia, Neem, Tamarindus	100	2,5	1
Chitradurga	Bukkalarahalli	27.82	Pongamia	76	1.2	.84
Davanagere	Honnali	20	Acacia, Pongamia	90.15	1.5	1.2
Hassan	Alur	6	Pongamia, Seemaruba, Meliadubia	30	2	1.2
Koppal	Gangavathi	20	Acacia, Thespesia	60	1.4	1

4.1.1 Key findings.

The survey has shown that, the CAMPA plantation raised during 2010-11 in different divisions have shown the survival percentage varying from 60 to 100 %. The lowest survival was recorded in Alur division with 30% survival followed by Koppal with 60% survival.

4.1.2 Analysis for the failure:

The causes for the failure of the plantations in Alur was critically examined and found that, poor protection and lack of supervision were the main reasons. However the moderate survival in Koppal division can be attributed to low rainfall and wrong selection of species.

Table showing the survival percentage and growth parameters of the plantations raised under CAMPA between 2011-12

Division	Location	Extent (in ha)	Species	Survival %	Mean Height	Mean Diameter
Bellary	Yerbanahalli	10.77	Hardwickia, Glyricidia	59.50	0.76m	1.5 cm
Bellary	Shidegallu	23	Pongamia, Hardwickia, Neem, Ficus	71.82	0.7 m	1.4 cm
Bellary	Bandri	50	Pongamia, Cassia, Ficus, Hardwickia	72.39	0.6 m	0.75 cm
Chitradurga	Marikanive	25	Pongamia, Syzygium, Embelica	85	1.4	
Chitradurga	Bukkalarahalli	4.25	Seemaruba, Pongamia	65		
Davanagere	Kumaranahalli	1.415	Acacia auriculiformis	62.03	2.165	1.47
Koppal	Toppalkatti	40	Pongamia, Thespesia, Embelica	60	1.1	
Weighted Average				70.13		

Division	Location	Extent (in ha)	Species	Survival %	Mean Height	Mean Diameter
Shimoga	Tirthahalli	10	Syzygium, Jack, Garcinia,	91	0.9	1.1
Shimoga	Agumbe	25	Artocarpus, Mango, Syzygium, Mahagony	75.45	1.5	1.8
Bhadravathi	Thyagadabagi	23	Artocarpus, Pongamia	94.70		
Sagar	Huligadde	25	Machilus, Rosewood, Syzygium, Pongamia, Terminalia bellerica	82.5	1.01	2.6
Sagar	Udri	10	Acacia auriculiformis	67		
Weighted Average				82.86		
Hassan	Manjenahalli	6.38	Mahagony, Embelica, Pongamia	80		
Tumkur	Sira	20	Hardwickia, Wrightia, Neem	85.35	0.9	1.0
Weighted Average				84.04		
Koppa	Samse	50	Terminalia tomentosa, Terminalia C, Artocarpus, Terminalia, Embelica	70.7	0.45	2.72
Koppa	Kikre	10	Artocarpus, Lagerströmea, SM, Terminalia	77	1.2	1.8
Weighted Average				71.50		

4.1.3 Key findings:

The survival % of plantation raised during 2011-12 is found varying between 59 to 94 percent across divisions. The circle wise survival rate and their corresponding rank is given in the table below.

Table showing circle wise success ranking of 2011-12 plantations

Circle	Very Good	Good	Average	Failed	% of success (very good and good)
Bellary	1	6	1	0	86
Shimoga	3	2	0	0	100
Hassan	0	2	0	0	100
Chikmagalur	0	2	0	0	100
%	24	71	5	0	100

Fig showing the circle wise success ranking of plantations



Shimoga, Hassan and Chikmagalur have shown good success rate of plantations with a weighted average of 74% survival rate. Similarly the highest man survival rate was Hassan with 84.04% followed by Shimoga with 82.86 % and Chikmagalurcircle with 71.75%. However the Bellary circle has shown a lightly lower average of 70.13.

Table showing the survival rate and growth parameters of the plantations raised under CAMPA between 2012-13

Division	Location	Extent (in ha)	Species	Survival %	Mean Height	Mean Diameter
Bellary	Hosahalli	90	HardwickiaPongamia, Dalbergiasissoo, Cassia siamea	77	0.78	0.57
Bellary	Sunkadakallu	83.84	Hardwickia, Pongamia, CA, Ficus	88.93	1.2	2.1
Bellary	Hadagali	22.50	SeemarubaHardwickiaPongamia	43	1.6	2.2
Bellary	Nimbalgere	1.29	HardwickiaPongamia	94.89	0.75	1.84
Chitradurga	T.Nulenur	19.39	, Pongamia, SeemarubaEmbelia	87.75	1.3	1.2
Koppal	Tavargera	26	PongamiaThespesiaMelia	75	2.5	
Davanagere	Machihalli	5.69	Seemaruba. Pongamia, Butea, Holoptelia, Sygygium	88.6	1.52	1
Davanagere	Gopagandana halli	25	Hardwickia, Ficusbengalensis, Neem, Euca	95.82	0.65	0.79
Davanagere	Karadigudda	25	Pongamia, Seemaruba, Hardwickia, Holopteliaintegrifolia	61.45	0.64	1.6
Tumkur	Bukkapatna	25	Pongamia, Hardwickia	80	1.1	1.2
Tumkur	Kamplapura	25				
Bhadravathi	Ajjampura	25	MeliaArtocarpus	100	1.28	1.9
Koppa	Y.Gere	10	Syzygium, Embelica, Adina Cordifolia, Vateriaindica		0.94	1.2

4.1.4 Survival rate

The overall survival percentage of all the plantations is 78% (weighted average). The Bhadravathi division has shown 100% survival rate followed by Davanagere division and Bellary with 94.5% survival rate. The lowest was recorded in Bellary in one of the plantation with 435 where the *Hardwickiabinata* was the main species planted. The circle wise survival rate is presented here with rankings.

Table showing circle wise success ranking of 2012-13 plantations

Circle	Very Good	Good	Average	Failed	% of Very Good & Good
Bellary	2	5	1	0	73
Hassan	0	1	0	0	9
Shimoga	1	0	0	0	9
Chikmagalur	1	0	0	0	9
% success	36	55	9	0	

4.1.5 Circle level rankings

The ranking of the plantation has shown that 36% falls in the category of very good and 55% under good category.

Fig. showing the circle wise success ranking of plantations



4.1.6: Key findings

A) Survival Rates:

The survey has indicated that the survival rate among the plantations raised during 2010-11, under CAMPA varied between 60 to 100 percent in different divisions. The maximum survival was found in Koppa division with 100 percent survival due to high rainfall and timely planting. Similarly, the lowest survival of 60 % was noticed in Koppal division where the rainfall is low and soil is very shallow. Similarly the survey has shown the survival percentage varying between 60 to 94.5 between divisions.

B) Growth Rate:

The growth indicators height and collar diameter assessment has shown significant difference between species. *Acacia auriculiformis* has shown the highest height growth in a all divisions and the lowest was found in Koppa division with less than 20 cm height increment in hardwood species like *Terminaliatomentosa* and *Terminaliabellerica*.

4.2 Model-2. Afforestation on degraded sites

Under CAMPA program the Afforestation of degraded forests land has been undertaken to achieve the objective of bringing back the degraded forests under the green cover and also to compensate the forests ecosystem loss due to diversion of forests lands for the non-forestry uses. The diversion of forests Lands for the mining purpose in Bellary, Tumkur and Chitradurga was compensated by raising plantation of the equal extent of forest land lost in these districts. The evaluation of the sampled plantations results under this scheme is presented in the table below.

Table showing the survival percentage and growth parameters of the Afforestation on degraded site plantations raised under CAMPA between 2010-13

Year	Division	Location	Extent in ha	SPP	Survival %	Mean Height	Collar Diameter
2010-11	Chitradurga	Chitradurga S. No33	73.04	PP SG	75	1.2	3
2010-11	Tumkur	Chikkasandra SF	25	PP SC ML AN	76	1.15	1.66
2012-13	Bellary	Sunkadakalli SF	0.36	HB FB	93.57	0.81	2.33
2012-13	Bellary	Sunkadakalli SF	1.43	do	87.2	0.96	2.34
2012-13	Bellary	Sunkadakalli SF	1.2	do	80	1.3	3
2012-13	Bellary	Sunkadakalli SF	0.83	Do	74	0.65	1.33
2012-13	Bellary	Shidigallu	6.60	Do	69.4	0.45	1.66
2012-13	Bellary	Sunkadakalli	2.07	87.34	69.4	0.7	0.66

4.2.1. Survival Rates:

The survey has shown that the survival rate was ranging between 70 to 94 percent across the divisions indicating a good success rate of the program in the first two years despite low rainfall and shallow soils persisting in these districts. The survival rate is maximum in the one year old plantations as compared to two and three year plantations. Among the species choice the *Hardwickiabinatata* has shown very high success rate with very promising growth potential.

4.2.2 Growth Rate:

The mean heights of the plantations are ranging between 0.7 to 1.3 meters with the collar diameter varying between 0.4 to 1 cm indicating a positive growth response under adverse conditions. However the ficus growth rate is very promising as compared to other species. Neem should have been planted in these hostile conditions for a better survival and growth rate.

4.2.3. Circle Rankings: The circle wise rankings of the plantation success have been done and the results are shown in the table.

Table showing the circle wise success ranking of plantations

Circle	Very Good	Good	Average	Failed
Bellary	2	4	0	0
Hassan	0	1	0	0
% of success	28	72	0	0

Fig.5 showing the circle wise success ranking of plantations



Success Rankings: The success rate was found very good in Bellary circle with more than 28% plantation falling under the very good category and 72% in the good category.

4.3 Model-3 Compensatory plantation program

The Department has implemented another model of plantation as compensatory plantations on the alternative lands obtained against the diversion of forest lands. The survey has been done by randomly selecting the CA plantations from Davabagere, Chitradurga and Bellary divisions. The assessment results are presented in the table below.

Table showing the survival percentage and growth parameters of the Compensatory plantation plantations raised under CAMPA between 2010-11

Year	Division	Location	Extent	Species	Survival %	Mean Height	Collar Diameter
2010-11	Davanagere	Kallanahalli	15	AN CS PP	72.99	2.1	2.2
2010-11	Chitradurga	Holalkere	21.2	CS, PP Euca	75	1.8	0.73
2010-11	Bellary	Kudthani	33.50	HB	92.7	1.6	3

4.3.1 Survival and Growth rate

The survey results of the Compensatory plantation has shown survival rate ranging between 73 to 92.7 indicating very promising success of the plantation. The growth rate was also found quite encouraging as the height was found to be ranging between 1.6 to 2.1 meter and the collar diameter ranging between 0.73 to 2.2 cm indicating very high promising growths potential.

4.4 Species wise survival in different divisions

The species wise survival in different models has been represented circle wise for illustration.

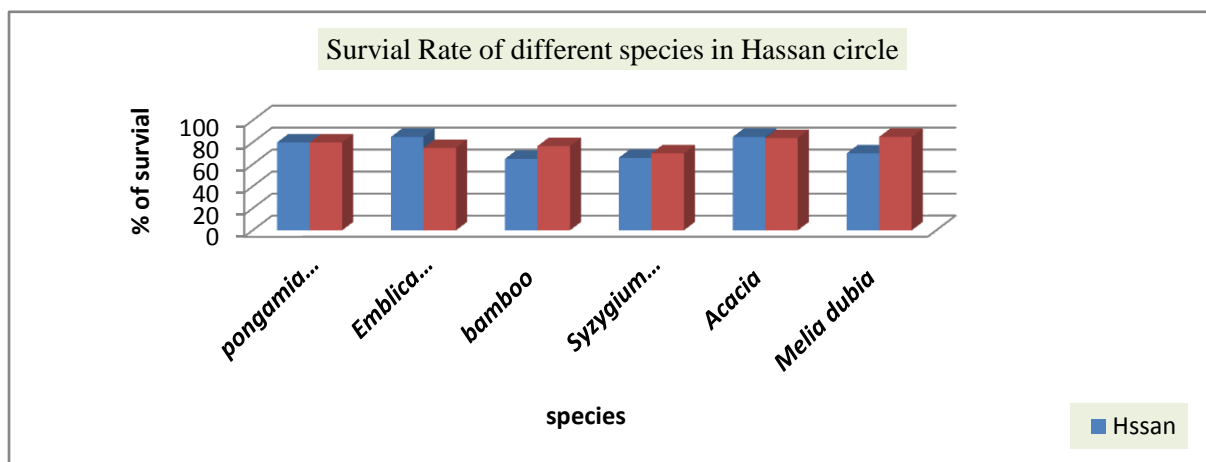
4.4 1 Hassan circle

In Hassan circle *Acacia auriculiformis* was shown 84.5% survival followed by *Pongamiapinnata* and *Embelicaofficinalis* with 80% survival. The weighted average is 76.79%.

Table showing survival rate of different species in Hassan circle

Species	Division		Mean
	Hassan	Tumkur	
<i>Pongamiapinnata</i>	80	80	80
<i>Embelicaofficinalis</i>	85	75	80
<i>Bbamboo</i>	65	76.6	70.8
<i>Syzygiumcumini</i>	66	70	68
<i>Acacia auriculiformis</i>	85	84	84.5
<i>Meliadubia</i>	70	85	77.5
Mean	75.16	78.43	76.79
Sem±	2.2 (b/w species) and 1.16(b/w divisions)		
Cd@5%	NS		

Fig. showing the survival rate of different species in Hassan circle



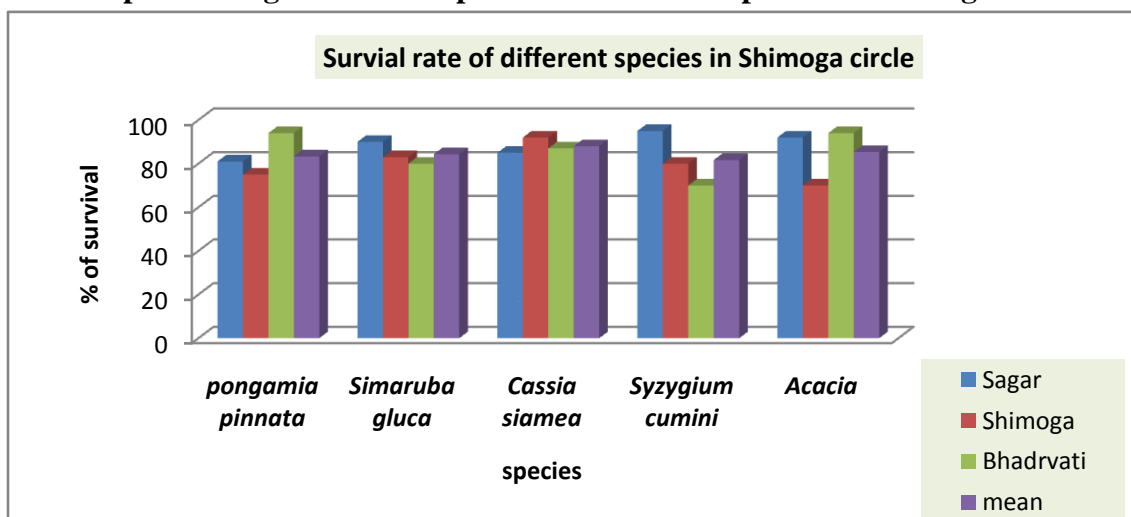
4.4.2 Shimoga circle:

In Shimoga circle *Cassia siamea* was found to have 88% survival followed by *Acacia auriculiformis* with 85.33% and the rest of the species were in the range of 81 to 85% survival

Table showing survival rate of species in Shimoga circle

Species	Divisions			Mean
	Sagar	Shimoga	Bhadravathi	
<i>Pongamiapinnata</i>	81	75	94	83.33
<i>Simarubagluca</i>	90	83	80	84.33
<i>Cassia siamea</i>	85	92	87	88.00
<i>Syzygiumcumini</i>	95	80	70	81.66
<i>Acacia</i>	92	70	94	85.33
Mean	88.6	80	85	85.53
Sem±	2.2 56 (b/w species) and 1.81 (b/w divisions)			
Cd@5%	NS			

Graph showing the survival percent of different species in Shimoga circle



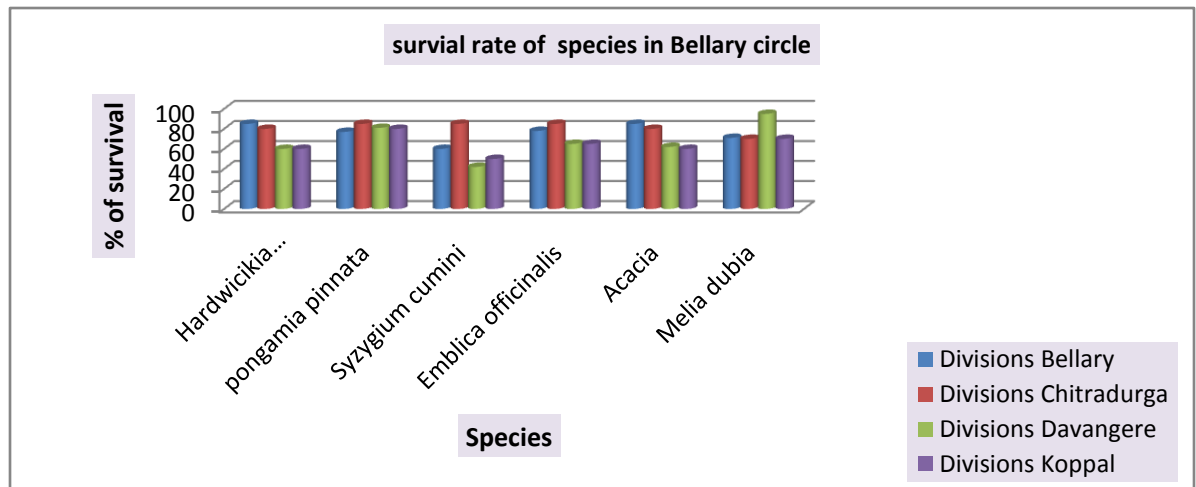
4.4.3 Bellary circle:

In Bellary circle the *Pongamiapinnata* was found to have 80% survival followed by *Hardwickiabinata* with 71.55% survival and the rest were found to have weighted average of 71% survival.

Table showing survival rate of different species in Bellary circle

Species	Divisions				Mean
	Bellary	Chitradurga	Davangere	Koppal	
<i>Hardwickiabinata</i>	85	80	60	60	71.25
<i>pongamiapinnata</i>	77	85	81	80	80.75
<i>Syzygiumcumini</i>	60	85	42	50	59.25
<i>Emblicaofficinalis</i>	78	85	65	65	73.25
<i>Acacia</i>	85	80	62	60	71.75
<i>Meliadubia</i>	71	70	95	70	76.5
Mean	76	80.83	67.5	64.16	72,13
Sem±	2.7 (b/w species) and 2.1 (b/w divisions)				
Cd@5%	NS				

Graph showing the survival rate of different species in Bellary circle



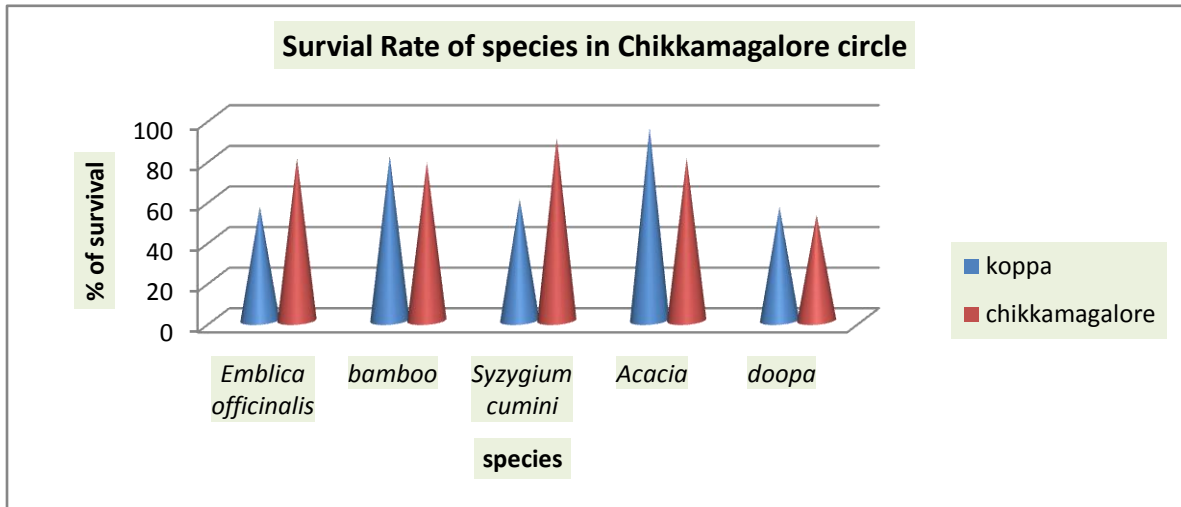
4.4.4 Chikmagalur circle:

In Chikmagalur, *Acacia auriculiformis* has shown highest survival followed by Bamboo. Doopa (*Vateria*) was found to have lowest survival rate.

Table showing survival % of species inChikmagalur circle

Species	Divisions		Mean
	Koppa	Chikmagalur	
<i>Emblicaofficinalis</i>	56	80	68
<i>Bamboo</i>	81	78	79.5
<i>Syzygiumcumini</i>	60	90	75
<i>Acacia auriculiformis</i>	95	80	87.5
<i>Vateria</i>	56	52	54
Mean	69.6	76	72.8
Sem±	2.0 (b/w species) and 1.1 (b/w divisions)		
Cd@5%	NS		

Fig. showing the survival rate of different species in Chikmagalur circle



4.5. Wildlife Protection

During 2009-10 under the wildlife protection works like water hole creation and solar fencing were evaluated for their efficacy and specifications for physical verifications. The following observations were made.

4.5.1 Water Hole Creation

In Bhadra at Doddakanive location, a new water hole has been created for the wildlife at a cost of Rs 2.0 lakhs which is very close to the backwater (0.5 km) that may be unnecessary as the backwater is very close to the spot. Similarly the new water hole created at Shettihalli did not have any water during March 2014 indicating the wrong choice of sites.

4.5.2 Desilting of tanks

The desilting of tanks in the wildlife areas have, however have been very effective as per the visual observations. The specifications of the works were found to be correct compared to the sanctioned specifications.

4.5.3 Solar Fencing

Solar fencing work has been taken-up under this scheme to reduce the man-animal conflict. However out of the three works evaluated, two were found effective and one work was ineffective due to elephant damage. There should be a mechanism where in place the local communities are involved in the maintenance and operation of solar fencing. The sampled work of solar fencing is given in the table above.

4.5.4 Salt licks

Saltlicks creations were created in the wildlife areas as part of the wildlife management practices. The evaluation of these salt licks has shown that some are under use and few are abandoned without maintenance.

Table showing the quality of the Wild life protection Activities under CAMPA between 2009-10 to 2012-13

Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2009-10	Bhadra WL	Creation of new water holes	Doddakanive area	1 (Nos)	1	Effective
2	2009-10	Bhadra WL	Solar Fencing	Kesarahalla Gate to Hulitimmapura S.F area	3 km	1.5	Not Effective [80% fencing is damaged]
3	2009-10	Chikmagalur	Solar Fencing	Doddahalla to Hebbalagadde	3 km	3km	Effective

Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2010-11	Shimoga WL	Creation of new water holes	Shettihalli,	15m*20m*1.5m (1Nos)	15m*22m*1.57m	Effective
2	2010-11	Shimoga WL	Desilting of tanks	Muppani	30m*20m*1.6m (1Nos)	31m*20m*1.5m	Effective
3	2010-11	Hassan	Elephant depredation camps/ Antipoaching camps	Kerodi	1 (1Nos)	1 (1Nos)	Effective
4	2010-11	Chikmagalur	Wildlife Protection and Management EPT	Idalli - Kanchikaldarga	2 km	2km	Effective
5	2010-11	Bhadra WL	Salt licks	Kadukuri Road to MavinahallaRoad	20 numbers	Currently not under use.	Not Effective
6	2010-11	BhadraWL	Salt licks	Kavalapura Road to DiviationRoad	20 numbers	Not used	Not Effective
Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2011-12	Shimoga WL	Desilting of tanks	Hanagere&Kalase	14m*24m*1m(1Nos)	15m*25m*1.5m	Effective
2	2011-12	Daroji	Construction of culverts	Seetaramtanda towards Venkatapura Road BukkasagaraBlock –	3m*4.10m*.5m (3Nos)	3m*4.10m*.5m (3Nos)	Effective
3	2011-12	Bhadra WL	Elephant depredation camps/ Antipoaching camps	Kalenahalli	1 (1Nos)	1	Effective

Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2012-13	Daraji	Desilting of tanks	Obalapura to Kamalapura	40*40*1 (2200Cu m)	40*40*1 (2200Cu m)	Effective
2	2012-13	Bhadra WL	Desilting of Tanks	Anegundikere	1 (1Nos)	1	Effective
3	2012-13	BhadraWL	Desilting of Tanks	Jodikere	2 (1Nos)	2	Effective
4	2012-13	Bhadra WL	Anti depredation Camps	Hunasebyle	1 (1Nos)	1	Effective

Key findings

1. Physical verifications. The physical verifications of the works taken up in the wildlife areas has shown that, all the works sampled works were found executed. Similarly the works were measured against the specifications and found that they were executed in accordance with the approved plans.
2. Quality of the works. The wild life protection works were evaluated for their effectiveness by observing their site specific needs and the effectiveness. It is observed that most of the works were found effective. However the location of the water hole in Bhadra needs a relook in the background of the hige water body in and around Bhadra reservoir.

4.6 Building construction and maintenance

Under the scheme many works related to infrastructure like building constructions and maintenance were taken up. The following table gives the investment pattern of the building works and maintenance.

**Table showing the quality of the Building Construction and Maintenance Activities under
CAMPA between 2009-10 to 2012-13**

Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2009-10	Sagar	Building maintenance	RFO Office	Painting (1 No's)	work done	Good
2	2009-10	Sagar	Building maintenance	Staff quarters	painting and wood works (1 No's)	work done	Good
3	2009-10	Sagar	Building maintenance	RFO Quarters	painting and others (1 No's)	work done	Good
4	2009-10	Koppal	Building maintenance	Munirabad	Painting (3 No's)	work done	Good
5	2009-10	Davangere	Building maintenance	DCF quarters, Davanagere	Painting (1 No's)	work done	Good
6	2009-10	Hassan	Building maintenance	RFO Quarters Gendekatte	Painting (1 No's)	work done	Good
7	2009-10	Hassan	Building maintenance	Forest Guard Quarters	painting and others (1 No's)	work done	Good
8	2009-10	Koppa	Building maintenance	Departmental Quarters at Koppa	painting roof (1 No's)	Workdone	Good
9	2009-10	Bhadrawl	road network in protected area	Thadas Jelly	2.5 km	2.5 km	Good
10	2009-10	Chikmagalur	Building Maintenance	R.F.O. Office repairs	painting works (1 No's)	work done	Effective and Good
Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2010-11	Sagar	Maintenance of staff quarters	Repairs of FG twin quarters	painting works and others (1 No's)	work done	Effective and Good
2	2010-11	Shimoga	Maintenance of staff quarters	Maintenance of FDA Qtrs	(1 No's)	Work done	Good

3	2010-11	Hassan	Maintenance of staff quarters	Staff quarters	painting (1 No's)	work done	Good
4	2010-11	Tumkur	Maintenance of staff quarters	RFO Qtrs, Gubbi	(1 No's)	Work done(painting and other works)	Good
5	2010-11	Tumkur	Maintenance of staff quarters	RFO Office, H.Durga	(1 No's)	Work done(painting and other works)	Good
6	2010-11	Tumkur	Maintenance of staff quarters	Caretaker Qtrs, Kaduborannahalli	(1 No's)	Work done(painting and other works)	Good
7	2010-11	Tumkur	Maintenance of staff quarters	Staff Qtrs, Koratagere	(1 No's)	Work done	Good
8	2010-11	Koppa	Maintenance of staff quarters	Departmental Quarters at Nemmar	doors and roof (1 No's)	work done	Moderate
9	2010-11	Chikmagalur	Building Maintenance	Twin Staff Quarters repairs at Attigundi	painting and doors (1 No's)	work done	Good
Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2011-12	Shimoga WL	Maintenance of road network in Protected Area	Sasichowka, Hadaka, Mupani	5 km	5km	Good
Sl. No.	Year	Division	Activity	Location	Specification	Field Measurements	Remarks
1	2012-13	Daraji	Maintenance of road network in Protected Area	Yemmedok to Sunnadabatluni tan	5 km	5km	Good
2	2012-13	Bhadra WL	Development & maintenance of Road network in protected area	SukalattiMain Road	8 km	8km	Good

4.6.1 Building maintenance

The works were evaluated for the physical existence and for the quality. All the sampled works of Building maintenance were verified by the visual observation for the maintenance work. The quality and the specifications were checked by verifying the old vouchers and the estimates. It is observed that, the building maintenance was found necessary and it was very useful to the occupants.

4.6.2 Road network in the protected areas

The Road work network taken-up under this scheme were verified and found that the physically these works were carried out. The work that was visible was recorded by travelling through the Road length. The clearance of vegetation on both the sides of the road and the filling up of the pot holes were observed. Most of the road works were limited to consolidation of mud using manual labors.

4.7 Vehicles and equipments

The vehicle purchase like two wheelers, four wheelers, has been done under the scheme CAMPA. Similarly the equipments like GPS, computer, Copier and Installation of Boards has also been undertaken. The following table gives the pattern of investment on different items is given in the table below.

The physical verifications of vehicles and equipments were made by visually observing the items sampled from the population. The quality was also checked by referencing the vouchers and bills. The effectiveness was also verified by operation the items.

Key findings: (a) It is found that, all the vehicles and the equipments supplied were found in use and were in good working conditions.

The GPS, Computers and copiers were also found in use.

Table showing the quality of Vehicles and Equipments Activities under CAMPA between 2009-10 to 2012-13

Sl. No.	Year	Division	Activity	Location	Physical Quantity (No's)	Field Measurement	Remarks
1	2009-10	Sagar	RF Boards / hoardings etc.,	Nagar	1	1	Effective and used
2	2009-10	Shimoga	GPS	Shimoga	9.00	9.00	Effective and used
3	2009-10	WP Shimoga	GPS	Thirthahalli	3.00	3.00	Effective and used
4	2009-10	Bellary	GPS	Bellary	5.00	5.00	Effective and used
5	2009-10	Davangere	Supply of 4 Wheeler (Jeep)	Jagalur	1.00	1.00	Effective and used
6	2009-10	Koppal	RF Boards / hoardings etc.,	Kushtagi	3.00	3.00	Effective and used
7	2009-10	Hassan	RF Boards / hoardings etc.,	Belur	7	3	Effective and used [4 are broken]
8	2009-10	Tumkur	GPS	Circle CCF	7	7	Effective and used
9	2009-10	Koppa	RF Boards / hoardings etc.,	Kalasa	4.00	4.00	Effective and used
10	2009-10	Chikmagalur	Purchase of GPS	Chikmagalur	2	2	Effective and used
11	2009-	Chikmagalur	Purchase of GPS	Muthodi	1	1	Used
Sl. No.	Year	Division	Activity	Location	Physical Quantity (No's)	Field Measurement	Remarks
1	2010-11	Shimoga WL	Supply of 2 Wheelers (Hero Honda)	Shimoga	2	2	Effective and used
2	2010-11	Bellary	Digital Copier (Xerox Machines)	Bellary	2	2	Effective and used
3	2010-11	Bellary	Supply of 2 Wheelers (HeroHonda)	Bellary	3	3	Effective and used
4	2010-11	Chitradurga	Supply of 2 wheelers (Hero Honda)	Chitradurga	2	2	Effective and used
5	2010-11	Koppal	Desk Top Computers.	Kushtagi	1	1	Effective and used
6	2010-11	Tumkur	GPS	Tumkur	7	7	Effective and used

7	2010-11	Bhadra WL	Desk Top computers	Lakkavalli	1	1	Effective and used
Sl. No.	Year	Division	Activity	Location	Physical Quantity (No's)	Field Measurement	Remarks
1	2011-12	Research, Bellary	Supply of 2 Wheelers (Hero Honda)	Research, Bellary	2	2	Effective and used
2	2011-12	Tumkur	Supply of 2 Wheeler (HeroHonda)	Tumkur	1	1	Effective and used

4.8 Survey and Demarcation work

The survey and demarcation work has been taken up as a part of the boundary consolidation work of the forest area under this scheme. The pattern of investment is given in the table below. Cattle proof trench work was intended at reducing the cattle grazing in the forests areas.

The works like CPT and Boundary consolidation works were evaluated for their physical execution and quality (specifications) along with effectiveness. The following observations have been made. The results of the sampled works are given in table below.

Table showing the quality of the Survey and Demarcation Activities under CAMPA between 2009-10 to 2012-13

Sl. No.	Year	Division	Activity	Location	Physical Quantify	Field Measurement	Remarks
1	2009-10	Sagar	CPT	BanigaSy.No. 65	4 km	4km	good
2	2009-10	Shimoga	CPT	Ragihosalli MF	2 km	2km	good
3	2009-10	WP Shimoga	Survey and Demarcation of Block & Compartment	Thirthahalli jurisdiction	24.2 km	24.2 km (743 plate)	good
4	2009-10	WP Shimoga	Survey and Demarcation of Block & Compartment	Thirthahalli jurisdiction	53 km	53km(469 plates)	good
5	2009-10	WP Shimoga	Survey and Demarcation of Block & Compartment(Purchase of G I Plates	Thirthahalli	3486 Nos	work done	good

6	2009 -10	Bellary	CPT	Sidegal RF	5k (1*1.5*1)	5k (1*1.5*1)	good
7	2009 -10	Koppa	CPT	Nemmar Sy.No.47,68,109 ,108 & 127	2km	2km	good
8	2009 -10	Koppa	D line clearance (Per Km)	Konakere PF	5 km	5.00	good
9	2009 -10	Koppa	D line clearance (Per Km)	Simse PF	5 km	5.00	good
10	2009 -10	Koppa	D line clearance (Per Km)	Arenoor Cross hillock - Tanodi road	9 km	9km	good
11	2009 -10	Koppa	D line clearance (Per Km)	Rambapuri Mutt Estate - Gantenaika Estate	7km	7.15 km	good
12	2009 -10	Koppa	D line clearance (Per Km)	Balige Block	15 km	15 km	good
13	2009 -10	Koppa	D line clearance (Per Km)	Dayamballi forest reserved area	21 km	21 km	good
Sl. No.	Year	Division	Activity	Location	Physical Quantify	Field Measurement	Remarks
1	2010 -11	Sagar	Forest boundary consolidation through CPT	Duglihosur Sy.N o. 217	2 km	2 km	good
2	2010 -11	Sagar	Forest boundary consolidation through CPT	Avinahalli	4.12 km	4.12 km	good
3	2010 -11	Shimoga	Forest boundary consolidation through CPT	Lakkunda MF Sy. No. 64,42,94	1.5 km	1.5 km	good
4	2010 -11	WP Shimoga	Survey and Demarcation of Block & Compartment	Mandagadde jurisdiction	3.5km	work done(35 plates)	good
5	2010 -11	WP Shimoga	Survey and Demarcation of Block & Compartment	Ayanur jurisdiction	22.2 km	work done(23 plates)	good
6	2010 -11	Chitradurga	Forest boundary consolidation through CPT				

7	2010 -11	Hassan	Forest boundary consolidation through CPT	Gubbi SF	0.8 km	.8 km	good
8	2010 -11	Tumkur	Forest boundary consolidation through CPT	R.D.Betta	5km	5 km	good
9	2010 -11	Koppa	Forest boundary consolidation through CPT	Mavinkere Sy.No. 176 (Devarabetta Reserve Forest)	4km		good
Sl. No.	Year	Division	Activity	Location	Physical Quantify	Field Measurement	Remarks
1	2011 -12	WP Shimoga	Survey and Demarcation of Block & Compartment	Bantwala jurisdiction	20 km	20km(22 plates)	good
2	2011 -12	Bellary	CPT	Vyasanakere / Gunda RF	2 km	2 km	good
3	2011 -12	Koppa	Forest boundary consolidation through CPT	Huigere Sy.No.60	1.5km	1.5 km	good
4	2011 -12	Chikmagalur	EPT (in KM)	Mudagolahara to Belagodu	2.25 km	2.25 km	good
Sl. No.	Year	Division	Activity	Location	Physical Quantify	Field Measurement	Remarks
1	2012 -13	Chitradurga	Forest boundary consolidation through CPT (Fresh works)	Devaragudda RF & Sec.4 area Challakere RF	15km	8km	good
2	2012 -13	Hassan	Forest boundary consolidation through CPT (Fresh works)	Ramenahalli	2km	1.98km	good
3	2012 -13	Koppa	Forest boundary consolidation through CPT (Committed works)	Tanodi Sy. No. 44	1.5km	1.5km	good

4.8.1 Cattle proof trench

The CPT works taken-up were mostly to demarcate the boundaries from encroachment. the effectiveness of CPT to prevent cattle's from grazing was not found evident as compared to their usefulness as boundary demarcation lines. The results of the sampled works are given in table above.

4.8.2 Boundary consolidation works

The Boundary consolidation works were verified for their physical existence and quality. It was found that all the sampled works were found verifiable. The effectiveness as an indicator of quality was also evaluated and it is observed that, the effectiveness was very strong. The results of the sampled works are given in table above.

Key findings:

- (a) The boundary consolidation works was found very useful in demarcation of the boundary lines.
- (b) The CPT as not effective as boundary demarcation work. As they here found getting filled up.

4.9 Fire protection work

It is gratifying to note that, under CAMPA substantial amount of funds has been invested on the fire protection work like fire line formation, fire watchers and fire control works. The following table shows the pattern of investment in the fire protection works.

The fire protection works like fire line creation, fire watchers and the fire protection works. Were evaluated and assessed for the physical verification and the quality. It was difficult to verify the old works on the ground as the signs were not observable. However the verification of records and the history fire incidence in the previous years and the vegetation clearances were used the markers to judge the quality and quantity of the work

Table showing the quality of the Fire protection Activities under CAMPA between 2009-10 to 2012-13

Sl. No.	Year	Division	Activity	Location	Physical Quantity	Field Measurements	Remarks
1	2009-10	Bhadravathi	Engaging fire watchers	Bhadravathi	3*106 days	Work done	Effective
2	2009-10	Bellary	Fire protection- Cleaning of Firelines	Bhujanganagara	10 km length	10 km length, 3m width	Effective
3	2009-10	Bellary	Fire protection- Cleaning of Firelines	Sogi RF	35km length	35 km length, 3m width	Effective
4	2009-10	Koppa	Fire protection- Cleaning of Firelines	Bekkanur to Bolapura	7 km length, 3m width	7km	Effective
5	2009-10	Koppa	Fire protection- Cleaning of Firelines	Gunavanthe to makkimane	4 km length, 3mwidth	4km	Effective
6	2009-10	Koppa	Fire protection- Cleaning of Firelines	Gulladamane to Garebylu	4 km length, 3m width	4km	Effective
7	2009-10	Koppa	Fire protection- Cleaning of Firelines	Karkeshwara RF Block I & II	15km	15km	Effective
8	2009-10	Chikmagalur	Clearance of fire lines	Kalasapur SF, Churchegud, Kamenahally	109 km	Work done	Effective
Sl. No.	Year	Division	Activity	Location	Physical Quantity	Field Measurements	Remarks
1	2010-11	Bhadravathi	Engaging Fire waters	Bhadravathi	2 waters*81 days	Work done	Effective
2	2010-11	Shimoga	Fire protection	Bedanakalmatti	1 km	1 km	Effective
3	2010-11	Davanagere	Fire protection	Madenahalli SF,	16 km	16km	Effective
4	2010-11	Koppal	Fire protection	Udamkal	10 km	10km	Effective
5	2010-11	Hassan	Fire protection	Chakanakatte	10 km	10 km	Effective
6	2010-11	Hassan	Fire protection	GalipurKaval	0.5 km	0.5 km	Effective
7	2010-11	Hassan	Fire protection	S Ankanahalli	4 km	4 km	Effective

8	2010-11	Hassan	Fire protection	Bidarakka	4 km	4 km	Effective
9	2010-11	Hassan	Fire protection	Doddabetta	25 km	25 km	Effective
10	2010-11	Hassan	Fire protection	Kaggalikaval	3 km	3 km	Effective
11	2010-11	Hassan	Engaging Fire watchers	Kempole SF	5 km	5 km	Effective
12	2010-11	Hassan	Engaging Fire watchers	Idalla	3 km	3 km	Effective
13	2010-11	Tumkur	Fire protection	Chowdlapura SF	5 km	5 km	Effective
14	2010-11	Tumkur	Engaging Fire watchers	Nidagal SF	180 No's	Work done	Effective
15	2010-11	Koppa	Fire protection	Halagar to Kotegudda	6 km	6 km	Effective
16	2010-11	Koppa	Fire protection	Yealekal cross to Andavani	5km	5km	Effective
17	2010-11	Koppa	Engaging Fire watchers	Range Jurisdiction	4 persons *56 days	work done (checked through paper work)	Effective
18	2010-11	Chikmagalur	Creation of fire lines	Mullaih nagiri- Bababudangiri-	36.33 km	36.33	Effective

4.9.1 Fire line formations

The fire line formations were verified by measuring the distance using GPS and also travelling the distance. The works were recorded as effective wherever the watchers were appointed; the verifications were done through records.

4.9.2 Fire protection works

The fire protection works like fire line clearances were not easily verifiable as they were executed in the previous years. Therefore the vegetation clearance and the undergrowth in the fire lines were used as reference to verify the clearance.

CHAPTER – VI

OBSERVATIONS AND IMPACT ANALYSIS

The overall performance of the scheme and its impact on the objectives of the programs were assessed based on the survey results. The results are discussed here against objectives.

1. **Compensatory Afforestation.** The compensatory plantation objective is to raise the plantation on the non-forest lands equivalent to the area diverted for the developmental projects and to establish the forests to derive similar forests ecosystem function. The raising of plantation though may not replace the bio-diversity value of the forests that is lost; the man-made forests will meet the other functional requirement of the forests like green cover, carbon sequestration and soil and water conservation etc. Thus the compensatory plantation primary objectives have been served.
2. **Bio-diversity value.** The species chosen in each plantation are limited to very few (less than 10) and therefore there is a limitation of the plantations in achieving the objectives.
3. **Productivity of the plantations.** The productivity has been assessed by measuring the growth parameters. The overall increment in the height is around 0.75 meter/annum and the collar diameter is about 1 cm which is moderate as compared to the growth rates on better soils and high rainfall areas. The extrapolation of the growth parameter will give us approximately 8 cm diameter (DBH) and 6 meter height at the end of 8 years for the fast growing species. The mean basal area will be around 10 m²/ha/ at 10 year. And it may take 40 years to cover the canopy.
4. **Climate change mitigation.** The productivity of the plantation at the rate of 10 m² /basal area with a mean height of 6 to 7 meter will give approximately 5 to 6 m³/year in the drier areas and 10 to 12 m³ /ha/year in high rainfall areas. This rate of productivity can sequester on an average 2 tons of carbon/ha/year.
5. **Employment generation.** The investment on compensatory plantation has generated (70% plantation cost is labour cost) employment in the rural areas. The 70% of cost of raising plantation goes for employment.
6. **Investment on non-plantation works.** More than 40% of the funds under this scheme has been done on the infrastructure like buildings, Roads, and equipments to strengthen the departmental capacity. This has been difficult to relate to the benefits.

CHAPTER – VII

RECOMMENDATIONS

1. The activities under CAMPA are too many resulting in very thin spread of investment which may not have desirable impact on the departmental programs. It should focus much on the compensatory plantations by spending 70% investment and rest on the natural forests management.
2. Expenditure on the building maintenance and vehicles should not be a major activity.
3. The investment on the research and wildlife is inadequate needs to be balanced.
4. The natural forests, bio-diversity conservation, enrichment planting and research programs needs to be given priority.
5. **Plantation size:** Many compensatory plantations have been raised are very small in size (less than 5 ha). This may not be viable to maintain and protect. It is better to aggregate the smaller units into a viable size of at least 10 ha to raise plantations.
6. The plantation on degraded sites must be well defined as in many places well stocked areas have been planted up.
7. The site clearance for raising plantation was noticed in some areas which need to be avoided.
8. **Choice of species:** The species choice was very mechanical and there was no effort to match the sites.
9. *Acacia auriculiformis* is planted as core species in many compensatory plantations in high rainfall areas which may be completely avoided. Native species mix is the best option.
10. The SMC works are done very unscientifically. A guideline may be necessary to design and structure the works by estimating the quantum of water that could be impounded is to be done. The contour maps are to be used to locate the structure. The planning processes to regulate the SMC works are necessary.
11. The protection measures were not effective in many places. It is essential to provide maintenance provisions for five years so that the purpose is well achieved.
12. **Plantation care:** The plantation care and maintenance needs to be done for minimum five years. The investment must be done to ensure success of the plantations.
13. CAMPA must set a very successful model of plantation through innovations and higher investment as there is no cap on the unit cost.
14. Three year assessment is too early to judge the success. There should be five years interval evaluation twice to make a meaningful evaluation.
15. **Internal evaluation:** The internal evaluation needs to be strengthened and the database must be established to monitor the changes.