Third Party Monitoring and Evaluation of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) Activities of Andhra Pradesh Forest Department (APFD) During 2018-19

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PREFACE

The report on the Monitoring and Evaluation of Forestry Works under the Compensatory Afforestation Management and Planning Authority (CAMPA) Scheme presents a comprehensive assessment of forestry interventions implemented by Andhra Pradesh Forest Department (APFD) during 2018–19. The evaluation was undertaken by a team of scientists and officers from the Indian Council of Forestry Research and Education – Institute of Wood Science and Technology (ICFRE–IWST), Bengaluru, and provides a detailed appraisal of the planning, implementation, and outcomes of CAMPA-funded activities across various forest divisions of the state. By systematically examining plantation performance, soil and moisture conservation (SMC) works, protection measures, construction activities, and community participation, the study highlights best practices, identifies challenges, and derives actionable lessons to strengthen future forestry interventions under the CAMPA framework.

Andhra Pradesh Forest Department, as custodian of the state's rich forest resources, holds a crucial mandate to conserve, protect, and sustainably manage forests and wildlife that underpin the region's ecological stability. To offset the impacts of deforestation and forest degradation resulting from developmental activities, the CAMPA scheme serves as a key mechanism through which funds collected from user agencies diverting forest land are utilized for compensatory afforestation, forest restoration, wildlife habitat improvement, and other ecological works. In the context of increasing developmental pressures, CAMPA-funded interventions play an essential role in maintaining ecological balance while aligning with the state's developmental objectives.

This evaluation, covering diverse forest ecosystems ranging from the moist evergreen forests of the Eastern Ghats to dry deciduous and scrub forests in the plains, provides critical insights into the effectiveness, efficiency, and sustainability of CAMPA activities. The findings not only assess the performance of implemented works but also offer strategic recommendations to enhance the long-term ecological resilience and sustainability of Andhra Pradesh's forest landscapes.

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LIST OF ABBREVIATIONS

ABO	Assistant Beat Officer
ACF	Assistant Conservator of Forests
ANR	Assisted Natural Regeneration
APC	Anti-Poaching Camp
APFD	Andhra Pradesh Forest Department
APSF	Andhra Pradesh State forest
AR	Artificial Regeneration
CA	Compensatory Afforestation
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CCT	Continuous Contour Trenches
CF	Conservator of Forests
CG	Collar Girth
CPT	Cattle Proof Trench
DCF	Deputy Chief Conservator of Forests
DRFO	Deputy Range Forest Officer
DSO	Division Sanction Order
EEC	Environmental Education Centre
EPT	Elephant Proof Trench
FBO	Forest Beat Officer
FNB	Field Note Book
FRO	Forest Range Officer
FSO	Forest Section Officer
GBH	Girth at Breast Height
GPS	Geographic Positioning System
JFMC	Joint Forest Management Committee
KML	Keyhole Mark-up Language
NA	Not Available/Not Applicable
NPV	Net Present Value
NTSH	Non-Teak Secondary Hardwood
PCCF	Principal Chief Conservation of Forests
PPT	Peripheral Trenches
PT	Percolation tank
PW	Protection Watcher
QGIS	Quantum Geographic Information System
RF	Reserved Forest
RSO	Range Sanction Order
RSP	Road Side Plantation
SDSO	Sub-division Sanction Order
SF	State Forest
SMC	Soil Moisture Conservation
ST	Staggered Trenches
SO. No	Sanctioned Order Number
Sy. No	Survey Number
VSS	Vana Samrakshana Samithi
WL/WLM	Wild life/ Wild life management

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I. EXECUTIVE SUMMARY

Andhra Pradesh Forest Department has implemented a wide range of activities under CAMPA, including plantations, maintenance, protection, construction, and soil and moisture conservation (SMC) across all forest circles and divisions. To evaluate the quality, effectiveness, and field-level outcomes of these interventions, third-party monitoring and evaluation for the year 2018–19 was entrusted to the Institute of Wood Science and Technology (ICFRE–IWST), Bengaluru. During 2018–19, a total of 3,686 activities were implemented across all divisions of Andhra Pradesh under CAMPA, with 836 of these sampled for monitoring and evaluation. Plantation activities accounted for 186 implemented, with 50 sampled. Maintenance activities were the most numerous, with 789 implemented and 172 sampled. Protection activities saw 152 implementations and 47 samplings, while SMC activities included 373 implementations and 87 samplings. Construction activities were fewer, with 49 implemented and 19 sampled. Other activities accounted for the largest share, with 2,137 implemented and 461 sampled. Afforestation activities (including maintenance, protection, construction, and SMC) were assessed after a gap of seven years to evaluate their survival, growth performance, and site sustainability outcomes based on all interventions. While plantations, maintenance, protection, soil and moisture conservation (SMC), and construction works were taken up across divisions, their impact was uneven due to site conditions.

The Compensatory Afforestation Fund Management and Planning Authority (CAMPA) scheme has played a pivotal role in ecological restoration by rejuvenating degraded landscapes and significantly increasing green cover across targeted regions. It has also led to improved soil quality, better moisture retention in afforested areas, and greater community involvement in plantation and maintenance activities, thereby supporting the safeguarding of biodiversity and wildlife habitats. The scheme primarily focuses on compensatory afforestation, forest protection notably through strengthened fire prevention and control mechanisms and wildlife habitat improvement. These interventions have made a meaningful contribution to balancing developmental needs with environmental conservation. Overall, the evaluation highlights CAMPA's effectiveness in fostering a more resilient, sustainable, and biodiverse forest ecosystem within the state. The important findings of each intervention are as follows;

Plantation outcomes across various divisions showed significant variability. Highly successful and outstanding plantations were found in sites with suitable soils and adequate moisture, such as Beluguppa in Ananthapuramu, Valligatla in Chittoor West, Vinduru and Madamanuru in Nellore, Itukulapadu in Proddatur, Nallakonda in Visakhapatnam, Puligummi in Vizianagaram, and Katrenipadu in Krishna. At these locations, survival rates often exceeded 80%, and the growth in height and girth was vigorous. Moderate success was recorded in Pathagunta (Chittoor East) and Vathangi (Kakinada), where survival rates hovered between 60 and 70 %, accompanied by steady growth. In contrast, plantations at Nandanam (Chittoor East), Maddurupadu (Nellore), Gandlur (Proddatur), Chilakacherla (Markapur), Daragedda (Kakinada), and some bamboo sites in Chintur exhibited comparatively lower survival. These results were mainly due to rocky or shallow soils, waterlogging or submergence, a few instances of encroachment and grazing. Occasionally, divisions reported discrepancies between sanctioned plantation areas and actual plantation extents during GPS or GIS verification. These mismatches were often caused by perambulation along natural boundaries. Additionally, as

these plantations are more than 9 years old, missing or damaged plantation boards and difficulty in verification of information in plantation journals with that of monitoring outcomes were common challenges across the divisions. During 2018–19, plantation performance was largely influenced by how well the species were matched with site conditions. In places like Beluguppa, Valligatla, Paderu, Nallakonda, and parts of Nellore, plantations demonstrated excellent survival and growth, illustrating the benefits of sound planning and site selection. In areas such as Nandanam, Gandlur, Chintur, and coastal or submergence-prone zones, plantations performed differently than expected. Specific species also showed vulnerability; for example, *Pterocarpus santalinus* in Nellore were affected due stress. Bamboo plantations at Atmakur achieved moderate survival and were threatened by grazing animals and invasive weeds. While most plantations remained largely free of pests, poor soil conditions and sporadic grazing incidences challenged their progress. Furthermore, field verification uncovered some mismatches between recorded and actual plantation areas, with actual areas often being larger than reported.

Maintenance was the most widely implemented ecological intervention across the divisions. Activities such as casualty replacement, soil working, circular weeding, coppice regulation, pruning, fertilizer application, and fire line upkeep were carried out in nearly all areas. These operations generally improved plantation survival, bole formation, and stand density, especially in young plantations. In some instances, it was observed that fertilizer application, and fire line clearance were inadequate to support the plantation. It is also evident that maintenance periods has ended before plantations were fully established and there were inadequate pruning cycles. Evaluators in multiple divisions recommended extending maintenance cycles by at least additional two more years, particularly for plantations in semi-arid and rocky areas, to ensure proper stabilization and growth. Weed invasions, especially by Lantana, and regrowth of grasses in fire lines were common challenges, requiring more intensive weeding and vigilance. Despite being widespread, maintenance quality varied significantly. Where maintenance was carefully followed, such as in Ananthapuramu, Paderu and Visakhapatnam, plantations exhibited stronger growth and greater resilience. Conversely, in divisions where maintenance activities faltered, the ecological benefits of the plantations were reduced.

Protection efforts primarily focused on fire lines and fencing across several divisions. In divisions such as Ananthapuramu, Chittoor West, Nellore, and Rajampet, fire lines were constructed according to specifications and proved effective when regularly cleared of weeds and grasses. Notable examples of good protection included clean fire lines in Puttur (Chittoor East), Beluguppa (Ananthapuramu), and Kuppam (Chittoor West), as well as intact chain-link fencing at Irala (Chittoor West) and Kesavaram (Nellore). Conversely, protection works in Kollagunta (Chittoor East), Mungilipattu (Chittoor East), Lothugedda (Narsipatnam), and Sundipenta (Atmakur) suffered from heavy weed regrowth, which diminished their effectiveness. Patrol-based protection was particularly notable in Atmakur, where a river patrol boat and watchers were deployed to curb threats such as fire and illegal logging. Overall, while protection infrastructure was largely established as per the sanctioned plans and uneven maintenance in few cases has reduced the ecological utility of plantations. Protection measures depended heavily on regular follow-up. Fire lines, fences, and patrolling paths were very effective in general upkeep of plantations, wherever maintained properly. However, in some

locations, their purpose was undermined by weed overgrowth which leading to incomplete coverage of fire lines, and grazing pressures. Divisions such as Tirupati, Atmakur, and Nandyal demonstrated stronger fire line upkeep, whereas divisions like Krishna and Chintur revealed vulnerabilities in their protection works.

Soil and Moisture Conservation (SMC) works were extensively implemented across the divisions. Common structures included saucer pits, continuous contour trenches, staggered trenches, rock-filled dams, cement check dams, percolation tanks, and artificial ponds. Most of these structures were technically sound and conformed to measurement book specifications at the time of their construction. Effective examples included check dams in Eluru, cement structures in Chittoor West, percolation tanks in Ananthapuramu, and saucer pits in Nellore and Giddalur. The SMC structures in many areas have been proved to be effective in controlling the top soil erosion which is evident from heavy siltation. However, it was also observed that weed infestation, erosion of side walls, seepage, or damage caused by monsoon overflows has undermined the effectiveness of SMC structures in some places. In divisions such as Eluru, Krishna, Chintur, and Kakinada, evaluators found numerous structures clogged or weakened, resulting in reduced water-holding and recharge capacities. These structures have served their purpose of checking the soil erosion and supporting the plantation by improving water infiltration. However, regular de-silting, repairs, and protective upkeep of SMC structures such as check dams, percolation tanks etc. are essential to sustain the long-term benefits these structures provide to plantations and natural forests. While soil and moisture conservation works like trenches, saucer pits, and check dams were widely constructed and played their role of arresting soil erosion and water infiltration in the initial stages of plantation. In divisions including Chittoor East and West, Rajampet, Nellore, and Proddatur, SMC structures exhibited heavy siltation. Meanwhile, in Kadapa and Guntur, where few or no SMC works were undertaken, the ecological impact was limited from the outset. Overall, the SMC structures and works were found to be effective initially which is evident from the amount of silt they have accumulated which would otherwise have washed away from the plantation site. However, the SMC structures such as Check dams, percolation tanks etc. needs regular maintenance to elicit sustained ecological benefits.

Construction activities were relatively fewer but included important boundary and infrastructure works. Several divisions erected RCC boundary pillars and cairns to demarcate forest and revenue boundaries. These structures were generally intact, dimensionally accurate, and effective in preventing encroachments, as observed in Sathyavedu (Chittoor East), PN Wildlife Sanctuary (Kadapa), Marupuru (Nellore), and Kondapalli (Krishna). Watchtowers, such as the one at Tekumanda in Chittoor West, were found to be functional and strategically placed for monitoring elephants and fires, although they required weed clearance around their bases. Gravel roads and pathways in divisions like Tirupati and Guntur were structurally sound but needed periodic upkeep to withstand monsoon damage. While construction works were technically well-executed, evaluators emphasized the importance of regular maintenance to preserve their visibility, durability, and utility. These construction activities provided more durable contributions overall. RCC cairns, boundary walls, and cement concrete pathways helped clearly demarcate forests and strengthen ecological infrastructure. In divisions such as Rajampet, Proddatur, and Atmakur, these structures were robust and required only minor

maintenance. However, in coastal divisions, weathering and soil coverage reduced their visibility and durability, which lessened their overall impact.

Other works consistently accounted for the largest share of activities in nearly every division, sometimes making up more than half of the annual portfolio. These activities included administrative tasks, community works, and miscellaneous operations. Financial audits, both internal and external, generally confirmed that sanction orders, estimates, and expenditures were properly aligned. However, documentation lapses were also observed in some cases. Common issues included missing or incomplete work registers, unavailable cost estimates, and typographical errors in official records, particularly in divisions such as Guntur, Nellore, Chittoor east, and Kakinada. Although expenditure utilization was transparent and remained within sanctioned limits, repeated observations emphasized the need for stricter documentation practices, consistent submission of records, and GIS-based mapping to improve accuracy and accountability. On the financial side, management and auditing were strong across almost all divisions. Works were executed with fiscal discipline and accountability, but technical and administrative weaknesses persisted in field-level documentation. Discrepancies between recorded and actual plantation areas were observed in some areas. Incomplete registers, missing estimates, and irregular journal entries were noted in divisions including Chittoor east, Guntur, Eluru, and Markapur.

The role of people in plantation success was the most uneven of all factors. Community engagement through **Vana Samrakshana Samithi (VSS)** and JFMC (Joint Forest Management Committees) varied dramatically between divisions. In Nandyal, Paderu, and parts of Visakhapatnam, positive community participation strengthened plantations by providing ongoing oversight and continuity. However, in divisions such as Chittoor East, Chintur, and several others, social ownership was either minimal or absent, which weakened both monitoring and the long-term sustainability of the interventions. The evaluation highlights that active VSS participation has contributed to the long-term success of CAMPA-funded plantations. Where VSS were effectively engaged, plantations not only supported ecological regeneration but also delivered socio-economic benefits to forest-dependent communities. Conversely, divisions with passive VSS participation reveal gaps in community engagement that would have resulted in better management and eliciting the greater ecological benefits. To address these gaps, strengthening awareness campaigns, expanding the inclusion of Non-Timber Forest Product (NTFP) species, and enhancing the institutional capacity of VSS are essential steps. Ultimately, community-driven forest management remains the cornerstone of sustainable afforestation and ecological security in Andhra Pradesh.

I. INTRODUCTION

Andhra Pradesh is a geographically diverse state, extending from the eastern coastal plains to the Eastern Ghats, encompassing a wide range of topographic and climatic conditions that foster rich edaphic and biotic diversity. Politically, by Reorganization act, 2014, the erstwhile state of Andhra Pradesh has been bifurcated into two states, Andhra Pradesh & Telangana by June 2014. Andhra Pradesh is the 8th largest state in India having the geographical area of 1,62,760 km^2, comprising 4.56 % land area of the country situated in the South-Eastern part of the country. The state lies between 12° 37′ N to 19° 55′ N latitude and 76° 45′ E to 84° 46′ E longitude and is bordered by Odisha & Chhattisgarh in the north, Telangana & Karnataka in the west and Tamil Nadu in the south. The Bay of Bengal is on the East to the state. After Gujarat, the state of Andhra Pradesh has the second-longest coastline among the states of India. Physio graphically, the state can be divided into Coastal Andhra and the comparatively drier Rayalaseema regions. The major peninsular rivers the Godavari and Krishna along with the Pennar support the state of Andhra Pradesh.

Physiographically, Andhra Pradesh experiences a hot and humid climate, with annual rainfall ranging from 1,100 mm to 1,250 mm and temperatures varying from 15°C to 45°C. Major soil types include red, black, deltaic alluvial, and coastal alluvial. The state is drained by significant rivers such as the Godavari, Krishna, and Penna.

The state's diverse topography, from the Eastern Ghats and Nallamala hills to the Bay of Bengal shore, supports varied ecosystems rich in flora and fauna. The forests are broadly categorised into four biotic provinces: Deccan Plateau, Central Plateau, Eastern Highland, and East Coastal Plains.

Forest Types and Distribution

As per the Champion and Seth Classification of Forest Types (1968), Andhra Pradesh's forests belong to five type groups, further categorised into 20 forest types. The vegetation is predominantly dry deciduous, with species like Teak, *Terminalia*, *Dalbergia*, *Pterocarpus*, and *Anogeissus*. Red Sanders (*Pterocarpus santalinus*) is an endemic species highly valued for its distinct red colour and grain pattern. Andhra Pradesh is also a pioneer in adopting Joint Forest Management (JFM), with approximately one-third of its forest area under JFM.

Forests in Andhra Pradesh are primarily divided into two broad legal categories:

- Reserved Forests (RF): These are legally protected for conservation purposes, with public use generally restricted unless specific legal provisions allow. The majority of forested areas in the state fall under this category.
- Protected Forests (PF): Under government control, these are less restrictive than Reserved Forests, allowing regulated logging and local community use for activities such as grazing and firewood collection.

Based on vegetation, influenced by climatic, edaphic, and biotic factors, the forests are classified into six major types:

1. **Tropical Semi-Evergreen Forests**: Found at altitudes around 800m in districts like Visakhapatnam, Vizianagaram, Srikakulam, and East Godavari, these are a mix of

deciduous (e.g., *Michelia champaca*, *Dillenia pentagyna*) and evergreen species (e.g., *Psychortia fulva, Leea crispa, Diospyros malabarica, Syzygium cumini)*.

2. **Tropical Moist Deciduous Forests**: Characterised by over 1000mm annual rainfall and a dry period in March-April, these are further sub-divided:
    - Northern Tropical Moist Deciduous Sal Forests: Dominated by *Shorea robusta*, found exclusively in Srikakulam district, marking the species' southern limit.
    - Southern Tropical Moist Deciduous Forests: Found in Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Kurnool, and Chittoor districts, dominated by species like *Terminalia alata, Anogeissus latifolia, Dalbergia latifolia*, and *Sterculia urens*.
    - Southern Tropical Moist Deciduous Riparian Forests: Common along riverbanks, especially the Godavari, featuring semi-evergreen species such as *Terminalia arjuna, Ficus racemosa*, and *Syzygium cumini*.
3. **Tropical Dry Deciduous Forests**: Widespread across the state, these forests exhibit leaf-fall during summer and are classified into teak, non-teak, and mixed deciduous types:
    - Dry Deciduous Teak Forests: Dominated by *Tectona grandis*, found mostly in the Eastern Ghats of Visakhapatnam, East and West Godavari, and Kurnool.
    - Dry Deciduous Non-Teak Forests: Found in Rayalaseema and Nellore districts, dominated by *Pterocarpus santalinus, Anogeissus latifolia*, and *Hardwickia binata*.
4. **Dry Savannah Forests**: Primarily found in the Eastern Ghats, these are characterized by grasses with scattered, stunted trees, resulting from biotic interference. Common species include *Phyllanthus emblica* and *Phoenix humilis*.
5. **Dry Evergreen Forests**: Occur in coastal and plain areas with less than 600mm rainfall and altitudes below 250m, in districts such as Vizianagaram, Visakhapatnam, Srikakulam, Nellore, and Chittoor. Common species include *Manilkara hexandra, Sapindus emarginatus*, and *Garcinia spicata*.
6. **Thorny Scrub Forests**: These are degraded deciduous forests found in arid and semi-arid parts of the Eastern Ghats, particularly in forest peripheries, due to biotic interference, overexploitation, and frequent fires. Common species include *Balanitis aegyptica, Capparis zeylanica*, and *Cadaba fruiticosa*.

The Eastern Ghats region is dominated by dry deciduous forests, comprising 52 % of the total forest cover. This region has experienced significant forest fragmentation, with the largest patch shrinking from 41,669 km² in 1930 to 27,800 km² by 2013.

CAMPA (Compensatory Afforestation Management and Planning Authority)

CAMPA is an authority established by the Indian government to manage funds for compensatory afforestation (reforestation) when forests are diverted for non-forest purposes like infrastructure development, mining, or urbanisation. Andhra Pradesh initiated its State CAMPA on 11th September 2009, under orders from the Ministry of Environment, Forests and Climate Change, Government of India. The primary goal is to enhance forest and tree cover,

conserve and manage wildlife, by utilising funds from Compensatory Afforestation (CA) and improving Net Present Value (NPV) of forests.

Key Objectives of State CAMPA

- Conservation, protection, regeneration, and management of existing natural forests.
- Management of wildlife and its habitat within and outside protected areas, including consolidation of protected areas.
- Implementation of compensatory afforestation.
- Generation of wood and non-timber forest products.
- Provision of ecosystem services such as climate regulation, flood moderation, carbon sequestration, soil health, and air and water regime improvement.
- Enhancement of biodiversity services.
- Training and capacity building to strengthen research activities.

The Andhra Pradesh Forest Department, as the custodian of the state's rich and diverse forest resources, bears the crucial responsibility of conserving, protecting, and managing forests and wildlife that form the ecological backbone of the state. To mitigate the adverse impacts of deforestation and forest degradation arising from developmental activities, the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) scheme has emerged as a vital mechanism. It ensures that the diversion of forest land for non-forestry purposes is offset through compensatory afforestation, forest restoration, and biodiversity enhancement measures aimed at maintaining ecological balance.

Under the CAMPA framework, funds collected from user agencies responsible for forest land diversion are utilized for afforestation, wildlife habitat improvement, soil and moisture conservation, and other allied activities that promote long-term sustainability. In the face of increasing developmental pressures and rising demands on forest resources, compensatory afforestation plays a key role in reconciling ecological conservation with economic growth.

The Forest (Conservation) Act, 1980 significantly curtailed the diversion of forest lands from about 1.43 lakh hectares annually at country level before its enactment to around 15,000 hectares per annum thereafter primarily for essential public projects such as drinking water supply, irrigation, power generation, transportation, defence, and mining. For each approved diversion, compensatory measures such as afforestation, catchment area treatment, wildlife habitat improvement, and rehabilitation are mandated to mitigate ecological loss.

To oversee these initiatives, the Compensatory Afforestation Management and Planning Authority (CAMPA) was constituted at the national level, supported by a dedicated monitoring cell within the Ministry of Environment, Forest and Climate Change (MoEF&CC) to track proposal progress and ensure compliance with forest clearance conditions. Andhra Pradesh State CAMPA was formally established on 11th September 2009, with the objective of enhancing forest and tree cover, improving wildlife conservation, and managing funds received towards Compensatory Afforestation (CA) and Net Present Value (NPV).

The Andhra Pradesh Forest Department has since implemented a wide range of activities under CAMPA, including plantations, maintenance, protection, construction, and soil and moisture conservation (SMC) work across all forest circles and divisions. To assess the quality and effectiveness of these interventions, a third-party monitoring and evaluation was entrusted to Institute of Wood Science and Technology (ICFRE–IWST), Bengaluru for the year 2018–19.

This report presents the comprehensive findings from seven circles and twenty-four divisions across Andhra Pradesh, assessing key parameters such as plantation area, species survival, average growth, and the condition of plantations, protection measures, constructions, and SMC works. It also offers division-wise observations, lessons learned, and strategic recommendations to enhance the effectiveness and sustainability of future CAMPA interventions in the state.

III. METHODOLOGY

The monitoring and evaluation (M&E) of CAMPA initiatives constitute systematic and iterative processes wherein all implemented interventions together with ancillary activities are critically appraised using objective, quantifiable indicators as prescribed under the CAMPA framework. For the assessment of afforestation and associated activities executed under CAMPA during 2018–2019, comprehensive records of all sanctioned undertakings were meticulously obtained from the respective Division and Range Forest offices. The entire spectrum of interventions was stratified into six principal categories: plantation, maintenance, soil and moisture conservation (SMC), construction, protection, and miscellaneous ("other") actions.

To ensure statistical rigor and representativeness, 20 % of these activities were randomly sampled at division level from the consolidated list using random number generator and incorporated into an evaluation checklist. This checklist was disseminated to the respective divisions and ranges a minimum of one week before commencing on-site assessments, thereby fostering operational preparedness, transparency, and stakeholder engagement.

1. Methodology for evaluation of Plantation

This project section delineates the methodology and outcomes of an evaluation undertaken on a designated plantation site

a. Verification of Plantation Area**:** The spatial extent of each plantation activity was meticulously validated through systematic field verification. This entailed physical traversal of plantation boundaries, guided by geospatial reference data derived from Keyhole Markup Language (KML) files. The data acquired during these perambulations were subsequently processed using Quantum Geographic Information System (QGIS) software, allowing for precise computation of the actual plantation area.

b. Sample Plot Layout: Within the plantation, five sample plots of 0.1 hectares each were strategically established in a quadratic configuration—each measuring 33 x 33 meters. For line plantations situated along linear features such as roads or canals, sample data were collected via transects of 100 meters in length to ensure equivalency in assessing seedling condition and survival.

c. Enumeration of Plantation Growth Parameters: Comprehensive enumeration was conducted to assess fundamental growth metrics of the planted species. Parameters measured included plant height, girth at breast height (GBH) or collar girth (as appropriate for species and developmental stage), survival rates, and the incidence of pests or diseases. This provided valuable insights into individual and overall plantation performance.

d. Evaluation of Seedling Survival: Seedling survival rates at each site were estimated employing a randomized sampling approach. Survival counts within each designated sample plot were recorded, from which survival percentages were derived. This metric served as a critical indicator of the plantation's establishment success and ecological health.

e. Data Analysis and Reporting**:** All field data were rigorously analysed and synthesized into the final plantation evaluation report. The report comprises key statistics such as mean plant height and girth, calculated survival percentages, detailed documentation of perambulation, and geospatial tracking of the plantation via GPS coordinates.

2. Methodology for Evaluation of Maintenance

Maintenance activities are pivotal for fostering the healthy development and long-term success of plantation species. Under the CAMPA scheme, all maintenance operations—including qualitative and quantitative interventions—were monitored and evaluated during the initial and subsequent years of plantation establishment. This project aimed to critically evaluate maintenance activities integral to cultural operations within plantation management, such as weeding, trenching, pruning, climber and coppice cutting, pit reopening, and fire line maintenance.

Methodology

a. **Documentary Review:** Comprehensive examination of plantation journals, measurement books, work registers and estimate sheets was undertaken to ascertain the scope, nature, and frequency of sanctioned maintenance activities, as well as their associated expenditures.

b. **Field Verification:** Targeted field inspections were conducted to directly observe the execution and efficacy of maintenance tasks. The assessment encompassed the quality and extent of weeding, trenching, pruning, climber and coppice removal, pit reopening, and the upkeep of fire lines.

Table 1 Details of year wise maintenance operations

Sl. no.	Operations	Years when carried out
1	Replacement of up to 25 % casualties with new seedlings, including pit preparation, transportation, and planting	1 Year, 2 & 3 Year
2	Dual cutting of coppice growth to ground level across the entire site, retaining beneficial species	1 Year
3	Two rounds of circular weeding within a 0.5-meter radius around each plant	1 Year, 2&3 Year, 4&5 Year
4	Thorough soil working to a radius of 0.5 meters and depth of 15 cm using manual methods	1 Year, 2&3 Year, 4&5 Year
5	Pruning lower branches to up to one-third of plant height	1 Year, 2&3 Year
6	Creation and ongoing maintenance of fire lines	1 Year, 2&3 Year, 4&5 Year
7	Additional contingencies: maintenance of plantation boards, journals, and stationery	1 Year, 2&3 Year, 4&5 Year

c. **Data Collection:** Field data capturing the timing, frequency, and qualitative aspects of all maintenance activities were systematically collected during on-site evaluations.

d. **Analysis:** The gathered data were analysed to detect discrepancies between planned and actual implementation. The effectiveness of each maintenance intervention was further assessed based on its contribution to seedling vigour, overall growth, and plantation productivity. Upon completion of the analysis, a comprehensive Maintenance Evaluation Report was compiled, offering actionable insights to optimize future maintenance protocols and enhance plantation outcomes.

3. Methodology for Evaluation of Protection

The division implemented a range of protective measures, including fencing, terracing, trenching, and fire line creation, aimed at securing forest assets and mitigating risks such as grazing, encroachment, and fire hazards. During evaluation, the executed works were systematically cross-verified with sanctioned estimates and entries recorded in the Measurement Book (MB). The verification process involved: Dimensional checks to confirm adherence to prescribed specifications. Physical inspection to assess the structural integrity and functionality of each protective measure. Condition assessment to determine the current status, durability, and effectiveness of the assets in fulfilling their intended purpose. Any deviations or deficiencies noted during field verification were documented for corrective action, ensuring that the protective interventions conform to the standards envisaged at the planning and sanctioning stage.

4. Methodology for Evaluation of Soil and Moisture Conservation (SMC)

The Soil and Moisture Conservation (SMC) initiative was strategically implemented to enhance soil moisture retention and curtail nutrient depletion through the deployment of context-appropriate conservation interventions. This report outlines the rigorous evaluation protocol, encompassing detailed appraisal of primary SMC structures and their current operational status.

Dimensional Verification: All SMC interventions including check dams, saucer pits, gully plugs, and various trench types (continuous contour trenches, staggered trenches, percolation tanks, mini percolation tanks, and semi-lunar trenches) were subject to precise dimensional measurement. These data points were systematically cross-referenced with sanctioned estimates and measurement book entries to validate construction integrity and adherence to design specifications.

- **Check Dams:** Length, height, and width were meticulously recorded and reconciled with official documentation, facilitating the assessment of hydraulic regulation efficacy and moisture retention potential.
- **Saucer Pits:** Diameter and depth measurements allowed for evaluation of moisture augmentation capacity and plant establishment support.
- **Gully Plugs:** Dimensional reviews provided insight into erosion control effectiveness and surface runoff retention.
- **Trenches:** Key trench parameters length, depth, and inter-trench spacing were analyzed to determine their performance in runoff moderation, moisture conservation, and landscape hydrological improvement.
- **Structural and Functional Appraisal:** Each Soil and Moisture Conservation asset was comprehensively inspected to identify manifestation of wear, structural compromise, or ongoing degradation. Inspection criteria included the identification of cracks or breaches in check dams, evidence of erosional processes adjacent to saucer pits, and observations of silt deposition within gully plugs. The vitality and proliferation of vegetative cover on and around SMC structures were also evaluated as proxy indicators of ecological performance and asset sustainability.

Data Analysis and Reporting: All collected measurements and field observations underwent systematic analysis to discern trends, outliers, and overall efficacy of the SMC interventions. The findings were synthesized into the final project report, providing actionable insights and evidence-based recommendations for ongoing and future soil and moisture conservation initiatives.

6. Methodology for Evaluation of Construction

Construction interventions including watchtowers, RCC cairns, seed storage facilities, protective walls, and boundary pillars constitute critical elements of forest protection infrastructure. The dimensions of these structures were precisely measured and systematically cross-referenced with sanctioned specifications and measurement records to ensure compliance and structural adequacy. Concurrently, each asset's physical condition was rigorously evaluated to ascertain its functional effectiveness in forest safeguarding. Subsequently, all collected data was subject to comprehensive analysis, culminating in the preparation of a detailed construction assessment report

7. Methodology for Evaluation of Others

Certain Forest Department initiatives such as the procurement of laptops, disbursement of bill vouchers and wage payments, maintenance of vehicles, provision of stationery and communication facilities, compensation for crop damage, execution of elephant drives, and advance operations are not amenable to physical verification. Accordingly, these activities were evaluated through a financial audit, wherein sanctioned allocations were systematically reconciled with actual expenditures as documented in divisional and range sanction orders, estimation sheets, and work registers. As part of this process, relevant supporting documentation including photocopies of estimate bills and work registers was collated, and a comprehensive "Others Report" was compiled to encapsulate the financial conformity and procedural integrity of these non-physical interventions.

8. Details of Data Collected

1. **Primary Data:** Firsthand information was systematically collected using customized data collection instruments tailored to capture the full spectrum of CAMPA activity components and sub-components. This approach ensured accurate documentation of on-ground realities essential for robust evaluation.
2. **Secondary Data:** Supplementary data pertaining to CAMPA implementation was sourced from Division and Range offices through standardized formats and comprehensive checklists. These records detailing sanctioned works, financial expenditures, and progress milestones served as the foundational documentation for triangulating and cross-validating field-based findings.
3. **Focus Group Discussions (FGDs):** Focused group discussions were organized with Vana Samrakshana Samithi (VSS) members to elicit community perspectives, lived experiences, and levels of engagement in CAMPA interventions. These interactive sessions provided nuanced qualitative insights into public participation, operational challenges, and the perceived social and ecological impacts of project activities.

4. **Consultations with Forest Officials:** Structured interviews and consultations were conducted with key forest personnel spanning all levels of CAMPA implementation including Division Forest Officers (DFOs), Forest Range Officers (RFOs), Forest Section Officers (FSOs), Forest Beat Officers (FBOs), and Forest Guards. These dialogues yielded critical insights into the processes of planning, resource allocation, execution, and performance monitoring from an administrative and operational standpoint.

5. **Field Observations:** Comprehensive field inspections were undertaken to rigorously assess:

- Plantation Performance: Survival rates, tree height and girth, and overall vegetative health.
- Soil and Moisture Conservation (SMC) Works: Structural stability, water retention efficiency, and operational functionality.
- Protection Measures: Effectiveness of fire lines, fencing, and boundary demarcations.
- Weed and Invasive Species Management: Prevalence and distribution within plantation areas.
- Detailed field notes and photographic records were systematically compiled, providing verifiable evidence for the comprehensive evaluation of CAMPA intervention outcomes and impact.

9. Division wise activities undertaken

The tables present a structured account of CAMPA activities implemented across forest divisions during 2018–19. Activities were categorized under six major heads: plantation, maintenance, protection, soil and moisture conservation, construction, and other works. A consistent pattern emerges across the period, with maintenance and "other" activities constituting the bulk of interventions, while plantation, protection, and soil/moisture conservation works, though present, were comparatively limited.

The evaluation sampling (ranging from about 20–25 % of total activities) ensured representativeness across activity types. Over time, the dataset shows stable maintenance workloads, incremental plantation efforts, and gradual inclusion of soil and moisture conservation and construction works. The "other" category consistently absorbed a significant share, pointing to diversified interventions outside the main plantation-protection framework.

Overall, the tables highlight both the breadth of CAMPA implementation and the relative emphasis on routine and auxiliary activities. This provides a useful baseline for assessing division-wise performance and planning balanced interventions in future cycles.

10. Limitations of the Study

While the monitoring and evaluation exercise provides valuable insights into the implementation and outcomes of CAMPA activities, certain limitations need to be acknowledged:

1. Sampling constraint: Only about 20–25 % of activities were sampled for field verification, which may not fully capture the diversity and variability of outcomes across the entire division.

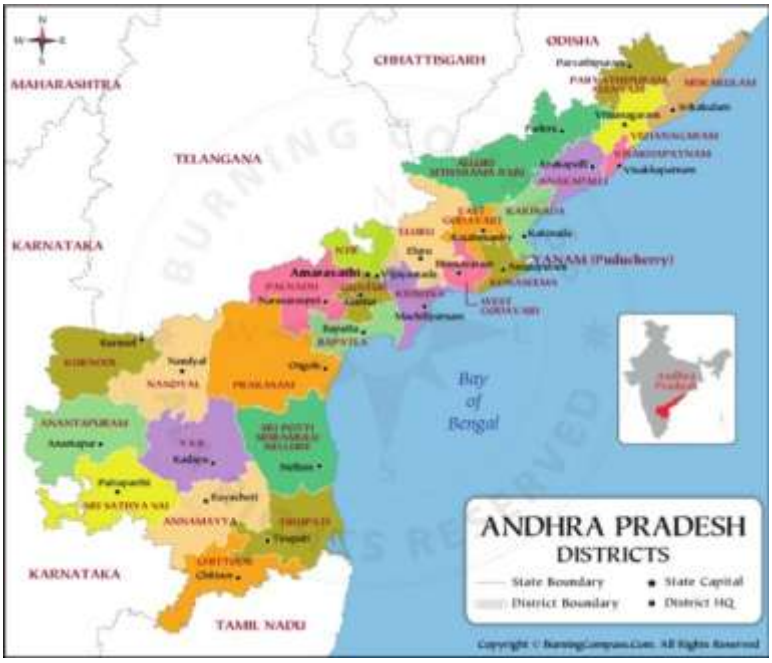
2. Temporal limitation: Evaluations were conducted in a single season, meaning survival and growth data reflect conditions at the time of inspection but not year-round variations.
3. Ecological variability: Outcomes such as survival and growth are heavily influenced by rainfall, soil conditions, and grazing pressures, factors beyond administrative control, which can bias assessment results.
4. Documentation gaps: Incomplete maintenance of plantation journals, missing plantation boards, and inconsistent community records limit the ability to triangulate field observations with historical data.
5. Community involvement: Limited participation of VSS/JFMCs in some sites restricted the inclusion of local perspectives and reduced opportunities for cross-validation of findings.
6. Assessment gap: Afforestation activities were assessed after a time gap of seven years to evaluate their survival, growth performance, and site sustainability outcomes.

In light of these limitations, results should be interpreted as indicative rather than exhaustive, with emphasis on improving future monitoring systems, ensuring comprehensive record-keeping, and strengthening participatory approaches for more robust and representative evaluation.

Table 2 Details of activities implemented/sampled for monitoring and evaluation on division basis during 2018-19

Sl. no.	Divisions	Plantation activity		Maintenance activity		Protection activity		SMC activity		Construction activity		Other Activity		Grand Total	
		No. implemented	No. sampled	No. implemented	No. sampled	No. implemented	No. sampled	No. implemented	No. sampled	No. implemented	No. sampled	No. implemented	No. sampled	Total no. implemented	Total no. sampled
1	**Chittoor East**	8	3	58	13	40	8	11	5	9	4	106	22	232	55
2	**Chittoor West**	12	3	80	16	19	4	21	6	2	1	99	24	233	54
3	**Rajampet**	8	2	24	5	0	0	15	3	1	1	32	7	80	18
4	**Tirupati**	0	0	11	2	10	3	6	1	4	2	113	24	144	32
5	**Nellore**	19	4	87	19	9	4	11	3	6	1	282	58	414	89
6	**Kadapa**	0	0	13	3	4	1	0	0	3	1	96	19	116	24
7	**Proddatur**	22	4	38	8	5	1	5	1	2	1	90	19	162	34
8	**Ananthapuram**	12	4	115	24	12	4	24	6	5	3	48	14	216	55
9	**Giddalur**	2	1	0	0	8	2	7	2	0	0	62	13	79	18
10	**Kurnool**	7	2	18	5	0	0	0	0	0	0	40	9	65	16
11	**Nandyal**	2	1	0	0	0	0	0	0	0	0	0	0	2	1
12	**Atmakur**	0	0	10	3	7	2	6	2	4	1	148	30	175	38
13	**Markapur**	1	1	14	3	6	2	6	2	7	2	83	20	117	30
14	**Guntur**	10	2	30	6	4	3	0	0	5	1	139	30	188	42
15	**Krishna**	1	1	32	6	3	2	57	12	1	1	45	9	139	31
16	**Eluru**	0	0	34	7	0	0	79	19	0	0	115	24	228	50
17	**Eluru WLM**	0	0	2	1	0	0	0	0	0	0	82	16	84	17
18	**Chintur**	12	4	10	3	3	1	94	19	0	0	21	6	140	33
19	**Kakinada**	17	5	33	8	0	0	24	5	0	0	20	6	94	24
20	**Narsipatnam**	10	3	30	6	5	3	0	0	0	0	39	8	84	20
21	**Paderu**	20	4	43	12	2	1	0	0	0	0	138	34	203	51
22	**Visakhapatnam**	10	3	42	9	3	2	0	0	0	0	86	17	141	31
23	**Vizianagaram**	5	1	43	9	12	4	7	1	0	0	120	25	187	40
24	**Srikakulam**	8	2	22	4	0	0	0	0	0	0	133	27	163	33
	Grand Total	**186**	**50**	**789**	**172**	**152**	**47**	**373**	**87**	**49**	**19**	**2137**	**461**	**3686**	**836**

IV. MONITORING AND EVALUATION OF CAMPA ACTIVITIES DIVISION WISE



As per ISFR-2023, Andhra Pradesh has 30,084.96 sq. km of forest cover and 35,424.98 sq. km of forest & tree cover (21.74% of the state's geographical area). Of this, 23,867.76 sq. km lies within the Recorded Forest Area (RFA) and 6,217.20 sq. km outside RFA. Forests are classified into Very Dense (≥70% canopy), Moderately Dense (40–70%), and Open Forests (10–40%), with the state's cover dominated by MDF and OF classes. Over the past decade (2013–2023), forest cover has increased by ~4,041 sq. km (15.5%), though recent years show slight declines in dense forests. Mangrove cover stands at 421.43 sq. km, showing modest gains. Major challenges include forest fires, district-level losses, development pressures, and degradation of dense canopy forests, which are more difficult to regenerate.

The Andhra Pradesh Forest Department administers the state's forest resources through a structured system of territorial and functional divisions. The state's forest area extends across the Eastern Ghats, Nallamala, and Seshachalam hill ranges, with significant tracts of Reserved Forest, Protected Forest, and Wildlife Sanctuaries. For effective management, the department is organized into Forest Circles, each comprising several Divisions that oversee protection, conservation, afforestation, and sustainable utilization of forest resources. Each Forest Division is the primary field unit, headed by a Divisional Forest Officer (DFO), responsible for enforcement of the Forest Acts, prevention of encroachments, wildlife management, soil and moisture conservation, and implementation of schemes like CAMPA, NREGS, and State Forestry Programs. Functional divisions such as Wildlife, Social Forestry, Working Plan, and Flying Squads support territorial divisions in specialized areas. Currently, Andhra Pradesh has multiple territorial divisions distributed across the state, covering the varied ecological zones of Rayalaseema, Coastal Andhra, and Northern Andhra. These divisions play a critical role in biodiversity conservation, protection of critical wildlife habitats, supply of timber and NTFPs, and promotion of eco-tourism, while also acting as the frontline agency in addressing challenges like deforestation, forest fires, and human–wildlife conflict.

The assessment spanned the entire geographical gradient of the state from the southern dry deciduous tracts of Rayalaseema (including Chittoor-East, Chittoor-West, Rajampet, Tirupati, Nellore, Kadapa, Proddatur, Ananthapuramu, Giddalur, Kurnool, Nandyal, Atmakur, and Markapur) through the central divisions of Guntur, Krishna, and Eluru, to the northern Eastern Ghats and coastal regions (such as Eluru–WLM, Chintur, Kakinada, Narsipatnam, Paderu, Visakhapatnam, Vizianagaram, and Srikakulam). Each division was evaluated for implementation efficiency, quality of works, and the impact of CAMPA interventions including plantations, soil and moisture conservation measures, fire protection, and maintenance of existing assets. This state-wide assessment provided a comprehensive understanding of the performance of territorial divisions and their collective role in advancing ecological restoration and sustainable forest management across Andhra Pradesh's diverse landscapes. The forest divisions, which formed the core units covered under the monitoring and evaluation of CAMPA activities across Andhra Pradesh, are presented in the report as follows:

1.Chittoor-East Division
2. Chittoor-West Division
3. Rajampet Division
4. Tirupati Division
5. Nellore Division
6. Kadapa Division
7. Proddatur Division
8. Ananthapuramu Division
9. Giddalur Division
10. Kurnool Division
11. Nandyal Division
12. Atmakur Division
13. Markapur Division
14. Guntur Division
15. Krishna Division
16. Eluru Division
17. Eluru- WLM Division
18. Chintur Division
19. Kakinada Division
20. Narsipatnam Division
21. Paderu Division
22. Visakhapatnam Division
23. Vizianagaram Division
24. Srikakulam Division

1. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN CHITTOOR EAST DIVISION

Introduction

Chittoor East division, situated in the eastern part of Chittoor district in Andhra Pradesh, forms part of the Eastern Ghats landscape and is characterized primarily by Southern Tropical Dry Deciduous Forests interspersed with scrub and degraded patches. While the India State of Forest Report (ISFR) 2023 does not publish forest data at the division level, it reports that Chittoor district has a total forest cover of 1,246.31 sq. km accounting for 18.79 % of the district's geographical area. This includes 457.98 sq.km of Moderately Dense Forest and 788.33 sq. km of Open Forest with no area classified as Very Dense Forest an indication of generally fragmented forests with low canopy density. Chittoor district, which includes the East Division, also witnessed a net loss of 5.44 sq. km in forest cover compared to ISFR 2021 highlighting ongoing pressures such as land-use change, encroachment, and degradation. Chittoor East shares ecological features with the rest of the district and includes parts of the Seshachalam hill ranges which are known for Red Sanders-bearing forests and rich biodiversity. The flora of the region includes key species such as *Pterocarpus santalinus* (Red Sanders), *Terminalia arjuna*, *Anogeissus latifolia*, *Lannea coromandelica*, *Albizia amara*, *Syzygium cumini* and *Azadirachta indica*. In the understorey and degraded zones, drought-resistant shrubs and grasses are common along with several medicinal plants like *Phyllanthus amarus*, *Adhatoda vasica* and *Andrographis paniculata* which are widely used by local communities. The presence of endemic and threatened species such as *Shorea tumbuggaia* and *Cycas beddomei* further underscores the conservation value of the division. Forest fires are a major issue in the region especially during dry seasons. While fire alerts are recorded at the district level, satellite data (SNPP-VIIRS) show Chittoor as one of the more fire-prone districts in Andhra Pradesh, with over 1,000 alerts in the 2023-24 season alone. These fires, combined with grazing, fuelwood collection and NTFP overharvesting, pose serious threats to regeneration and ecological stability. Additionally, Chittoor district has 625.25 sq.km of scrubland, much of which is likely within Chittoor East Division offering potential for ecological restoration and CAMPA-supported afforestation programs. While ISFR 2023 lacks a specific breakdown for Chittoor East, the division clearly represents a critical area for forest conservation**,** endemic species protection and community-based resource management within the Eastern Ghats landscape.

A total of 232 activities were implemented across all ranges, while 54 activities were sampled, representing approximately 23.3 % of the total implemented activities. In Chittoor East range, a total of 28 activities were implemented, with 7 sampled. The major contributions were Maintenance (13 implemented, 3 sampled) and Others (10 implemented, 2 sampled), while Plantation (3 implemented, 1 sampled), Protection (1 implemented, 0 sampled), SMC (1 implemented, 1 sampled) also had minor contributions, and Construction had none. In Karvetinagar range, 24 activities were implemented, of which 6 were sampled. Others (14 implemented, 3 sampled) and Maintenance (4 implemented, 1 sampled) dominated, along with Protection (3 implemented, 1 sampled), SMC (2 implemented, 1 sampled), and Construction (1 implemented, 0 sampled). Piler range implemented 18 activities with only 4 sampled, mostly in Others (11 implemented, 2 sampled), Protection (3 implemented, 0 sampled), SMC (2 implemented, 1 sampled), and Construction (2 implemented, 1 sampled), while Plantation and Maintenance were absent. In Tirupati range, 30 activities were implemented, 6 sampled; Others

(17 implemented, 3 sampled) and Maintenance (7 implemented, 2 sampled) were dominant, followed by Protection (6 implemented, 1 sampled), with Construction, SMC, and Plantation contributing minimally or none. Puttur range had 24 implemented activities with 7 sampled, mainly in Others (15 implemented, 3 sampled), Maintenance (3 implemented, 1 sampled), Protection (4 implemented, 1 sampled), and Construction and Plantation with minor contributions. Sathyavedu range was the most active with 68 implemented activities, 15 sampled, dominated by Maintenance (16 implemented, 3 sampled), Others (24 implemented, 6 sampled), Protection (16 implemented, 3 sampled), and smaller contributions from Plantation, Construction, and SMC. In Srikalahasti range, 40 activities were implemented, 9 sampled, with Maintenance (15 implemented, 3 sampled), Others (15 implemented, 2 sampled), Protection (7 implemented, 2 sampled) as major activities, and minor contributions from Plantation, Construction, and SMC.

1. Monitoring and Evaluation of Plantation Activities

In Plantation category, Chittoor East range led with 3 implemented activities (1 sampled), followed by Sathyavedu range with 3 implemented (1 sampled), Puttur range with 1 implemented (1 sampled), and Srikalahasti range with 1 implemented (0 sampled), while Karvetinagar, Piler, and Tirupati range had no plantation activities during 2018-19.

1.1 Chittoor east range

Three plantation activities were implemented under the CAMPA scheme in Chittoor east range during 2018–19. Accordingly, one plantation activity (constituting 33 %) was chosen for monitoring and evaluation purposes.

Table 3 Details of plantation selected in Chittoor east range

Sl. no.	Plantation	SO no. and year
1	Raising of 15 Ha Misc., plantation in Compt. No.s 437 & 439, Panapakam Extn.RF, Pathagunta beat	DSO 161 (2018-19)

The fifteen-hectare plantation site at Pathagunta Beat is characterized by red soil with a sandy loam texture. This soil type is moderately fertile, well-drained, and capable of retaining adequate moisture while allowing excess water to percolate, thereby reducing the risk of waterlogging.

Survival percentage: At Pathagunta Beat, the fifteen-hectare plantation site recorded moderate to good survival rates for multiple species: *Pterocarpus santalinus* (74.37 percent), *Syzygium cumini* (70.24 percent), *Hardwickia binata* (68.59 percent), and *Terminalia arjuna* (67.76 percent).

Growth: The fifteen-hectare Pathagunta plantation recorded average tree heights ranging from 2.41 to 4.04 metres and girths between 14.30 and 31.59 cm.

Table 4 Details of plantation enumerated in Chittoor east range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Pathagunta 15 Ha	1	*Pterocarpus santalinus*	N 13.420678 E 79.252139	75.20	4.04 ±0.65	31.59 ±8.80

		2	*Pterocarpus santalinus*	N 13.420756 E 79.252190	73.55	3.92 ±0.71	14.30 ±7.37
		3	*Syzygium cumini*	N 13.394101 E 79.920618	70.24	2.41 ±0.42	24.41 ±6.69
		4	*Hardwickia binata*	N 13.421121 E 79.251159	68.59	2.87 ±0.44	28.10 ±6.68
		5	*Terminalia arjuna*	N 13.394101 E 79.920618	67.76	3.30 ±0.54	29.48 ±7.74
Plantation average					**71.07**	**3.31**	**25.58**

1.2 Sathyavedu range

Three plantation activities were implemented under the CAMPA scheme in Sathyavedu range during 2018–19. Accordingly, one plantation activity (constituting 33 %) was chosen for monitoring and evaluation purposes.

Table 5 Details of plantation selected in Sathyavedu range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha (C-Category) Barren Hill Afforestation including advance operations in Compt No.314, Rajugunta RF of Ambakam Beat	DSO 146 (2018-19)

The selected 20-hectare Barren Hill Afforestation plantation site at Ambakam Beat is characterized by red soil with large rocks, indicating shallow soil depth, uneven terrain, and moderate constraints for root establishment and water retention.

Survival percentage: The 20 Ha BHA Ambakam beat plantation site shows good suitability for Pterocarpus santalinus with an average survival rate of 62.78 %.

Growth: In Ambakam 20 Ha BHA plantation, the average tree height ranges from 2.38 to 2.92 meters, with a girth range from 14.30 to 19.89 cm.

Table 6 Details of plantation enumerated in Sathyavedu range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Ambakam (BHA)	1	*Pterocarpus santalinus*	N 13.425457 E 79.894824	63.63	2.68 ±0.24	15.05 ±1.58
		2	*Pterocarpus santalinus*	N 13.424999 E 79.895146	66.66	2.38 ±0.70	14.30 ±4.21
		3	*Pterocarpus santalinus*	N 13.394101 E 79.920618	60.00	2.50 ±0.45	14.39 ±2.68
		4	*Pterocarpus santalinus*	N 13.394101 E 79.920618	63.63	2.92 ±0.34	19.89 ±4.09
		5	*Pterocarpus santalinus*	N 13.394101 E 79.920618	60.00	2.53 ±0.40	18.78 ±1.92
Plantation average					**62.78**	**2.60**	**16.48**

1.3 Puttur range

One plantation activity implemented under the CAMPA scheme in the Puttur range during 2018–19 was identified. Accordingly, one plantation activity (constituting 100 %) was chosen for monitoring and evaluation purposes.

Table 7 Details of plantation selected in Puttur range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha BHA Plantation including AO in Nandanam beat of Puttur range during 2018-19	DSO 144 (18-19)

The selected 20-hectare plantation site at Nandanam beat is characterized by red soil mixed with sandy particles and scattered boulders. The site, located in a hilly terrain, has good natural drainage, which prevents waterlogging and supports healthy plantation growth.

Survival percentage: In Puttur Range, the Nandanam plantation site has shown low suitability for *Syzygium cumini* and *Pterocarpus santalinus*, with average survival rates of 22.66 % and 26 % respectively.

Growth: In the Nandanam plantation, the average tree height ranges from 2.36 to 3.00 meters, while the average girth ranges from 20.43 to 23.80 cm.

Table 8 Details of plantation enumerated in Puttur range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Nandanam 20 Ha	1	*Syygium cumini*	N 13.367712 E 79.830749	28	2.36 ±0.80	20.43 ±8.18
		2	*Pterocarpus santalinus*	N 13.367839 E 79.830539	32	2.81 ±0.53	21.25 ±2.97
		3	*Pterocarpus santalinus*	N 13.36813 E 79.830512	20	3.00 ±0.35	23.80 ±4.38
		4	*Syzygium cumini*	N 13.368147 E 79.830478	20	2.80 ±0.57	22.40 ±2.88
		5	*Syzygium cumini*	N 13.367188 E 79.830403	20	2.60 ±0.65	21.00 ±9.48
Plantation average					**24.00**	**2.71**	**21.78**

Comparative assessment of plantations in Chittoor west division during 2018-19

The 15-hectare plantation at Pathagunta Beat exhibits the best overall performance, with moderately fertile red soil of sandy loam texture that is well-drained and moisture-retentive, supporting good root development and reducing waterlogging risks. This site recorded the highest survival rates across multiple species, with *Pterocarpus santalinus* showing 74.37%, *Syzygium cumini* 70.24%, *Hardwickia binata* 68.59%, and *Terminalia arjuna* 67.76%. Growth measurements here were also the highest, with tree heights ranging from 2.41 to 4.04 meters and girths between 14.30 and 31.59 cm. In comparison, the 20-hectare Ambakam Barren Hill Afforestation (BHA) site is characterized by shallow red soil mixed with large rocks and uneven terrain, which poses moderate constraints for root establishment and water retention. Despite these challenges, it demonstrated a reasonably good survival rate of 62.78% for *Pterocarpus santalinus*, although tree growth was more limited, with heights ranging from 2.38 to 2.92 meters and girths from 14.30 to 19.89 cm. On the other hand, the 20-hectare Nandanam Beat plantation, located in hilly terrain with red soil mixed with sandy particles and scattered boulders, showed the least favorable results. Although the site offers good natural drainage, the rocky and shallow soil appears to hinder plant survival, with *Syzygium cumini* and *Pterocarpus santalinus* recording low survival rates of 22.66 % and 26 % respectively. However, growth

performance was slightly better than Ambakam in terms of girth (20.43 to 23.80 cm), though average heights remained between 2.36 and 3.00 meters. Overall, Pathagunta Beat is the most suitable site among the three, offering both higher survival and better growth conditions, while Nandanam Beat appears least suitable due to poor survival rates despite moderate growth.

Verification of plantation area and boundaries

The plantation boundaries and areas were verified using KML files obtained for each site. These files were processed using GIS tools to generate accurate maps and to calculate the actual area covered under each plantation. This geospatial verification ensured consistency between recorded and actual field data.

Table 9 Details of plantation area perambulation in Chittoor west division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 15 Ha Misc., plantation in Compt. Nos 37 & 439, Panapakam Extn.RF, Pathagunta beat	15	15.72
2	Raising of 20 Ha (C-Category) Barren Hill Afforestation in Compt No.314, Rajugunta RF of Ambakam Beat, Sathyavedu Section	20	20.32
3	Raising of 20 Ha BHA Plantation including AO in Nandanam beat of Puttur range	20	26.79

During the verification of plantation areas at Pathagunta, Ambakam BHA, and Nandanam, it was consistently observed that the perambulated extents exceeded the officially recorded areas. The field verification was conducted with the assistance of local forest beat officers, and in all cases, the plantations were surrounded by dense jungle growth, trenches, and natural obstructions. Consequently, the field teams traced the outer boundaries of these physical features, rather than adhering strictly to the originally recorded plantation limits. As a result, the perambulated area was found to be 0.72 hectares larger at Pathagunta, 0.32 hectares larger at Ambakam BHA, and 6.79 hectares larger at the Nandanam plantation. This discrepancy is attributed to the inclusion of waste, degraded, or rocky patches within the demarcated plantation areas that may not have been reflected in earlier records. Spatial analysis was conducted using QGIS software, and the verification was further supported through physical perambulation using the Geo Tracker mobile application. To substantiate the findings, geo-tagged photographs and GIS-based mapping outputs were generated, providing clear evidence of the verification process.

15.72 Ha Pathagunta

20.32 Ha Ambakam (BHA)

26.79 Ha Nandanam

Health status of plantations: During field visits to the plantation sites at Pathagunta, Ambakam BHA, and Nandanam, the health status of all plantations was found to be satisfactory, with no evidence of damage caused by pests or insects.

Protection of plantations: Consistent protective measures including the establishment and maintenance of fire lines, inspection paths, and the deployment of fire watchers were observed at all three locations, ensuring effective protection against fire hazards and other environmental threats.

Biotic (human/cattle) pressure on plantations: Biotic pressure from grazing or browsing by cattle or humans was minimal to negligible across all sites, indicating that the plantations are generally well-protected from such disturbances.

Maintenance of plantation journals and records: Journals were reported to be systematically maintained, certain issues were noted: the journal was unavailable at Pandur beat (under Ambakam BHA), and regular updating of journal parameters is still required at all sites to ensure data accuracy and reliability. Plantations are inspected by the concerned forest officials, and their observations are duly recorded.

Vana Samrakshana Samithi (VSS): In terms of community involvement, none of the plantations Pathagunta in Chittoor East Range, Ambakam BHA in Sathyavedu Range, or Nandanam in Puttur Range involved the Vana Samrakshana Samithi (VSS) in plantation activities, and consequently, Focus Group Discussions (FGDs) were not conducted at any of these sites.

Pathagunta in Chittoor east range

Ambakam (BHA) in Sathyavedu range

Nandanam beat plantation in Puttur range

2. Monitoring and Evaluation of Maintenance Activities

Maintenance was the most extensively implemented activity, totalling 58, with Chittoor East contributing 13 (3 sampled), Sathyavedu 16 (3 sampled), Srikalahasti 15 (3 sampled), Tirupati 7 (2 sampled), Karvetinagar 4 (1 sampled), and Puttur 3 (1 sampled), while Piler had none.

Table 10 Maintenance activities selected for evaluation in Chittoor east division

Sl. No.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Chittoor east range			
1	First and second year maintenance of 5 Ha CA plantation in Basavapalli Village of B Samudram beat	N 13.102642 E 79.144536	DSO 220 (2018-19)
2	Second year maintenance of 30 Ha Red Sanders plantation in Chittoor beat	N 13.127507 E 79.162521	DSO 216 (2018-19)
3	First year maintenance of 2.725 Ha SZA plantation in Pathagunta beat	N 13.427941 E 79.211651	DSO 113 (2018-19)
Sathyavedu range			
4	First year maintenance of 20 Ha RS plantation in Banglabatagutta locality of Ambakam beat	N 13.39184 E 79.922954	DSO 111 (2018-19)
5	Second year maintenance of 7 Ha miscellaneous plantation in Pandur beat of Kambakam section of Sathyavedu range	N 13.562879 E 79.910327	DSO 192 (2018-19)
6	Third year maintenance of 20 Ha Red Sanders plantation in Rallakaalava locality of Pandur beat of Sathyavedu range	N 13.549086 E 79.892178	DSO 194 (2018-19)
Srikalahasti range			
7	First year maintenance of 20 Ha Red Sanders plantation in Moolakona locality of Thimmasamudram beat	N 13.62382 E 79.71817	DSO 108 (2018-19)
8	Second year maintenance of 20 Ha Red Sanders plantation in Muchivolu locality of Chinthalapalem beat	N 13.795183 E 79.60736	DSO 115 (2018-19)
9	Third year maintenance of 10 Ha Red Sanders plantation in Nemalitippalu locality of Katur beat of Sri Kalahasti range	N 13.703008 E 79.829263	DSO 180 (2018-19)
Tirupati range			
10	Second year maintenance of 20 Ha NTSHS plantation in Maddimanukunta locality of Nendragunta beat	N 13.508539 E 79.168882	DSO 118 (2018-19)
11	Second year maintenance of RS 20 Ha plantation in Yerpedu beat	N 13.690877 E 79.580523	DSO 114 (2018-19)
Karvetinagar range			
12	Maintenance of 61 Ha CA plantation in Rayalacheruvu beat of Karvetinagar range	N 13.520753 E 79.387427	DSO 188 (2018-19)
Puttur range			
13	Third year maintenance of 20 Ha Red Sanders plantation at Malligunta locality in Nandanam beat of Puttur range.	N 13.404877 E 79.837165	DSO 184 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. The works undertaken included casualty replacement, circular weeding and soil working, coppice management, pruning of lower branches, fertilizer application, creation and upkeep of fire lines, and other contingency measures. Verification showed that most of these activities had been properly executed in accordance with sanctioned orders. Circular weeding and soil working reduced weed competition and improved aeration, coppice cutting minimized competition from secondary shoots, and pruning promoted healthier plant structure. Fertilizer application was

carried out in several plantations, though in some cases the dosage and distribution were not uniform. Fire lines were created or maintained, but at certain locations they required better clearance to remain effective in peak summer. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth are as follows;

General recommendations for maintenance activities

- Ensure the timely replacement of failed seedlings to maintain adequate stocking and promote healthy plantation growth.
- Maintain proper fertilizer application methods consistently to support optimal tree development.
- Strengthen weed control efforts, focusing particularly on invasive species like lantana and bushy grasses.
- Increase the frequency and scope of weeding operations, especially circular weeding along plantation boundaries, to reduce competition and support healthy growth.
- Regularly clear and maintain fire lines to ensure visibility and effectiveness in reducing fire risks.
- Install, repair, or replace plantation stones and boards as needed to improve site identification and facilitate effective monitoring.

5 Ha CA of B Samudram beat

30 Ha Red Sanders in Chittoor beat

20 Ha RS in Ambakam beat

20 Ha RS in Pandur beat

20 Ha NTSHS in Nendragunta beat

20 Ha RS plantation in Yerpedu beat

3. Monitoring and Evaluation of Protection Activities

Protection activities accounted for 40 implemented actions and 8 sampled, with the highest in Sathyavedu range (16 implemented, 3 sampled), Tirupati range (6 implemented, 1 sampled), Srikalahasti range (7 implemented, 2 sampled), Puttur range (4 implemented, 1 sampled), Chittoor East range (1 implemented, 0 sampled), Karvetinagar range (3 implemented, 1 sampled), and Piler range (3 implemented, 0 sampled) during 2018-19.

3.1 Creation and maintenance of fire lines in Ambakam beat of Sathyavedu range

GPS location: N 13.390651 E 79.911955 **SO no. and year:** RSO 52 (2018-19)

3.2 Maintenance of fire lines in Sathyavedu beat & section of Sathyavedu range

GPS location: N 13.428003 E 79.94253 **SO no. and year:** RSO 50 (2018-19)

In Sathyavedu Range, fire lines were created and maintained in both Sathyavedu beat and Ambakam beat. These works were monitored and evaluated against the specifications recorded in the measurement book, and the field measurements corresponded accurately with the documented dimensions, confirming no deviations. The newly created fire line in Sathyavedu beat measured 3 meters in width and 6000 meters in length, while in Ambakam beat it measured 3 meters in width and 1500 meters in length. Although the fire lines were established as per specifications across the natural forest areas of both beats, visibility was poor due to dense growth of grasses and weeds along the lines. This indicates the need for more frequent maintenance to ensure their effectiveness as protective barriers against fire.

Fire lines in Ambakam beat

Fire lines in Sathyavedu beat

3.3 Creation of new fire lines in Ambakam beat, Sathyavedu section of Sathyavedu range

GPS location: N 13.376143 E 79.907187 **SO no. and year:** RSO 53 (2018-19)

3.4 Creation of new fire lines in Mungilipattu beat, Panapakam section of Tirupati range

GPS location: N 13.529502 E 79.2331 **SO no. and year:** RSO 17 (2018-19)

A fire line was created and maintained in the natural forest of Ambakam beat of Sathyavedu range and Mungilipattu beat of Tirupati range. These works were monitored and evaluated against the specifications recorded in the measurement book and verified with actual field measurements.

Ambakam beat (Sathyavedu range): The fire line measured 6 m in width and 1500 m in length. Field measurements matched the records, showing no deviations. The fire line was well maintained, free from noticeable weed or grass growth, and ensured clear visibility throughout.

No fire incidences have been reported since its establishment, demonstrating its effectiveness in fire prevention.

Mungilipattu beat (Tirupati range): The fire line measured 3 m in width and 1000 m in length, with field measurements matching the records. However, dense weed and grass growth was observed all along the fire line, compromising its visibility. The line was not well maintained and therefore did not provide a clear barrier.

Fire lines in Ambakam beat

Fire lines in Mungilipattu beat

3.5 Formation of the new fire lines at Anjur RF, Katur beat of Sri Kalahasti range

GPS location: N 13.581509 E 79.670485 **SO no. and year:** RSO 11 (2018-19)

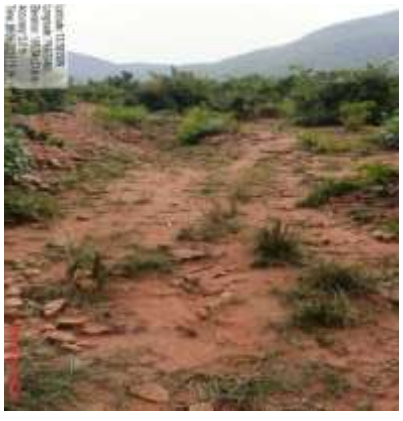
3.6 Formation of the new fire lines at Kalavagunta beat of Sri Kalahasti range

GPS location: N 13.855602 E 79.456901 **SO no. and year:** RSO 215 (2018-19)

In Srikalahasti Range, fire lines were created and maintained in both Katur beat and Kalavagunta beat. These works were monitored and evaluated against the specifications recorded in the measurement book, and the field measurements corresponded accurately with the documented dimensions, confirming no deviations. The newly created fire lines in both beats measured 3 meters in width and 1000 meters in length.

- **Katur beat:** The fire line was clear and well maintained, with no noticeable grass or weed growth. Visibility was good throughout the natural forest area, indicating proper upkeep.
- **Kalavagunta beat:** Although the fire line was created as per specifications, visibility was poor due to dense growth of grasses and weeds along the line. This highlights the need for more frequent maintenance to ensure its effectiveness as a protective barrier against fire.

Fire lines in Kalavagunta beat



Fire lines in Katur beat

3.7 Creation of new fire lines in Kollagunta section of Karvetinagar range

GPS location: N 13.368148 E 79.475039 **SO no. and year:** DSO 318 (2018-19)

3.8 Creation of new fire lines in Diguvaputtur beat of Puttur range

GPS location: N 13.512108 E 79.702092 **SO no. and year:** RSO 18 (2018-19)

A fire line was created and maintained in the natural forest of Kollagunta section of Karvetinagar range and Diguvaputtur beat of Puttur range. These works were monitored and evaluated against the specifications recorded in the measurement book and verified with actual field measurements. In Kollagunta section (Karvetinagar range) the fire line measured 6 m in width and 6000 m in length. Field measurements matched the records, showing no deviations. However, dense weed and grass growth was observed all along the fire line, compromising its visibility. The line was not well maintained and therefore did not provide a clear barrier. In Diguvaputtur beat (Puttur range) the fire line measured 3 m in width and 1000 m in length, with field measurements matching the records. The fire line was well maintained, free from noticeable weed or grass growth, and ensured clear visibility throughout. No fire incidences have been reported since its establishment, demonstrating its effectiveness in fire prevention.

Fire lines in Kollagunta section

Fire lines in Diguvaputtur beat

4. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

Soil and Moisture Conservation (SMC) activities totalled 11 implemented and 5 sampled, concentrated in Sathyavedu range (5, 1 sampled), Karvetinagar and Piler range (2 each, 1 sampled each), Chittoor East range (1, 1 sampled), and Srikalahasti range (1, 1 sampled), while Tirupati and Puttur range had none during 2018-19.

4.1 Construction of saucer pits 12 no's in Chittoor beat of Chittoor East range

GPS location: N 13.210367 E 79.10733 **SO no. and year:** DSO 313 (2018-19)

Twelve saucer pits constructed in Chittoor beat of Chittoor East range were monitored and evaluated against the specifications recorded in the measurement book. The field measurements matched the documented dimensions, confirming no deviations. Each saucer pit measured 2 meters in diameter and 0.5 meters in depth. All 12 saucer pits were found to be in good condition and well maintained. However, to further enhance their storage capacity, removal of accumulated dirt and re-plastering with cement are recommended.

Saucer pits in Chittoor beat

4.2 Soil Moisture Conservation works (CCT and RFD) in 50.64 Ha CA plantation, Rayalacheruvu beat of Karvetinagar Range

GPS location: N 13.51026 E 79.382805 **SO no. and year:** DSO 327 (2018-19)

Soil Moisture Conservation (SMC) works consisting of 100 Continuous Contour Trenches (CCTs) and 50 Rock-filled Dams (RFDs) in the 50.64 ha CA plantation at Rayalacheruvu beat of Karvetinagar Range were monitored and evaluated against the specifications recorded in the measurement book. The field measurements corresponded accurately with the documented dimensions, confirming no deviations.

- Continuous Contour Trenches (CCTs): Each trench measured 10 m in length, 0.5 m in width, and 0.5 m in depth, with a volume of 2.5 cu. m. The CCTs were found to be generally well maintained. However, in some of the lower trenches, depth had been reduced due to siltation. Regular de-siltation is recommended to restore their full capacity and ensure effective soil moisture conservation.
- Rock-filled Dams (RFDs): Each structure measured 8 m in length, 1 m in width, and 0.3 m in depth, with a volume of 2.4 cu. m. The gully check structures were in good condition and well maintained. Regular de-siltation is advised to enhance their storage capacity, improve water infiltration, and maintain soil moisture levels. These structures have contributed positively to biomass growth, particularly of boda grass and associated vegetation.

Soil Moisture Conservation works (CCT and RFD) in 50.64 Ha CA, Rayalacheruvu beat

4.2 Construction of Saucer pits in Piler range during 2018-19

GPS location: N 13.538001 E 79.041253 **SO no. and year:** RSO 25 (2018-19)

Twenty-three saucer pits constructed in Piler range were monitored and evaluated against the specifications recorded in the measurement book. The field measurements matched the documented dimensions, confirming no deviations. Each saucer pit measured 2 meters in diameter and 0.5 meters in depth. All 23 saucer pits were found to be in good condition and well maintained. However, to further enhance their storage capacity, removal of accumulated dirt and re-plastering with cement are recommended.

Saucer pits in Piler range

4.4 Construction of saucer pits in Mannavaram beat, Pallam section of Srikalahasti range

GPS location: N 13.90291 E 79.520973 **SO no. and year:** DSO 340 (2018-19)

Seven saucer pits constructed in Mannavaram beat, Pallam section of Sri Kalahasti range were monitored and evaluated against the specifications recorded in the measurement book. The field measurements matched the documented dimensions, confirming no deviations. Each saucer pit measured 4 meters in diameter and 0.5 meters in depth. All seven saucer pits were found to be in good condition and well maintained. However, to further enhance their storage capacity, removal of accumulated dirt is recommended.

Saucer pits in Sri Kalahasthi range

4.5 Construction of saucer pits- 4 no's in S K Madugu beat, Beerakuppam section of Sathyavedu range

GPS location: N 13.47993 E 79.859807 **SO no. and year:** DSO 334 (2018-19)

Four saucer pits constructed in Piler range were monitored and evaluated against the specifications recorded in the measurement book. The field measurements matched the documented dimensions, confirming no deviations. Each saucer pit measured 3 meters in diameter and 0.5 meters in depth. All four saucer pits were found to be in good condition and well maintained. However, to further enhance their storage capacity, removal of accumulated dirt and re-plastering with cement are recommended.

Saucer pits in SK Madugu beat

5. Monitoring and Evaluation of Construction activities

Construction works reached 9 implemented, 4 sampled. In Sathyavedu range (4 implemented, 1 sampled), Piler (2 implemented, 1 sampled), Puttur range (1 implemented, 1 sampled), and Srikalahasti range (1 implemented, 1 sampled), Karvetinagar range (1 implemented, 0 sampled) with Tirupati range having none during 2018-19.

5.1 Construction of RCC boundary pillars in Kadur beat, Kambakam section of Sathyavedu

GPS Location: N 13.610971 E 80.005224 **SO no. and year:** DSO 353 (2018-19)

5.2 Construction of RCC boundary pillars in Ganugapenta beat Mangalampeta section of Piler range

GPS Location: N 13.301924 E 79.084052 **SO no. and year:** DSO 255 (2018-19)

Ten RCC boundary pillars constructed in Kadur beat (Kambakam section, Sathyavedu range) and ten RCC boundary pillars in Ganugapenta beat (Mangalampeta section, Piler range) were monitored and evaluated against the specifications recorded in the measurement book. The above-ground dimensions of all pillars were 1.20 m in height, 0.30 m in top width, and 0.45 m in bottom width. Field measurements matched the recorded specifications, with no major deviations observed. All pillars were intact, in good condition, and effectively demarcated the boundaries between reserve forest and adjoining revenue land in both beats.

RCC pillars in Kadur beat

RCC pillars in Ganugapenta beat

5.3 Construction of RCC boundary pillars in Nagari beat of Puttur range

GPS Location: N 13.468203 E 79.592470 **SO no. and year:** DSO 339 (2018-19)

5.4 Construction of RCC boundary pillars in Kukkambakam beat, Srikalahasti section

GPS Location: N 13.671987 E 79.841113 **SO no. and year:** DSO 253 (2018-19)

Twenty RCC boundary pillars ten in Nagari beat (Puttur range) and twenty in Kukkambakam beat (Sri Kalahasti section, Sri Kalahasti range) were monitored and evaluated against the specifications recorded in the measurement book. The above-ground dimensions of all pillars were 1.20 m in height, 0.30 m in top width, and 0.45 m in bottom width. Field measurements matched the recorded specifications, with no major deviations observed. All pillars were intact, in good condition, and effectively demarcated the boundaries between reserve forest and adjoining revenue land in both beats. A total of 20 boundary pillars were constructed across the two beats for boundary demarcation, all of which are in good condition and adequately marking the forest boundaries.

RCC pillars in Nagari beat

RCC boundary pillars in Kukkambakam beat

6. Monitoring and Evaluation of Other activities

The "Others" category once again formed the largest share of CAMPA activities in Chittoor East Division during 2018–19, with 106 works implemented across the seven ranges. Of these, 21 activities about 20 percent were sampled for verification. Sathyavedu range recorded the highest number of works with 24 implemented and 6 sampled, followed by Tirupati with 17 implemented and 3 sampled, Karvetinagar with 14 implemented and 3 sampled, Puttur with 15 implemented and 3 sampled, Srikalahasti with 15 implemented and 2 sampled, Piler with 11 implemented and 2 sampled, and Chittoor East with 10 implemented and 2 sampled. Document verification and cross-checking were carried out in the presence of Division and Range staff. The verification process focused on sanction orders, estimation sheets, and work registers. In most cases, the sanctioned amounts were in alignment with actual expenditures, and financial records were properly maintained and authenticated by the Divisional Forest Officer (DFO), Sub-Divisional Officer (SDO), and Forest Range Officer (FRO). The utilization of funds was appropriate and consistent with approved estimates and CAMPA guidelines. Both internal audits conducted by the Conservator of Forests and external audits by the Accountant General's office confirmed compliance with financial and administrative protocols, ensuring transparency and accountability in implementation.

Nevertheless, some shortcomings were observed in the availability of records. In Karvetinagar range, the estimates and work registers for DSO 129, DSO 307, and DSO 381 (2018–19) were

not made available for verification. Similarly, in Srikalahasti range, the estimates for DSO 41 and DSO 49 (2018–19) were not presented. In Tirupati range, the work registers for DSO 72 (2018–19) was also not produced. These lapses limited the completeness of verification in the affected ranges. From a range-wise perspective, Sathyavedu stood out as the most active range with nearly one-quarter of all activities, and its sampled records were well documented. Tirupati, while also contributing a high number of activities, showed gaps in record availability, pointing to the need for stronger documentation practices. Karvetinagar and Srikalahasti displayed moderate implementation levels but were among the ranges where key records were missing. In contrast, Puttur, Piler, and Chittoor East, though smaller in scale, generally showed better alignment between sanctioned and actual expenditures, aside from the minor record gaps noted.

Key Findings

- Plantations showed contrasting results: excellent at Pathagunta, moderate at Ambakam, and very weak at Nandanam.
- Maintenance works were widespread and effective, but uneven fertilizer use, weak fire line clearance, and missing boards reduced quality.
- Protection infrastructure was created across ranges, but inconsistent upkeep undermined its role.
- SMC works were properly executed but are vulnerable to siltation without regular upkeep.
- Boundary pillars were strong and effective in demarcation.
- Financial accountability was sound, though area mismatches persisted.
- Community participation was completely absent, weakening social ownership.

Recommendations

- Prioritize high-performing sites (Pathagunta) for expansion and avoid weak sites like Nandanam unless species–site matching is improved.
- Extend maintenance cycles division-wide, with greater attention to fire line clearance, fertilizer use, and plantation identification.
- Institutionalize seasonal clearance of fire lines and strengthen watch systems across all ranges.
- Scale up SMC coverage and introduce regular desilting schedules to preserve capacity.
- Enforce GIS-based verification to reconcile field extents with records.
- Mandate structured VSS involvement and FGDs to institutionalize community participation.
- Rebalance the CAMPA portfolio to reduce dependence on “others” and channel more resources into plantations, SMC, and protection.

2. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN CHITTOOR WEST DIVISION

Introduction

Chittoor west division, located in the south-western region of Andhra Pradesh, is a critical ecological zone within the Anantapur Forest Circle. Characterized by a mix of dry deciduous forests, southern thorn scrub, and semi-arid landscapes, the division spans undulating terrain with elevations reaching up to 2,500 feet. The region falls under a semi-arid climate, with red sandy and loamy soils supporting native vegetation adapted to seasonal rainfall and prolonged dry periods. The forests host a variety of native and locally significant tree species, such as *Azadirachta indica* (Neem), *Ficus racemosa* (Athi), and *Acacia auriculiformis*, along with regenerating species like Adavi Gummadi and Adavi Nimma. Despite this biodiversity, overall forest density is low (approximately 0.2), reflecting degradation due to anthropogenic pressures including deforestation, habitat fragmentation, and land diversion for infrastructure projects. A key ecological feature of the division is the presence of Red Sanders (*Pterocarpus santalinus*), a rare and high-value endemic tree species. However, illegal harvesting and smuggling have placed immense pressure on its remaining habitats. The division also faces conservation challenges such as human-wildlife conflict—particularly with elephants—along with threats from quarrying, road construction, and forest clearance proposals. To safeguard its ecological integrity, the division requires a multi-pronged approach focusing on sustainable forest management, community engagement, and strong enforcement against illegal activities. Strategic conservation of biodiversity-rich corridors, protection of Red Sanders habitats, and effective implementation of compensatory afforestation are essential to ensure the long-term resilience and sustainability of the Chittoor West division.

Across all five ranges in Chittoor west, a total of 233 activities were conducted during the year 2018-19. Out of these, 54 activities were sampled, resulting in an overall sampling rate of approximately 23.1 %. In the Chittoor range, a total of 39 activities were implemented of which 11 were sampled. 1 plantation activity was carried out but not sampled. 18 maintenance activities were implemented with 4 sampled. 2 protection activities were carried out, of which 1 was sampled. 2 SMC activities were implemented with 1 sampled. No construction activities were reported. 16 activities fell under the "Others" category, with 5 sampled. Palamaner range recorded 57 activities, with 15 sampled. 1 plantation activity was conducted but not sampled. 13 maintenance activities were carried out, with 3 sampled. 4 protection activities were implemented but none were sampled. 3 SMC activities were implemented of which 2 was sampled. 2 construction activities were reported, with 1 sampled. 34 activities fell under "Others", and 9 were sampled. In Kuppam range, 40 activities were conducted and 8 were sampled. 3 plantation activities were carried out, with 1 sampled. 17 maintenance activities were implemented with 3 sampled. 5 protection activities were carried out, with 1 sampled. No construction and SMC activities were reported. 15 activities fell under "Others", of which 3 were sampled. Punganur range had 24 activities, of which 6 were sampled. 2 plantation activities were implemented with 1 sampled. 10 maintenance activities were carried out, with 2 sampled. 5 protection activities were implemented of which 1 was sampled. 3 SMC activities were implemented with 1 sampled. No construction activities were reported. 4 "Others" activities were implemented with 1 sampled. Madanapalli recorded the highest number of activities (73), with 14 sampled. 5 plantation activities were carried out, with 1 sampled. 22

maintenance activities were implemented with 4 sampled. 3 protection activities were carried out, of which 1 was sampled. 13 SMC activities were implemented with 2 sampled. No construction activities were reported. 30 activities were classified under "Others", with 6 sampled.

1. Monitoring and Evaluation of Plantation Activities

During 2018–19, a total of 12 plantation activities were conducted across the division, of which 3 were sampled, representing 25 % of the total. Kuppam recorded 3 plantation activities, with 1 sampled. Punganur had 2 plantation activities, with 1 sampled. In Chittoor and Palamaner, 1 activity each was conducted but not sampled. Madanapalli carried out 5 plantation (1 sampled).

1.1 Kuppam range

During 2018–19, a total of three plantation activities were undertaken under the CAMPA scheme in the Chittoor west range. As part of the monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was selected for assessment.

Table 11 Details of the plantation selected in Kuppam range

Sl. no.	Plantation	SO no. and year
1	Raising of 15 Ha NTSH (LIM) plantation at Kuppam beat of Kuppam range	DSO 186 (2018-19)

In Kuppam plantation in Kuppam range, the trees have a moderate survival rate but show stunted growth due to the site not being suitable for optimal tree development.

Survival percentage: The 15 Ha plantation in Kuppam range demonstrates good site suitability for *Azadirachta indica* and *Sterculia urens*, with survival rates of 70.31% and 74.99% respectively, indicating moderately favorable conditions for their growth and establishment.

Growth: In 15 Ha Kuppam plantation in the Kuppam range, the average tree height ranges from 1.01 to 1.68 m and the girth ranges from 17.53 to 20.31 cm. The relatively smaller size compared to the Kangundi plantation may be due to factors such as the age of the plantation, site conditions, species suitability, and environmental factors like soil quality, water availability, and microclimates.

Table 12 Details of plantation enumerated in Kuppam range

Sl. no.	Planation / Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girt
1	Kuppam	1	*Azadirachta indica*	N 12.770827 E 78.411709	70.31	1.01 ±0.47	17.53 ±3.81
		2	*Sterculia urens*	N 12.771145 E 78.411505	78.12	1.08 ±0.63	19.78 ±3.82
		3	*Sterculia urens*	N 12.772057 E 78.411505	76.56	1.07 ±0.60	18.43 ±4.51
		4	*Sterculia urens*	N 12.770432 E 78.411692	75.00	1.56 ±0.73	19.94 ±4.01
		5	*Sterculia urens*	N 12.772364 E 78.411318	70.31	1.68 ±1.05	20.31 ±4.43
Plantation average					**74.06**	**1.28**	**19.20**

1.2 Punganur range

During 2016–17, a total of three plantation activities were undertaken under the CAMPA scheme in Palamaner range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to one plantation activity, were selected for detailed assessment.

Table 13 Details of plantation selected in Punganur range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha NTSH plot at Valligatla beat, during 2018-19.	DSO 162 (2018-19)

The selected site for the **10-hectare plantation** at **Valligatla** is characterized by **sandy loamy soil**, which provides optimal conditions for plantation growth. The site demonstrates excellent suitability for the species chosen for planting, ensuring a high potential for successful establishment and growth.

Survival Percentage: In Punganur range, the Valligatla plantation demonstrates strong suitability for *Pterocarpus santalinus*, *Azadirachta indica*, and *Hardwickia binata*, with survival rates of 95.06%, 82.71%, and 84.29% respectively. These rates reflect the species' effective adaptation to local site conditions, including soil quality, moisture availability, and microclimatic factors. The exceptionally high survival rate of *Pterocarpus santalinus* (Red Sanders), a valuable and endemic species, suggests that the site offers optimal conditions for its growth likely due to favorable soil characteristics, sound plantation practices, and conducive microclimate. Similarly, the strong performance of *Azadirachta indica* and *Hardwickia binata* reinforces the site's suitability for mixed-species plantations, combining ecological resilience with economic potential.

Growth: In Valligatla plantation, tree heights range from 1.92 to 4.03 meters, and girths vary from 21.75 to 30.20 cm. The variation in height and girth across different plots in both plantations can be attributed to site-specific factors such as soil properties, microclimatic conditions, and other environmental influences affecting tree growth.

Table 14 Details of plantation enumerated in Punganur range

Sl. no.	Planation/ Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Valligatla	1	*Pterocarpus santalinus*	N 13.561225 E 78.74279	95.06	4.03 ±0.58	30.20 ±4.53
		2	*Azadirachta indica*	N 13.561607 E 78.74223	86.41	2.13 ±0.64	21.92 ±4.00
		3	*Hardwickia binata*	N 13.561778 E 78.741831	83.47	1.92 ±0.66	21.75 ±3.64
		4	*Hardwickia binata*	N 13.562078 E 78.741062	85.12	2.05 ±0.50	22.12 ±2.96
		5	*Azadirachta indica*	N 13.560979 E 78.743841	79.01	2.05 ±0.51	23.21 ±3.89
Plantation average					**85.81**	**2.44**	**23.84**

Comparative assessment of plantations in Chittoor west division during 2018-19

In the Kuppam 15 Ha plantation, Azadirachta indica and Sterculia urens recorded survival rates of 70.31% and 74.99%, respectively, with average tree heights ranging from 1.01 to 1.68 meters and girths from 17.53 to 20.31 cm. In contrast, the Valligatla plantation in Punganur range showed higher survival rates for Pterocarpus santalinus (95.06%), Azadirachta indica (82.71%), and Hardwickia binata (84.29%), with tree heights ranging from 1.92 to 4.03 meters and girths from 21.75 to 30.20 cm. Overall, Valligatla plantation demonstrates better species-site compatibility and growth performance, whereas Kuppam plantation exhibits moderate survival and smaller tree growth, likely influenced by plantation age, site conditions, and environmental factors.

Verification of plantation area and boundaries

The plantation boundaries and areas were verified using KML files obtained for each site. These files were processed using GIS tools to generate accurate maps and to calculate the actual area covered under each plantation. This geospatial verification ensured consistency between recorded and actual field data.

Table 15 Details of plantations area enumerated in Chittoor west division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 15 Ha LIM plantation at Kuppam beat of Kuppam range during 2018-19	15 Ha	15.02 Ha
2	Raising of 10 Ha NTSH plot at Valligatla beat of Punganur range during 2018-19	10 Ha	15.73 Ha

During the verification of plantation areas, the perambulated extents were consistently found to be larger than the officially recorded areas across multiple sites. Perambulation was conducted with the assistance of local forest beat officers, and in each case, dense jungle growth, trenches, and other natural obstructions surrounded the plantations. As a result, the field teams followed the outer boundary of these features rather than the precise recorded plantation limits.

In Kuppam beat plantation the perambulated area exceeded the recorded area by 0.02 hectares, while at Valligatla plantation the area was larger by 5.73 hectares. All measurements were carried out using QGIS software for spatial analysis and verified through physical perambulation with the Geo Tracker mobile application. Geo tagged photographs and GIS mapping outputs were generated to provide evidence of the verification process. The images documenting this process are provided below.

Kuppam 15.02 Ha

Valligatla 15.73 Ha

Health status of plantations: During the field visit, it was observed that both Kuppam and Valligatla plantations showed signs of pest and insect damage, including visible harm to leaves and stems, which could adversely affect overall plant health, growth, and survival if not managed.

Protection of plantations: Protective measures, such as the creation and maintenance of fire lines, establishment of inspection paths, and deployment of fire watchers, were implemented to safeguard the plantations from fire and other environmental threats.

Biotic (human/cattle) pressure on plantations: Incidents of grazing and browsing by cattle were noted in both the plantations. However, peripheral trenches and the engagement of plantation watchers have reduced cattle intrusion from nearby villages, thereby minimizing biotic pressure and supporting plantation regeneration.

Maintenance of plantation journals and records: Plantation journals were generally well-maintained, with plantation boards marking the initial boundary points. Periodic updates of key plantation parameters are recommended to ensure accurate monitoring and documentation. Plantations are inspected by the concerned forest officials, and their observations are duly recorded.

Vana Samrakshana Samithi (VSS): Community participation through Vana Samrakshana Samithi (VSS) was evident in Kuppam 15 Ha plantation, facilitating its implementation and maintenance. In contrast, at the Valligatla plantation in Punganur range, VSS involvement occurred during establishment and maintenance, but no Focus Group Discussion (FGD) was conducted, limiting opportunities for participatory evaluation and community engagement.

Valligatla plantation of Punganur

Kuppam Plantation of Kuppam range

2. Monitoring and Evaluation of Maintenance Activities

Maintenance was the most widely implemented activity, with 80 activities conducted and 16 sampled, resulting in a sampling rate of 20 %. Chittoor west range had 18 activities, with 4 sampled. Palamaner range conducted 13, with 3 sampled. Kuppam range recorded 17 activities, 3 of which were sampled. Punganur range carried out 10 activities, with 2 sampled. Madanapalli range had 22 activities, with 4 sampled during 2018-19.

Table 16 Maintenance activities selected for evaluation in Chittoor west division

Sl. No.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Chittoor west range			
1	First year maintenance of 1.64 Ha (2017) CA plot in Vavilthota RF in Santhapeta beat	N 13.335466 E 79.084419	RSO 3 (2018-19)

2	First year maintenance of 4.73 Ha (2017) safety zone plot in Bodabandla beat	N 13.144071 E 78.974211	DSO 261 (2018-19)
3	First year maintenance of 4.00 Ha (2017) ACA RSA plantation plot in of Chittapara RF & beat	N 13.097881 E 79.101736	DSO 256 (2018-19)
4	Third year maintenance of 20 Ha (2015) LI Method plot in Keenatampalle beat	N 13.113699 E 79.048188	DSO 133(A) (2018-19)
Palamner range			
5	First year maintenance of 15 Ha NTSH (LIM) plantation in Veerlabanda RF, compartment no. 287 of Nellipatla	N 13.086084 E 78.70066	DSO 197 (2018-19)
6	First year maintenance of 20 Ha NTSH (SMM) plantation in Allapalle RF, compartment no. 244 of Thotakanuma beat	N 13.132012 E 78.581814	DSO 134 (2018-19)
7	Second year maintenance of 20 Ha NTSH (SMM) plantation in Basivireddipalle RF, Compt. No. 276 of Kolamasinapalle	N 13.133874 E 78.631407	DSO 136 (2018-19)
Kuppam range			
8	Second year maintenance of 10 Ha plantation NTSH (LIM) Compartment no-346 in Kuppam beat of Kuppam range	N 12.781018 E 78.393442	DSO 188 (2018-19)
9	Third year maintenance of 10 Ha plantation AR_SMM in Kangundhi beat of Kuppam range	N 12.800558 E 78.452478	DSO 218 (2018-19)
10	Third year maintenance of 10 Ha plantation SMM in compartment no-334, Paipalem RF, Nadimur beat	N 12.79505 E 78.45193	DSO 253 (2018-19)
Punganur range			
11	First year maintenance of 15 Ha NTSH plot at Muthukur beat	N 13.258193 E 78.61879	DSO 146 (2018-19)
12	First year maintenance of 15 Ha LIM plot at Valligatla beat	N 13.560971 E 78.74395	DSO 163 (2018-19)
Madanapalle range			
13	Second year maintenance of 10 Ha NTSH (SMM) plantation compartment no. 48, of Kalikiri beat of Valmikipuram section	N 13.612345 E 78.742509	DSO 177 (2018-19)
14	Second year maintenance of 10 Ha (LIM) plantation compartment no. 62 T Sadukonda RF Thamballapalle	N 13.836544 E 78.505329	DSO 249 (2018-19)
15	Second year maintenance of 10 Ha SMM plantation compartment no. 03 Neredikonda RF and beat	N 13.748463 E 78.764475	DSO 250 (2018-19)
16	Second year maintenance of 10 Ha NTSH (LIM) plantation compartment no. 34 Kukkarajupalle RF of Ramiganipalle	N 13.721787 E 78.558998	DSO 181 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. The works undertaken included casualty replacement, circular weeding and soil working, coppice management, pruning of lower branches, fertilizer application, creation and upkeep of fire lines, and other contingency measures. Verification showed that most of these activities had been properly executed in accordance with sanctioned orders. Circular weeding and soil working reduced weed competition and improved aeration, coppice cutting minimized competition from secondary shoots, and pruning promoted healthier plant structure. Fertilizer application was carried out in several plantations, though in some cases the dosage and distribution were not

uniform. Fire lines were created or maintained, but at certain locations they required better clearance to remain effective in peak summer. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth are as follows;

General recommendations for maintenance activities

- Regularly maintain fire lines by clearing overgrown vegetation to ensure effective firebreaks and protect plantations from wildfires
- Remove coppice/cutting growth to promote clear bole formation
- Install, repair, or replace for clear demarcation and improved visibility
- Maintain soil and moisture conservation structures to support long-term plantation success
- Implement targeted interventions soil management, irrigation, and consistent maintenance
- Ensure overall plantation care for 2 additional years to support all above activities and long-term growth

Bodabandla beat, Chittoor West range

Chittapara beat, Chittoor West range

Muthukur beat Punganur range

Nellipatla beat, Palamaner range

Kalikiri beat of Madanapalle range

Neredikonda beat, Madanapalle range

3. Monitoring and Evaluation of Protection Activities

There were 19 protection activities conducted across the division, with 4 sampled, a sampling rate of approximately 21 %. Chittoor conducted 2 activities, with 1 sampled. Palamaner

recorded 4 activities, none sampled. Kuppam carried out 5 protection activities, 1 sampled. Punganur had 5 activities, 1 sampled. Madanapalli conducted 3, with 1 sampled.

3.1 Erection of chain link mesh fencing around the Irala CN of Chittoor West range

GPS location: N 13.2206485 E 79.0001042 **SO no. and year:** DSO 398 (18-19)

Chain link mesh fencing around the Irala CN of Chittoor West range was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 850 m. The field measurements matched those in the measurement book, indicating no deviations. The chain-link mesh fence was well-maintained, with intact pillars and no observed damage along its entire length. It was installed with the primary objective of preventing animal entry and protecting seedlings from grazing damage.

Chain-link mesh fencing around the Irala CN of Chittoor West range

3.2 Creation of new fire lines in BM Chenlu beat of Kuppam range

GPS location: N 12.761197 E: 78.528031 **SO no. and year:** DSO 325 (2018-19)

3.3 Creation of new fire lines to control burning of M.M. West beat of Punganur range

GPS location: N 13.44979 E 78.742474 **SO no. and year:** RSO 25 (2018-19)

3.4 Creation of new fire-lines in Kandlamadugu beat of Horsley hills in Madanapalle

GPS location: N 13.66474 E 78.40313 **SO no. and year:** DSO 339 (2018-19)

A fire line was created and maintained in BM Chenlu beat of Kuppam range, M.M. West beat of Punganur range and Kandlamadugu beat of Madanapalle range was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 6 m in all beat/ranges, however length is 5000 rmt, 2000 rmt and 4000 rmt in BM Chenlu beat, M.M. West beat and Kandlamadugu beat respectively. The field measurements matched those in the measurement book, indicating no deviations. The fire line is well maintained, though slight grass growth has been observed ensuring clear visibility throughout. Fire incidents have been recorded once a year.

BM Chenlu beat of Kuppam range

Kandlamadugu beat of Madanapalle

4. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

A total of 21 SMC activities were implemented, with 6 sampled, resulting in a 28 % sampling rate. Chittoor and Palamaner had 2 and 3 activities respectively, 1 sampled in Chittoor west and 2 sampled in Palamner. Kuppam had no SMC activities. Punganur recorded 3 activities, with 1 sampled. Madanapalli had the highest number with 13 SMC activities, of which 2 sampled.

4.1 Construction of check dam at Tayamma Vanka in compartment no.228, Keenatampalli RF & beat, Chittoor West range

GPS location: N 13.140605 E 79.051787 **SO no. and year:** DSO 415 (18-19)

4.2 Construction of cement check-dam across Balappagaripalli Vanka in compartment no. 243, Allapalle RF of Thotakanuma beat, Palamaner range

GPS location: N 13.106631 E 78.794259 **SO no. and year:** DSO 437 (2018-19)

Newly constructed cement check dam located in Tayamma Vanka in compartment no.228, Keenatampalli RF & beat, Chittoor West range and Balappagaripalli Vanka in compartment no. 243, Allapalle RF of Thotakanuma beat of Palamaner range was monitored and evaluated with reference to the specifications recorded in the measurement book and actual field measurements. The recorded dimensions of the structure are: Length: 20 m, Width: 1.5 m and Depth: 0.6 m in Keenatampalli beat and Length: 20 m, Width: 1.8 m and Depth: 0.3 m in Thotakanuma beat. Field measurements accurately matched the specifications noted in the measurement book, indicating no deviations from the approved design. The structure is currently well maintained and functions effectively. However, total water holding capacity of the check dam has been reduced due to the accumulation of silt and sediment, which has filled up the storage space. Minor repairs are needed on the apron, and desilting should be carried out to restore and increase the storage capacity of the check dam

Keenatampalli of Chittoor West range

Thotakanuma beat of Palamaner range

4.3 Excavation of artificial pond at Dommarapapamma Kunta locality in Kaluvapalle beat, Musalimadugu RF, compartment No. 298 of Palamaner range

GPS location: N 13.106533 E 78.794227 **SO no. and year:** RSO 25 (18-19)

Excavated artificial pond at Dommarapapamma Kunta locality in Kaluvapalle beat, Musalimadugu RF, compartment No. 298 of Palamaner range was monitored and evaluated with reference to the specifications recorded in the measurement book and actual field measurements. The recorded dimensions of the structure are: Length: 8 m, Width: 8 m and Depth: 1.3 m. Field measurements accurately matched the specifications noted in the measurement book, indicating no deviations. The artificial pond is experiencing significant silt deposition due to erosion, leading to a reduction in its depth and a narrowing of its sides from accumulated silt along the edges.

Artificial pond in Musalimadugu RF of Kaluvapalle beat

4.4 Formation of mini percolation tank – 1 near 4.00 Ha C.A land (Aruna Granites) of Neredikonda beat of Burakayalakota section in Madanapalle range

GPS Location: N 13.900515 E 78.368255 **SO no. and year:** DSO 445 (2018-19)

4.5 Formation of mini percolation tank in 10 Ha of compartment no. 34, Kukkarajupalle RF of Ramiganipalle beat of Burakayalakota section, Madanapalle range

GPS Location: N 13.722237 E 78.558384 **SO no. and year:** RSO 43 (2018-19)

Percolation tanks located at Neredikonda beat of Burakayalakota section in Madanapalle range and Ramiganipalle beat of Burakayalakota section, Madanapalle range was inspected and evaluated against the specifications recorded in the measurement book. Tank dimensions as per measurement book are; length: 50 m, width: 2 m, depth: 1 m and volume: 100 cum in Neredikonda beat and length: 30 m, width: 10 m, depth: 1.17 m and volume: 350 cum in Ramiganipalle beat. The field measurements were found to be consistent with the entries in the measurement book, confirming that the construction was carried out as per approved specifications, with no deviations observed. The percolation tank is well maintained and located in a catchment area, allowing all the rainfall water to accumulate. However, along with the water, there is a significant accumulation of silt, which reduces the tank's volume and storage capacity over time.

Neredikonda beat of Madanapalle range

Ramiganipalle beat of Madanapalle

5. Monitoring and Evaluation of Construction activities

There were 2 construction activities carried out division-wide, with 1 sampled, giving a sampling rate of 50 %, the highest among all activity types. Palamaner recorded 2 activities, with 1 sampled in each. Chittoor west, Punganur, Madanapalle and Kuppam range had no construction activities.

5.1 Construction of watch tower at Gounicheruvu Tekumanda beat of Palamaner range

GPS location: N 13.181168 E 78.817541 **SO no. and year:** DSO 380 (2018-19)

Watch tower at Gounicheruvu Tekumanda beat of Palamaner range was inspected and evaluated against the specifications recorded in the measurement book. Tank dimensions as per measurement book are; Height 8.5 m, Side width 4.15 m, Front width 5.4 m with tower pillars 6 no. The field measurements were found to be consistent with the entries in the measurement book, confirming that the construction was carried out as per approved specifications, with no deviations observed. The watch tower is well-maintained and strategically located adjacent to a water body, offering an ideal vantage point for monitoring elephant movement and recording any fire incidents within the forest. However, the surrounding weed growth needs to be cleared to maintain visibility and ensure easy access to the structure.

Watch tower at Gounicheruvu in Tekumanda beat of Palamaner range

6. Monitoring and Evaluation of Other activities

During the year 2018–19, the “Others” category recorded the second-highest number of activities under the CAMPA scheme, with a total of 99 activities conducted across five forest divisions. Out of these, 24 activities were sampled and verified, resulting in a sampling rate of 24.2 percent. Chittoor conducted 16 activities, of which 5 were sampled; Palamaner carried out

34 activities, with 9 sampled; Kuppam recorded 15 activities, 3 of which were sampled; Punganur had 4 activities, with 1 sampled; and Madanapalli conducted 30 activities, with 6 sampled.

Document verification and cross-checking were carried out in the presence of Division and Range office staff. The types of documents reviewed included sanction orders, estimation sheets, and work registers. It was observed that the sanctioned amounts were consistent with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials, including the Divisional Forest Officer (DFO), Sub-Divisional Officer (SDO), and Forest Range Officer (FRO). The utilization of funds was found to be appropriate and in alignment with the approved estimates and CAMPA guidelines. Both internal audits, conducted by the Conservator of Forests, and external audits, conducted by the Accountant General's Office, were completed. The overall process ensured transparency, accountability, and compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- Plantations showed divergent results: poor growth at Kuppam but exemplary survival and growth at Valligatla, proving the critical importance of species–site matching.
- Maintenance works were widespread and largely effective, but uneven fertilizer application, missing boards, and weak fire line clearance reduced their quality.
- Protection infrastructure was created to specification, with fencing and fire lines effective in principle, but grazing and fire risks persisted.
- SMC interventions were larger in scale than previous years, yet their long-term effectiveness was threatened by siltation and inadequate upkeep.
- Financial accountability was strong, but GPS-based verification continued to reveal area mismatches.
- Community participation was partial and inconsistent, with VSS active in some sites but absent in others.

Recommendations

- Consolidate plantations in sites with proven ecological suitability, prioritizing species like *Pterocarpus santalinus*, *Azadirachta indica*, and *Hardwickia binata* in Valligatla.
- Expand SMC coverage further, and introduce systematic desilting schedules to preserve water-holding capacity of check dams, ponds, and percolation tanks.
- Extend maintenance cycles division-wide, with stricter attention to fertilizer distribution, fire line upkeep, and record-keeping.
- Strengthen protection by institutionalizing seasonal clearance of fire lines and enhancing community-based grazing controls.
- Standardize GPS/GIS verification to reconcile plantation records with ground realities and prevent reporting mismatches.
- Mandate consistent and structured VSS involvement across all plantations, with FGDs institutionalized to capture community perspectives.
- Rebalance the CAMPA portfolio to reduce reliance on "Others" and increase investments in plantations, SMC, and protection.

3. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN RAJAMPET DIVISION

Introduction

Rajampet division encompasses an extensive forested landscape spread over 2,381.02 km², making it a significant ecological zone. The forest structure within the division presents a complex and diverse mosaic, reflecting various stages of canopy density and forest health. Of the total area, 28.48 km² is classified as Very Dense Forest (VDF), representing patches of relatively undisturbed and mature forest with closed canopies and rich biodiversity. A much larger portion, 1,294.69 km², falls under Moderately Dense Forest (MDF), forming the dominant forest type in the division and serving as a critical carbon sink and wildlife habitat. Complementing these are 1,057.85 km² of Open Forest (OF), which are characterized by sparse canopy cover and increased light penetration, indicating either naturally open forests or areas under varying degrees of anthropogenic pressure. However, despite this impressive forest wealth, the division faces mounting challenges. A net loss of 5.17 km² of forest cover has been recorded since 2021, a figure that is cause for concern given the ecological importance of the area. This decline points to ongoing and possibly accelerating pressures on forest resources. These degraded patches are often symptomatic of recurring threats such as shifting cultivation, frequent forest fires, encroachments for agriculture or settlements, and over-extraction of forest produce. Collectively, these trends highlight the urgent need for strengthened conservation measures, effective fire management, community participation in protection, and restoration initiatives aimed at halting further degradation and gradually improving canopy density.

In Rajampet division, a total of 80 CAMPA activities were carried out, of which 16 activities (around 25 %) were selected for detailed monitoring and evaluation. In Rajampet range, 37 activities were implemented, and 8 were sampled. In Kodur range, 6 activities were implemented, and 1were sampled. In Chitvel range, 20 activities were implemented, with 6 sampled. In Sanipaya range, 17 activities were implemented, and 3 were sampled. Among activity types, othersdominated with 32 activities 7 sampled), followed by maintenance (24; 5 sampled), soil and moisture conservation (15; 3sampled), plantation (8; 0 sampled), construction (1; 1 sampled) none of the activity reported in protection.

1. Monitoring and Evaluation of Plantation Activities

In Rajampet division, a total of 8 plantation activities were carried out under CAMPA, of which 2activities (about 21 %) were selected for monitoring and evaluation. Among the ranges, Rajampet with 1 (1 sampled) and chitvel with 1 (1 sampled).

1.1 Rajampet range

During 2018–19, a total of four plantation activities were carried out under the CAMPA scheme in Rajampet range. As part of the monitoring and evaluation process, 25 % of these activities, equivalent to one plantation site, was selected randomly.

Table 17 Details of plantation selected in Rajampet range

Sl. no.	Plantation	SO no. and year
1	Raising of 30 Ha Misc.gap plantation in Annasamudram beat	DSO 107 (2018-19)

The plantation sites selected at annasamudram are predominantly characterized by red, hard, and gravelly soil, which poses challenges for root penetration and moisture retention. These soil conditions indicate low fertility and poor water-holding capacity, necessitating specific soil management practices such as deep ploughing to ensure successful plant establishment and growth.

Survival percentage: In Rajampet Range, the annasamudram plantation site shows good suitability for *Hardwickia binata, Azadirachta indica, Holoptelea integrifolia, Syzygium cumini* with average survival rates of 50.61 %, 49.38 %, 45.67 % and 49.38 % respectively.

Growth: In the annasamudram plantation, the average tree height ranges from 0.79 to 0.99 meters, while the average girth ranges from 4.39 to 8cm.

Table 18 Details of plantations enumerated in Rajampet range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Annasamudram 30 Ha misc. plantation	1	*Azadirachta indica*	N 14.103608 E 79.193196	51.85	0.89 ±0.39	4.52 ±1.71
		2	*Syzygium cumini*	N 14.103576 E 79.193369	49.38	0.79 ±0.27	4.63 ±1.90
		3	*Hardwickia binata*	N 14.103648 E 79.193498	50.61	0.95 ±0.31	4.39 ±2.18
		4	*Holoptelea integrifolia*	N 14.103552 E 79.193334	45.67	0.92 ±0.28	4.46 ±1.85
		5	*Azadirachta indica*	N 14.103591 E 79.193208	46.91	0.99 ±0.30	8.00 ±2.93
Plantation average					**48.88**	**0.90**	**5.20**

1.2 Chitvel range

A total of one plantation project was implemented under the CAMPA scheme in the Chitvel Range during 2017–18. For evaluation purposes, 100 % of the project, amounting to one plantation site, was selected using a random sampling method.

Table 19 Details of plantations selected in Chitvel range

Sl. no.	Plantation	SO no. and year
1	Gap planting in 98 ha CA land in Malemarpuram, Rajukunta beat	DSO 110 A(2018-19)

The plantation sites at Rajukunta beat are red loamy with rocks light textured and porus, shallowsoil, gentle slope towards west. The major rock type is granite, erosion is moderate.

Survival Percentage: The species planted showed moderate adaptability to site conditions: *Terminalia arjuna, Syzygium cumini, Holoptelea integrifolia, Terminalia elliptica* and *Azadirachta indica* with average survival rates of 49.38 %, 50.61 %, 46.91%, 45.67 % and 55.55 % respectively.

Growth: In the Rajukunta plantation the average height: 2.43 to 2.58 meters and Average girth: 9.73 to 14.86 cm**.** These measurements reflect early-stage growth, with relatively slow development possibly influenced by climatic and edaphic factors.

Table 20 Details of plantation enumerated in Chitvel range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Rajukunta	1	*Terminalia arjuna*	N 14.231945 E 79.371569	49.38	2.43 ±0.46	9.73 ±3.15
		2	*Syzygium cumini*	N 14.231491 E 79.371580	50.61	2.51 ±0.51	10.00 ±3.42
		3	*Holoptelea integrifolia*	N 14.231755 E 79.371569	46.91	2.58 ±0.50	14.58± 3.95
		4	*Terminalia elliptica*	N 14.232228 E 79.371386	45.67	2.57 ±0.50	14.86± 4.27
		5	*Azadirachta indica*	N 14.231909 E 79.371566	55.55	2.58 ±0.50	13.22± 3.38
Plantation average					**49.62**	**2.53**	**12.47**

Comparative assessment of plantations in Rajampet division during 2018-19

Survival performance: Both sites showed moderate survival (45–55%), but Rajukunta outperformed Annasamudram in growth, with *Azadirachta indica* recording the highest survival across locations. In terms of growth performance**,** Rajukunta exhibited significantly better growth with average height of 2.43–2.58 m and girth of 9.73–14.86 cm, compared to Annasamudram's smaller height of 0.79–0.99 m and girth of 4.39–8 cm.

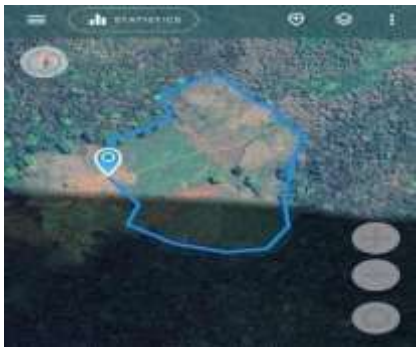
Verification of plantation area and boundaries

In Rajampet division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

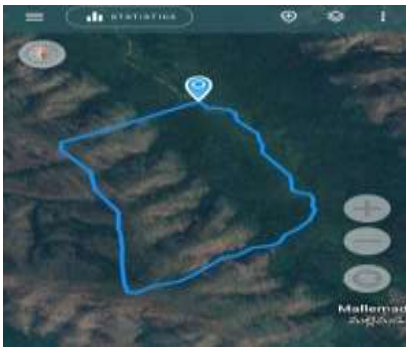
Table 21 Details of plantations area perambulation in Rajampet division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Raising of 30 Ha Misc. gap plantation in Annasamudram beat	30 Ha	44.99 Ha
2	Gap planting in 98 ha CA land in Malemarpuram village,Rajukunta beat	98 Ha	102.22 Ha

During the verification process, it was observed that the perambulated area exceeded the officially recorded area by 14.99 hectares at annasamudram and 4.22 hectares at Rajukunta. This discrepancy is likely due to the inclusion of certain patches within the demarcated plantation boundaries that comprise waste, degraded, or rocky land. The verification was carried out through physical perambulation using the Geo Tracker application, with on-ground validation provided by the local Forest Beat Officer. Geotagged images captured during the perambulation are provided below for reference.



44.99 Ha Annasamudram



102.22 Ha Rajukunta

Health Status of Plantations: Based on the observations recorded during the field visit, no visible signs of insect-related damage were detected within the plantation area. This suggests that, at present, the plantations are free from any significant pest-related threats, reflecting effective site protection and favourable ecological conditions for plant growth.

Protection Measures: To safeguard plantations from fire and other environmental threats, several protection measures were implemented, including the creation and maintenance of fire lines, development of inspection paths, and deployment of fire watchers. These measures have proven generally adequate in reducing plantation vulnerability, particularly during the dry season. However, ongoing maintenance and clear visibility of these features are essential to ensure their continued effectiveness.

Biotic Pressure on Plantations: Evidence of grazing and browsing by both wild and domestic herbivores was observed across several plantation sites. This biotic interference led to stunted apical growth in certain species, particularly in areas lacking adequate fencing or community oversight. These signs of pressure emphasize the need for stronger physical protection measures such as installation of protective barriers and increased community sensitization to ensure sustainable plantation development and seedling survival.

Maintenance of Plantation Journals and Records: Plantation journals are being maintained in all plantations. However, there is a need for regular updating of plantation parameters to ensure accuracy and facilitate effective monitoring. Plantation board was present.

Vana Samrakshan Samithi (VSS): The chitvel plantation were implemented and maintained with the involvement of any Vana Samrakshana Samithi (VSS). Consequently, Focus Group Discussion (FGD) activities were conducted. Therajampet plantation were implemented and maintained without the involvement of any Vana Samrakshana Samithi (VSS). Hence, Focus Group Discussion (FGD) activities were not conducted.

Annasamudram, Rajampet range

Rajukunta, Sanipaya range

2. Monitoring and Evaluation of Maintenance Activities

A total of twenty-four maintenance activities were carried out in Rajampet division during 2018-19, of which five activities were selected for monitoring. Chitvel accounted for the maximum with 8 activities (2 sampled), sanipaya 7 (1 sampled), Rajampet 6 (1 sampled) and kodur 3 (1 sampled).

Table 22 Maintenance activities selected for evaluation in Rajampet division

Sl. no.	Maintenance Activities	GPS Co ordinates	SO no. and year
Rajampet range			
1	First year maintenance of 28 Ha (Effected 8.50 Ha) SMM plantation at CA area in SR Palem beat	N 14.127721 E 79.084098	DSO 92 A (2018-19)
Kodur range			
2	3rd Year Maintenance of 20.0 Ha Red Sanders LIM Plantation in M. Bhavi Beat	N 13.962984 E 79.227014	DSO 86 (2018-19)
Chitvel range			
3	Second year maintenance of 10.0 Ha red sanders plantation (SMM) in RV Palli beat	N 14.043835 E 79.377760	DSO 75 (2018-19)
4	Third year maintenance of 10.0 Ha NTHS plantation (SMM) in Salivendula beat	N 14.163502 E 79.400814	DSO 119 (2018-19)
Sanipaya range			
5	First year maintenance of 25 Ha red sanders plantation in Sanipaya beat	N 14.067754 E 78.905867	DSO 96 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, formation of saucers, weeding operations, soil tilling (inter-ploughing), coppice management, pruning of lower branches, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control Lantana and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines, with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments, and complement contingency records.
- Maintain accurate and updated plantation journals, markers, and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.

- Implement routine coppice management to reduce competition from secondary shoots.
- Improve the frequency and timing of pruning operations to promote healthy plant structure and better bole formation.

SR Palem beat, Rajampet range

M. Bhavi beat, Kodur range

RV Palli beat, Chitvel range

Sanipaya beat, Sanipaya range

3. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

A total of fifteen SMC activities were carried out during 2018-19, of which three were sampled. The kodur reported 4 activity (1 sampled), sanipaya 7 activity (2 sampled), Rajampet range reported 2 activity (0 sampled) and chitvel with 2 activity (0 sampled),

3.1 Construction of check dam in 98 Ha CA land of Malemarpuram village, Rajukunta beat of Chitvel section and range

GPS Location: N 14.242618 E 79.366428 **SO no. and year:** DSO 267 (2018-19)

Check dam constructed in Rajukunta beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the check damwere: Length- 14 m, breadth- 1.50 m and depth- 1.20 m. The field measurements matched those in the measurement book, indicating no deviations. Minor repair required in apron. Total water holding capacity (total volume of the check dam) has been reduced due to the accumulation of silt and sediment. De-silting is to be done to increase the storage capacity.

3.2 & 3.3 Estimates for Restoration of Chilla Mitta Eguva Kunta and Chilla Mitta Diguva Kunta in Jillellamanda Beat, Pincha Section, Sanipaya Range

Chilla Mitta eguva and diguva Kunta:

GPS Location: N 13.874422 E 79.025779 **SO No. and Year:** DSO 228 (2018–19)

GPS Location: N 13.877767 E 79.020312 **SO No. and Year:** DSO 229 (2018–19)

The percolation tanks constructed in Jillellamanda beat were monitored and evaluated against the specifications recorded in the measurement book and verified through field measurements. The tanks measured 10–13 m in length, 10 m in width, and 1.5 m in depth, with a storage capacity ranging between 98.38 cubic meters and 100 cubic meters. Both structures are located in low-lying areas and have accumulated silt due to water overflow during the monsoon. While the structural integrity of the tanks remains intact, they are largely covered with silt. De-silting is essential to restore their full storage capacity and ensure effective groundwater recharge.

Jillellamanda beat, sanipaya range

Rajukunta beat, chitvel range

4. Monitoring and Evaluation of Construction Activities

There were one construction activities in the division during 2018-19, of which one was sampled. One activity taken up in the chitvel range. No construction activity were recorded in other ranges of Rajampet division.

4.1 Construction of permanent cairns in CA land in sy.no. 1979 Malemarpuram village, Rajukunta beat of Chitvel section and range

GPS Location: N 14.231617 E 79.37162 **SO no. and year:** DSO 90 (2018-19)

Construction of permanent cairns at Rajukunta beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the permanent cairn's enclosure are as follows; Height: 1.20 m, Top width: 0.30 m and bottom width: 0.45 m. The field measurements matched those in the measurement book, indicating no deviations. Boundary pillars are intact and covering the boundary, demarcating the boundary of reserve forest and revenue land. Total of 5 boundary pillars are constructed for the boundary demarcation and were in good condition. The basal part of the pillar has been submerged.

Rajukunta beat, Chitvel range

5. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 32 activities were carried out during 2017–18, of which 7 were sampled for verification. The maximum number of activities was reported from Rajampet Range with 25 activities (6 sampled), followed by Chitvel with 6 activities (1 sampled), and Kodur with 1 activity (none sampled). No activities were reported from Sanipaya Range. Document verification and cross-checking were conducted in the presence of Division and Range Office staff. The review revealed that all required records—such as sanction orders, estimation sheets, and work registers were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). The sanctioned amounts were consistent with actual expenditures, and fund utilization was in line with approved estimates and CAMPA guidelines. Both internal audits (conducted by the Conservator of Forests) and external audits (by the Accountant General's Office) confirmed transparency, accountability, and adherence to prescribed financial and administrative protocols.

Key Findings

- Plantation performance was moderate overall, with *Azadirachta indica* showing comparatively better survival. Growth at Rajukunta outperformed Annasamudram, though both sites were constrained by soil and grazing pressures.
- Verification revealed consistent excess in perambulated plantation areas compared to recorded extents.
- Maintenance operations were executed but weakened by missing signage and irregular updating of journals.
- SMC structures were functional but heavily silted, requiring immediate desilting and minor repairs.
- Construction of cairns at Rajukunta was effective for boundary demarcation, though partial soil coverage reduced visibility.
- "Other works" dominated the portfolio, implemented with financial compliance and regular audits.

Recommendations

- Improve site-species alignment and soil preparation to enhance plantation survival and growth, especially in challenging red and gravelly soils.
- Strengthen physical protection through fencing and grazing control to minimize biotic pressures.
- Institutionalize timely updating of plantation journals and ensure signage is maintained across all sites.
- Establish regular desilting and repair schedules for SMC structures to restore full water-holding capacity.
- Provide routine upkeep of cairns to maintain boundary visibility and effectiveness.
- Reduce dependency on "other works" by prioritizing ecological interventions such as plantations and SMC.
- Expand VSS involvement in all plantation sites to enhance community participation and accountability.

4. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN TIRUPATI DIVISION

Introduction

Tirupati division extends over a vast geographical area of 1,957.44 km², representing a significant portion of the forested landscape in the region. The forest cover is primarily composed of Open Forest (OF), which accounts for 1,138.90 km², indicating the predominance of sparsely vegetated woodland. This is followed by Moderately Dense Forest (MDF), spread over 816.94 km², which supports a relatively richer canopy and biodiversity. A comparatively small but ecologically vital area of Very Dense Forest (VDF), measuring 31.60 km², contributes to the division's role as a biodiversity refuge. Despite its rich natural heritage, the division has experienced a significant loss of forest cover, with a net reduction of –17.68 km², ranking among the highest losses recorded in the state. Additionally, the division includes 491.56 km² of scrubland, which provides habitat for diverse shrubland flora and fauna but remains susceptible to degradation if not properly managed. The Tirupati Division is of particular ecological and economic importance because it harbours highly fire-prone dry deciduous forests rich in red sanders (*Pterocarpus santalinus*), an endemic and globally valuable timber species. These forests require intensive monitoring and fire management measures to prevent large-scale losses during the dry season. Geographically, the division encompasses key hill tracts of the Eastern Ghats, which are ecologically significant for maintaining landscape connectivity and watershed health, while also being culturally revered due to their proximity to Tirumala and other sacred sites that attract millions of pilgrims annually.

In Tirupati division, a total of 144 CAMPA activities were carried out, of which 31 activities (around 21 %) were selected for detailed monitoring and evaluation. In Tirupati range, 67 activities were implemented, and 13 were sampled. In Chamala range, 43 activities were implemented, and 10 were sampled. In Balapalli range, 34 activities were implemented, with 8 sampled. In WLM Tirupati range none is implemented or sampled. Among activity types, others dominated with 113 activities (23 sampled), followed by maintenance (11; 2 sampled), protection (10; 3 sampled), soil and moisture conservation (6; 1 sampled), construction (4; 2) and plantation none are implemented.

1. Monitoring and Evaluation of Maintenance Activities

A total of 11 maintenance activities were carried out in Tirupati division during 2018-19, of which two activities were selected for monitoring. Tirupati accounted for 6 implemented (1 sampled) and Chamala 4 implemented (1sampled).

Table 23 Maintenance activities selected for evaluation in Tirupati division

Sl. no.	Maintenance activities	GPS Co ordinates	SO no. and year
Tirupati range			
1	First year maintenance of 25 Ha RS plantation in Krishnapuram beat	N 13.690337 E 79.554809	DSO 72A (2018-19)
Chamala range			
1	Improvement and management of Red Sanders bearing forests in Talakona south beat	N 13.760176 E 79.190425	DSO 175 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, weeding operations, coppice management, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantation. However, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control Lantana and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines, with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments, and complement contingency records.
- •Maintain accurate and updated plantation journals, markers, and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.

Krishnapuram beat Tirupati range

Talakona south beat Chamala range

2. Monitoring and Evaluation of Protection Activities

During 2017–18 the Andhra Pradesh Forest Department undertook ten protection activities under the CAMPA scheme. For the purpose of monitoring and evaluation, a representative sample of 20 %, comprising three protection activities, was selected. In Tirupati 4 implemented (1 sampled), Chamala 3 implemented (1 sampled) and Balapalli 3 implemented (1 sampled).

2.1 Creation of new fire line from Erriguntalu to Masalarevu Dari in T.N. Palem central beat of S.V. National Park Tirupati range

GPS location: N 13.711466 E 79.373461 **SO no. and year:** DSO 193 (2018-19)

A fire line was created and maintained in T.N. Palem beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 10 m, and length – 4000rmt. The field measurements matched those in the measurement

book, indicating no deviations. The visibility of the fire line was clear, as it was established along the inspection path. No dense grass or weed growth was observed, indicating that the fire line has been well-maintained.

2.2 Erection of chain link mesh around Eathagunta base camp in SVNP, Chamala range

GPS location: N 13.641456 E 79.321749**SO no. and year**: DSO 350 (2018-19)

Erection of chain link mesh around ethagunta base camp under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of chain link mesh are Height– 2 m, length – 75rmt and gate-2. The field measurements matched those in the measurement book, indicating no deviations. The chain-link mesh fence is well maintained with intact pillars and no visible damage along its entire length. It was installed to prevent the entry of animals and to provide protection to the base camp.

2.3 Creation of new fire-lies in natural forests in Gunjana South beat of Balapalli range

GPS location: N 13.865788 E 79.344459 **SO no. and year**: DSO 156 (2018-19)

A fire line was created and maintained in Gunjana south beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 10 m, and length – 5000rmt. The field measurements matched those in the measurement book, indicating no deviations. The fire line is well maintained with clear visibility throughout the plantation. Only minimal grass and weed growth is observed reflecting effective upkeep.

T.N. Palem central beat of Tirupati range

Eathagunta base camp in Chamala

Gunjana South beat of Balapalli range

3. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

A total of six SMC activities were carried out during 2018-19, of which one were sampled. The Chamala range reported 3 activities (1 sampled), Tirupati range reported 1 activity (0 sampled), and in Balapalli range reported 2 activities (0 sampled).

3.1 Desilting of Varisettivanikunta of Devarakonda beat of Chamala section of SVNP, Chamala range

GPS location: N 13.699662 E 79.202356 **SO no. and year:** DSO 325 (2018-19)

Desilting of perculation tank in Devarakonda beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the 2 perculation tanks were:

- Kunta 1: Width - 30 m, length – 40 m, depth – 1 m and volume – 1200 cum.
- Kunta 2:Width – 21.9 m, length – 40 m, depth – 1 m and volume – 876 cum.

The field measurements matched those in the measurement book, indicating no deviations. The percolation tank is relatively wide and holds substantial water during the monsoon season. However, regular de-silting is necessary to maintain and enhance its storage capacity.

Devarakonda beat of Chamala range

4. Monitoring and Evaluation of Construction Activities

There were four construction activities in the division during 2018-19, of which one was sampled. The Tirupati range reported 3 activities (0 sampled), Balapalli range reported 1 activity (1 sampled) and none of the activity implemented in Chamala and WLM Tirupati ranges.

4.1 Providing gravel road in Balapalli West beat

GPS location: N 13.788653E 79.412128 **SO no. and year**: DSO 90 (2018-19)

Construction of gravel road at Dunnapothula Marrimanu in Balapalli West beatsection was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the gravel road are as follows; Length -3000 m, width- 3m, the field measurements matched those in the measurement book, indicating no deviations. The road constructed along the boundary of Sheshachalam reserve forest in the Balapalli West beat is currently in good condition. However, seasonal maintenance during the monsoon is essential to ensure smooth and uninterrupted transportation.

Balapalli west beat, Balapalli range

5. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 113 activities were carried out during 2018–19, of which 23 were sampled for verification. The highest number of activities was recorded in Tirupati Range with 53 activities (10 sampled), followed by Chamala with 33 (7 sampled), Balapalli with 27 (6 sampled), while no activities were implemented or sampled in WLM Tirupati. Document verification and cross-checking were conducted in the presence of Division and Range Office staff. The review indicated that all key records such as sanction orders, estimation sheets, and work registers were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). The sanctioned amounts generally aligned with actual expenditures, and fund utilization adhered to approved estimates and CAMPA guidelines. Both internal audits (by the Conservator of Forests) and external audits (by the Accountant General's Office) were conducted, ensuring transparency and compliance with financial and administrative protocols under the CAMPA scheme.

However, certain discrepancies were noted during verification. In Balapalli Range, mismatches were observed in the amounts for RSO 9 (2018–19), which were attributed to typographical errors in the activity list provided by the Tirupati Divisional Office; the Balapalli Range has acknowledged these discrepancies in their notes. In Chamala Range, discrepancies were noted in DSO 35 (2018–19) and DSO 43 (2018–19) due to similar typographical errors in the divisional activity list, as acknowledged by the range. Additionally, estimates for RSO 3 (2018–19) and RSO 24 (2018–19) were not presented for verification; this omission has also been acknowledged by the Chamala Range in their notes. In Tirupati Range, certain miscellaneous sanction orders and consolidated sanction order numbers DSO 21 (2018–19), DSO 22 (2018–19), DSO 5 (2018–19), DSO 30 (2018–19), DSO 38 (2018–19), and DSO 66 (2018–19) were missing during document verification.

Key Findings

- No new plantations were undertaken, reflecting a focus on maintaining and protecting existing areas through gap filling, weeding, and boundary upkeep.
- Fire lines and fencing were well maintained, showing improved fire control and reduced risks of grazing and encroachment.
- SMC structures like contour trenches and percolation tanks were functional but silted, requiring regular de-silting and minor repairs to restore capacity.
- Discrepancies between field conditions and records persist; GIS-based validation and improved documentation are needed for accuracy and transparency.

Recommendations

- Conduct scheduled desilting of percolation tanks, contour trenches, and check dams to maintain optimal water retention capacity.
- Establish a pre-monsoon maintenance calendar to proactively address silt accumulation and prevent functional decline of water harvesting structures.
- Ensure these structures support vegetation growth and groundwater recharge, contributing to overall ecosystem health.
- Strengthen the involvement of Vana Samrakshana Samithis (VSS) and Joint Forest Management Committees (JFMCs), especially in Red Sanders sensitive zones, to promote sustainable forest stewardship.
- Train and equip local fire squads for early detection and effective suppression of forest fires.
- Promote rotational grazing practices and conduct awareness campaigns to reduce pressure from human and livestock activity on forest ecosystems.
- Design and align roads and footpaths to balance eco-tourism development with forest protection and ecological sensitivity.
- Plan routes that facilitate effective patrolling, visitor regulation, and safety, enhancing both protection and visitor experience.
- Leverage infrastructure development to deliver conservation benefits alongside sustainable tourism opportunities.
- Implement a standardized digital record-keeping system across all forest ranges to ensure consistency and data integrity.
- Integrate GIS mapping, mobile-based data collection, and online plantation journals for real-time monitoring and management.
- Improve reporting accuracy, transparency, and decision-making efficiency through digital tools and centralized dashboards.
- Undertake mixed-species plantations in degraded and open forest areas to support ecological restoration.
- Prioritize native flora adapted to local soil and climate conditions to ensure sustainability and resilience.
- Encourage natural regeneration processes to enhance biodiversity, soil fertility, and overall ecosystem resilience.

5. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN NELLORE DIVISION

Introduction

Nellore division, located in the Sri Potti Sriramulu Nellore district of Andhra Pradesh, encompasses a forest area of approximately 2,519 km² which accounts for about 19.26% of the division's total geographical area. The forests here fall under five major ecological types as per the Champion and Seth classification: Dry Red Sanders-bearing forests, Southern Tropical Dry Mixed Deciduous Forests, *Hardwickia binata* forests, Southern Tropical Thorn Forests and Southern Tropical Dry Evergreen Forests. This diversity reflects a landscape transitioning between dry deciduous and thorny scrub systems, typical of semi-arid eastern Andhra Pradesh. The region is ecologically significant, hosting major protected areas like the Penusila Narasimha Swami Wildlife Sanctuary, Pulicat Bird Sanctuary (a Ramsar site) and Nelapattu Bird Sanctuary which provide critical habitats for terrestrial and migratory bird species. The forest flora is dominated by hardy, drought-resistant species. The most common species by stem count include *Hardwickia binata*, *Albizia amara*, *Chloroxylon swietenia*, *Anogeissus latifolia* and *Gyrocarpus americanus*. In terms of growing stock, valuable species like *Pterocarpus santalinus* (Red Sanders), *Dalbergia paniculata*, *Eucalyptus camaldulensis* and *Anogeissus latifolia* contribute significantly, with the total estimated growing stock volume reaching around 1.51 million m³. This stock is distributed across dense forests (~0.80 million m³), open forests (~0.58 million m³), and scrub forests (~0.13 million m³) with average growing stock per hectare varying from 10 to 15 m³ depending on canopy density. In addition to its ecological value, the division supports 292 Vana Samrakshana Samithis (VSS) under the Joint Forest Management program, managing around 645.93 km² of forests. Despite pressures from deforestation, grazing and land conversion, Nellore Division's forests play a vital role in conservation, particularly due to the presence of endemic and endangered species like Red Sanders and support regional biodiversity across both dry deciduous and wetland ecosystems.

During the period 2018-19, a total of 414 CAMPA activities were undertaken in Nellore Forest Division. Out of these, 90 activities, accounting for approximately 21% of the total, were selected for detailed monitoring and evaluation. The range-wise distribution of these activities shows that Nellore range reported the highest number of activities with 98, of which 21 were sampled. Atmakur and Kavali ranges each reported 64 activities with 14 sampled from each. Udayagiri had 76 activities with 17 sampled, while Venkatagiri reported 67 activities with 14 sampled. Rapur had the lowest number of 45 activities with 10 selected for evaluation. With respect to type of activities, other works formed the largest share with 282 activities implemented and 58 sampled, followed by maintenance (87; 19 sampled), plantation (19; 4 sampled), SMC (11; 3 sampled), protection (9; 4 sampled) and construction (6; 2 sampled).

1. Monitoring and Evaluation of Plantation Activities

During 2018-19, Nellore Forest Division carried out a total of 19 plantation activities under CAMPA, of which 4 activities (approximately 21%) were selected for monitoring and evaluation. Range-wise distribution shows that Nellore range reported the highest number with 12 activities implemented and 2 sampled. This was followed by Kavali (3 implemented, 1 sampled) and Udayagiri (2 implemented, 1 sampled). Both Atmakur and Rapur ranges reported only 1 activity each with none sampled, marking them as the lowest in terms of both

implementation and sampling. The Venkatagiri Range did not report any plantation activities during this period.

1.1 Nellore range

During 2018–19, a total of 12 plantation activities were implemented under the CAMPA scheme in Nellore range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to two plantation sites, were randomly selected for assessment.

Table 24 Details of plantations selected in Nellore range

Sl. no.	Plantation	SO no. and year
1	Raising of 2018 Vinduru 20 Ha NTSH plantation	DSO 147 (2018-19)
2	Raising of 2018 Madamanuru bit-III 20 Ha NTSH plantation	DSO 295 (2018-19)

The selected site for Vinduru 20 Ha plantation is characterized by flat terrain with red loamy soil which is generally well-suited for plantation activities. In contrast, Madamanuru 20 Ha plantation site features a gentle slope also with red loamy soil offering good drainage conditions conducive to healthy plant growth.

Survival Percentage: At Vinduru 20 Ha plantation, *Syzygium cumini* and *Sterculia urens* exhibited moderate growth with survival rates of 66.11% and 76.03% respectively. In contrast, *Azadirachta indica* and *Terminalia arjuna* showed good suitability to the site with higher survival rates of 92.56 % and 82.64 %.

Madamanuru 20 Ha plantation demonstrated good species suitability across all observed species. *Syzygium cumini*, *Dalbergia latifolia*, *Hardwickia binata* and *Azadirachta indica* recorded survival rates of 93.38%, 85.12%, 90.08% and 80.99% respectively indicating favourable site conditions and effective plantation management.

Growth Performance: At Vinduru 20 Ha plantation, the average tree height ranged from 1.63 to 2.28 m with girth measurements ranging from 16.62 to 22.49 cm. In comparison, the Madamanuru 20 Ha plantation showed more advanced growth with average tree heights ranging from 3.14 to 4.50 m and girths ranging from 18.32 to 27.27 cm. These measurements indicate better growth performance at Madamanuru possibly due to more favourable site conditions or species suitability.

Table 25 Details of plantations enumerated in Nellore range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Vinduru 20 Ha plantation	1	*Syzygium cumini*	N 14.2005 E 79.797957	61.98	2.13 ±0.39	22.49 ±3.84	-
		2	*Sterculia urens*	N 14.201274 E 79.797844	76.03	1.63 ±0.46	16.62 ±2.83	-
		3	*Azadirachta indica*	N 14.201983 E 79.797718	92.56	2.03 ±0.32	19.82 ±2.92	-
		4	*Syzygium cumini*	N 14.203046 E 79.797871	70.24	1.79 ±0.29	17.76 ±3.76	-

		5	*Terminalia arjuna*	N 14.203922 E 79.797766	82.64	2.28 ±0.26	22.18 ±3.72	-
Plantation average					**76.69**	**1.97**	**19.77**	**-**
2	Madamanuru 20 Ha NTSH plantation	1	*Syzygium cumini*	N 14.260058 E 79.840695	95.04	3.14 ±0.70	-	24.98 ±6.59
		2	*Dalbergia latifolia*	N14.260063 E 79.840207	85.12	3.27 ±0.55	18.32 ±2.93	-
		3	*Hardwickia binata*	N14.260374 E 79.839937	90.08	4.50 ±0.79	-	27.27 ±6.51
		4	*Azadirachta indica*	N14.25933 E 79.83960	80.99	3.41 ±0.77	22.06 ±4.94	-
		5	*Syzygium cumini*	N14.258544 E 79.839676	91.73	3.88 ±0.96	-	24.59 ±6.39
Plantation average					**88.59**	**3.64**	**20.19**	**25.61**

1.2 Kavali range

During 2018–19, a total of 3 plantation activities were implemented under the CAMPA scheme in Kavali range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to one plantation site, were randomly selected for assessment.

Table 26 Detail of plantation selected in Kavali range

Sl. no.	Plantation	SO no. and year
1	Raising of 2018 Maddurupadu 20 Ha red sanders plantation	DSO 307 (2018-19)

Maddurupadu 20 Ha plantation site features fertile, well-drained red soil that can support a variety of species but regular moisture and fertility management practices are necessary to ensure healthy growth.

Survival Percentage: Maddurupadu plantation performed poorly overall, where *Hardwickia binata*, *Azadirachta indica* and *Pterocarpus santalinus* showed survival rates of only 15.29 %, 11.57 % and 36.02 % respectively.

Growth Performance: Maddurupadu plantation showed weak growth across species: *Hardwickia binata* had an average height of 1.08 to 1.48 m with girth between 11.80 and 16.22 cm; *Pterocarpus santalinus* was particularly stunted with height between 0.29 and 0.51 m and girth ranging from 2.65 to 4.16 cm; while *Azadirachta indica* recorded an average height of 1.32 m with a girth of 16.07 cm.

Table 27 Details of plantation enumerated in Kavali range

Sl. no.	Planation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Madduru Padu 20 Ha RS plantation	1	*Hardwickia binata and*	N 14.953889 E 79.974121	16.62	1.48 ±0.34	11.80 ±2.85
			Pterocarpus santalinus		45.45	0.29 ±0.09	3.88 1.39

		2	*Hardwickia binata and*	N 14.93244 E 79.975045	26.44	1.28 ±0.54	13.69 ±3.93
			Pterocarpus santalinus		32.23	0.51 ±0.15	4.16 ±1.08
		3	*Hardwickia binata*	N 14.952646 E 79.974603	10.74	1.08 ±0.57	13.77 ±4.43
			Pterocarpus santalinus		47.93	0.30 ±0.10	3.18 ±1.29
		4	*Hardwickia binata and*	N 14. 952196 E 79.973884	7.43	1.33 ±0.43	16.22 ±3.27
			Pterocarpus santalinus		23.96	0.31 ±0.10	2.65 ±0.87
		5	*Azadirachta indica*	N 14.951824 E 79.973998	11.57	1.32 ±0.37	16.07 ±2.92
			Pterocarpus santalinus		30.57	0.47 ±0.11	3.43 ±1.14
Plantation average					**25.29**	**0.83**	**8.88**

1.3 Udayagiri range

During 2018–19, a total of two plantation activities were implemented under the CAMPA scheme in Udayagiri range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to one plantation site, were randomly selected for assessment.

Table 28 Details of plantation selected in Udayagiri range

Sl. no.	Plantation	SO no. and year
1	Raising of 2018 Dakkanuru 20 Ha NTSH plantation in V.K.Padu beat.	DSO 304 (2018-19)

The selected site for Dakkanuru 20 Ha plantation is characterized by red soil with good drainage providing suitable conditions for healthy plant growth and root development.

Survival Percentage: At Dakkanuru 20 Ha plantation, species suitability was observed for *Sterculia urens* and *Hardwickia binata* which recorded survival rates of 83.05% and 69.42% respectively. These figures indicate a favourable response to site conditions, particularly for *Sterculia urens*.

Growth Performance: Dakkanuru 20 Ha plantation recorded average tree heights ranging from 2.71 to 3.79 m and girths ranging from 31.94 to 43.42 cm. In Dakkanuru plantation, *Sterculia urens* demonstrated good growth aligning with its higher survival rate. In contrast, *Hardwickia binata* exhibited comparatively poor growth despite moderate survival. Additionally, certain patches within the plantation showed no plant growth primarily due to overgrazing by cattle indicating localized biotic pressure and the need for improved protection measures.

Table 29 Details of plantation enumerated in Udayagiri range

Sl. no.	Planation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Dakkanuru 20 Ha	1	*Sterculia urens*	N 14.977120 E 79.477971	83.47	2.71 ±0.35	39.7 ±3.97

	NTSH plantation	2	*Hardwickia binata*	N 14.976817 E 79.477811	69.42	3.79 ±0.38	31.9 ±2.88
		3	*Sterculia urens*	N 14.976369 E 79.478148	82.64	2.71 ±0.28	43.42±4.07
Plantation average					**78.51**	**3.07**	**38.34**

Comparative assessment of plantations in Nellore division during 2018-19

Madamanuru plantation in Nellore showed the best results with high survival rates (81-93%) and strong growth indicating good site conditions and management. Vinduru (Nellore) had moderate survival and growth while Dakkanuru (Udayagiri) showed good survival but some growth was affected by grazing. Maddurupadu (Kavali) performed poorly with low survival rates (11-36%) and stunted growth suggesting poor site suitability and management issues. Overall, Madamanuru is most successful while Maddurupadu needs urgent improvements.

Verification of plantation area and boundaries

In Nellore division during 2018-19, measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 30 Details of plantation area perambulation in Nellore division

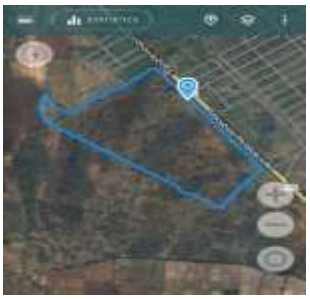
Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 2018 Vinduru 20 Ha NTSH plantation	20 Ha	26.93 Ha
2	Raising of 2018 Madamanuru bit-III 20 Ha NTSH plantation	20 Ha	28.65 Ha
3	Raising of 2018 Maddurupadu 20 Ha Red Sanders plantation	20 Ha	23.48 Ha
4	Raising of 2018 Dakkanuru 20 Ha NTSH plantation in V.K. Padu Beat	20 Ha	22.49 Ha

Perambulation of the plantation area was carried out in the presence of the designated Forest Officer and based on the demarcation indicated by the watcher/guard responsible for each site. During the verification process, it was observed that the perambulated area for all five plantations exceeded the officially recorded extent. This variance is primarily attributed to the inclusion of rocky terrain, trenches and barren patches within the plantation boundaries areas that were not accounted for in the original documentation. The actual extent of each plantation was measured using QGIS software, which confirmed the following deviations from the recorded area:

- 20 Ha NTSH Vinduru plantation (Nellore): Exceeded by 6.93 Ha
- 20 Ha NTSH Madamanuru bit-III plantation (Nellore): Exceeded by 8.65 Ha
- 20 Ha RS Maddurupadu plantation (Kavali): Exceeded by 3.48 Ha
- 20 Ha NTSH Dakkanuru plantation (Udayagiri): Exceeded by 2.49 Ha

The verification was conducted through physical perambulation using the Geo Tracker mobile application, which facilitated the collection of geotagged photographs and GPS coordinates for accurate documentation. The visual and spatial records are provided below for reference:

Vinduru 26.93 Ha



Madamanuru 28.65 Ha

Maddurupadu 23.48 Ha

Dakkunuru 22.49 Ha

Health Status of Plantation: The overall health status of plantations in all four plantations- Vinduru, Madamanuru, Maddurupadu and Dakkanuru was found to be satisfactory. Across all four sites, there were no observed incidences of insect or pest damage affecting any of the planted species. The plants appeared healthy, showing no visible signs of infestation or physiological stress. This indicates that the plantations are being well-maintained and that the environmental conditions at each site are favourable for healthy and sustained plant growth.

Protection Measures: To safeguard plantations from fire and other environmental threats, several protection measures were implemented, including the creation and maintenance of fire lines, development of inspection paths, and deployment of fire watchers. These measures have proven generally adequate in reducing plantation vulnerability, particularly during the dry season. However, ongoing maintenance and clear visibility of these features are essential to ensure their continued effectiveness.

Biotic (human/cattle) Pressure on Plantation: Incidents of grazing and browsing pressure were observed in all four plantations. However, these pressures have been significantly reduced through the creation of peripheral trenches and the deployment of plantation watchers which have helped restrict the entry of cattle from nearby villages.

Maintenance of Plantation Journals and Records: Plantation journals and records are generally well-maintained in all four plantations with baseline information properly documented. However, there is a need for regular and timely updates of key plantation parameters such as survival rates, growth metrics and maintenance activities to ensure that the records accurately reflect current field conditions and remain relevant for monitoring and evaluation purposes. Plantation is inspected by concerned forest official and entered the observations. During the field visit, it was observed that plantation board was missing at Vinduru (Nellore range) and damaged at Madamanuru (Nellore range). It is recommended that appropriate signage be installed to facilitate site identification enhance visibility and support ongoing monitoring and management efforts.

Vana Samrakshan Samithi (VSS): The involvement of Vana Samrakshan Samithi (VSS) or Joint Forest Management Committee (JFMC) was evident in all four plantations. Their participation reflects the integration of community-based forest management practices contributing to the protection, maintenance and monitoring of the plantation and supporting the overall objectives of sustainable forest regeneration.

Vinduru plantation, Nellore

Madamanuru plantation, Nellore

Maddurupadu plantation, Kavali

Dakkunuru plantation, Udayagiri

2. Monitoring and Evaluation of Maintenance Activities

During the period 2018-19, a total of 87 maintenance activities were implemented in the Nellore Forest Division, out of which 19 activities were selected for monitoring and evaluation. A range-wise analysis shows that Kavali range had the highest number of activities, with 24 implemented and 5 sampled, followed by Atmakur with 18 implemented and 4 sampled. Venkatagiri with 17 and 3 sampled. Nellore with 12 and 3 sampled. Udayagiri with 11 and 3 sampled and Rapur which recorded the lowest with 5 activities and 1 sampled. This sampling approach ensured adequate representation across all ranges for a comprehensive evaluation of maintenance efforts undertaken during the year.

Table 31 Maintenance activities selected for evaluation in Nellore division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Nellore range			
1	First year maintenance of 2017 Marupuru 20 Ha NTSH plantation	N 14.391748 E 79.797353	DSO 126 (2018-19)
2	Third year maintenance of 2016 Giri sastrulavari kandrika 20 Ha NTSH plantation	N 14.217349 E 79.793079	DSO 311 (2018-19)
3	Third year maintenance of 2016 Vadlapudi 20 Ha NTSH plantation	N 14.325159 E 79.808022	DSO 314 (2018-19)
Atmakur range			

4	First year maintenance of 20 Ha Red Sanders for 2017 plantation of Ponugodu VSS	N 14.707774 E 79.640911	DSO 157 (2018-19)
5	Second year maintenance of 20 Ha NTSH for 2016 plantation of Gandhijansangam VSS	N 14.661354 E 79.854327	DSO163 (2018-19)
6	Third year maintenance of 20 Ha NTSH for 2015 plantation of Rampalli location	N 14.740383 E 79.425608	DSO 327 (2018-19)
7	Third year maintenance of 20 Ha NTSH for 2015 plantation of Ponugodu location	N 14.706073 E 79.640667	DSO 324 (2018-19)
Kavali range			
8	First year maintenance of 2017 Peddavaram 10 Ha RS plantation	N 15.00514 E 79.914089	DSO 132 (2018-19)
9	Second year maintenance of 2016 Veligandla bit-I 20 Ha NTSH plantation	N 15.014187 E 79.622274	DSO 134 (2018-19)
10	Third year maintenance of 2015 Manubolupadu 10 Ha NTSH plantation	N 14.722788 E 79.862036	SDSO 04 (2018-19)
11	Third year maintenance of 2015 Kesavaram 10 Ha RS plantation	N 14.928124 E 79.82042	DSO 321 (2018-19)
12	Third year maintenance of 2015 Peddavaram 10 Ha NTSH plantation	N 14.980715 E 79.907168	SDSO 02 (2018-19)
Udayagiri range			
13	First year maintenance plantation of 2017 20 HA Kaniyamapadu NTSH plantation in V.K.Padu beat	N 15.001825 E 79.458215	DSO 152 (2018-19)
14	Second year maintenance of Nandipadu of 2016 20 Ha NTSH plantation in Nandipadu beat	N 14. 770453 E 79.36709	DSO 154 (2018-19)
15	Third year maintenance of 2015 20 HA NTSH plot in Yerukollu Gundemadakala plantation in Duttalur beat	N 14.852426 E 79.484654	DSO 333 (2018-19)
Venkatagiri range			
16	First year maintenance of Gottikadu 20 Ha NTSH plantation	N 14.041872 E 79.694654	DSO 179 (2018-19)
17	Third year maintenance of Pakapudi 20 Ha RS plantation	N 14.028479 E 79.666382	DSO 348 (2018-19)
18	Fourth year maintenance of Dandavolu 74 Ha bit-II miscellaneous plantation	N 14.071173 E 79.641813	DSO 441 (2018-19)
Rapur range			
19	First year maintenance of 2017 Yeturu - 20 Ha NTSH plantation in Ammavaripalem beat, Nallapalem VSS.	N 14.455046 E 79.648674	DSO 122 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), coppice management, pruning of lower branches, fire line management and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows:

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control *Lantana* and bushy grasses, minimizing competition and ensuring healthy plant growth.

- Continue maintaining clear and effective fire lines with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments and complement contingency records.
- Maintain accurate and updated plantation journals, markers and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.
- Improve the frequency and timing of pruning operations to promote healthy plant structure and better bole formation.

GS Khandrika, Nellore

Ponugodu, Atmakur

Peddavaram, Kavali

Utukuru, Udayagiri

Gottikadu, Venkatagiri

Ammavaripalem, Rapur

3. Monitoring and Evaluation of Protection Activities

During the period 2018-19, a total of 9 protection activities were undertaken in Nellore Forest Division, of which 4 activities were selected for monitoring and evaluation. Range-wise, Nellore implemented 5 activities with 1 sampled. Atmakur and Venkatagiri each implemented

1 activity, both of which were sampled. Rapur carried out 2 activities with 1 sampled. Notably, no protection activities were undertaken in the Kavali and Udayagiri ranges during this period.

3.1 Erection of chainlink fence (2''×2''×8'' gauge) with RCC poles round the fragmented block in Kesavaram RF on TGP canal boundary to check dam through Chedimala VSS

GPS Location: N 14.063681 E 79.944564 **SO no. and year:** DSO 541 (2018-19)

A chain-link fence constructed at Kesavaram Reserve Forest under the CAMPA-NPV (Forest Fire Management) scheme was monitored and found to match the specifications in the measurement book (2 m height, 530 rmt length) with no deviations. The fence is well maintained with intact boundary pillars and no visible damage effectively serving its purpose of preventing unauthorized entry into the reserve forest.

3.2 Creation of fire lines in RF areas of Sangam beat of Sangam section

GPS Location: N 14.596566 E 79.745795 **SO no. and year:** RSO 18 (2018-19)

3.3 Creation of fire lines at Venkatagiri range

GPS Location: N 13.937416 E 79.495736 **SO no. and year:** RSO 13 (2018-19)

3.4 Creation of fire line in Rapur-Veligonda RF of Rapur range

GPS location: N 14.193947 E 79.441901 **SO no. and year:** RSO 03 (2018-19)

Under the CAMPA-NPV (Forest Fire Management) scheme, fire lines were established across three locations with consistent adherence to specifications recorded in the measurement books and no observed deviations. In Sangam beat, a fire line measuring 3 m in width and 5000 rmt in length was created; however, its visibility has been reduced due to dense grass and weed growth necessitating regular clearing to maintain its effectiveness. In Kurjagunta beat, a 3-m in width and 2500 rmt long fire line was laid along an inspection path within the natural forest. This line is clearly visible and well maintained with no significant grass or weed growth. In Veligonda Reserve Forest, a fire line of 3 m in width and 2000 rmt in length was also established along a forest inspection path. While it remains visible, it is not well maintained with rocky patches and moderate grass and weed growth observed highlighting the need for periodic maintenance to ensure continued fire prevention effectiveness.

Fire lines in Venkatagiri

Fire lines in Veligonda RF, Rapur


Chain-link mesh fencing at Kesavaram RF of Nellore range

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During the period 2018-19, a total of 11 Soil and Moisture Conservation (SMC) activities were carried out across the division with 3 selected for verification. Nellore reported 3 activities (1 sampled), Udayagiri carried out 5 (1 sampled) and Rapur carried out 3 (1 sampled). No SMC activities were reported from the other ranges within this division during this period.

4.1 Construction of check dam across Yerragunta Vagu in Mittatmakur RF

GPS Location: N 14.226826 E 78.795564 **SO no. and year:** DSO 411 (2018-19)

A check dam constructed across Yerragunta Vagu in Mittamakur RF was monitored and evaluated against the specifications recorded in the measurement book and actual field measurements. The check dam's dimensions—length of 10 meters, width of 1.0 meter and depth of 1.20 meters- matched perfectly with the recorded specifications indicating no deviations. The structure was found to be well maintained; however, its total water holding capacity has decreased due to the accumulation of silt and sediment. Minor repairs are needed for the apron and de-silting is recommended to restore and increase the storage capacity.

4.2 Construction of RFD no.4 across Resubandavagu in Bhiaravanikonda RF in Arlapadiya

GPS Location: N 15.037235 E 79.265594 **SO no. and year:** RSO 14 (2018-19)

Rock Fill Dam was constructed across Resubandavagu in Bhiaravanikonda RF was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the rock fill dam: length - 7.60 m, width - 3.0 m and depth - 0.30 m. Field measurements showed reduced depth compared to records but the rock fill dam is maintained. It stores water well in monsoons, though regular de-silting and repairs are needed due to overflow damage. Jungle growth was also noted around the dam.

4.3 Construction of saucer pits in deer park at Kandaleru dam area of Rapur range

GPS Location: N 14.31402 E 79.627584 **SO no. and year:** DSO 437 (2018-19)

Eight saucer pits were constructed across Deer Park at Kandaleru dam, each measuring 2 meters in diameter and 0.10 meters deep. Field measurements matched the recorded specifications, with no deviations. All pits were in good condition and well maintained though cleaning and cement plastering are recommended to improve storage capacity.

Check dam in Mittatmakur RF

RFD in Bhairavanikonda RF

Saucer pits in Kandaleru dam area

5. Monitoring and Evaluation of Construction Activities

During the period, 2018-19, a total of six construction activities were carried out, all of which were reported in Nellore range. Of these, one activity was sampled for review. No construction works were recorded in the other ranges of Nellore division during this period.

5.1 Construction of 60 no's of Carins in Toderu R.F through Marupuru VSS

GPS Location: N 14.403202 E 79.782481 **SO no. and year:** DSO 378 (2018-19)

5.2 Construction of 40 no's of Carins in Mittatmakuru RF through Thurpupundla VSS

GPS Location: N 14.221257 E 79.802991 **SO no. and year:** DSO 387 (2018-19)

5.3 Construction of 120 Nos of Carins in Marupuru R.F Through Marupuru VSS

GPS Location: N 14.391901 E 79.797401 **SO no. and year:** DSO 379 (2018-19)

Construction activities involving RCC cairns at Toderu, Mittatmakuru and Marupuru beats were monitored and evaluated against the specifications recorded in the measurement book. Field verification confirmed that carins at all three sites had consistent on-site measurements: length: 1.20 m, width: 0.45 m and height: 1.20 m which matched the recorded specifications, with no deviations observed. A total of 60 RCC cairns were installed at Toderu, 40 at Mittatmakuru and 120 at Marupuru. All cairns were found to be intact and effectively serving their purpose of demarcating forest boundaries, offering consistent and visible boundary markings that contribute significantly to forest protection and management. However, it was noted that the bases of several cairns were partially covered with soil, and the cement plastering had deteriorated in places due to weathering. Periodic maintenance is recommended to preserve their visibility and structural integrity over time.

Carins in Toderu

Carins in Marupuru

Carins in Mittatmakuru

6. Monitoring and Evaluation of Other Activities

During 2018-19, a total of 282 activities were carried out under the "Others" category, of which 58 were selected for verification. Nellore reported the highest number of activities (60, with 12 sampled), followed by Udayagiri (58, 12 sampled), Venkatagiri (49, 10 sampled), Atmakur (44, 9 sampled), Kavali (37, 8 sampled), and Rapur (34, 7 sampled). Verification of sanction orders, estimation sheets, and work registers, conducted in the presence of Division and Range office staff, confirmed that sanctioned amounts aligned with actual expenditures and funds were utilized appropriately. Internal and external audits ensured transparency and compliance under the CAMPA scheme. However, certain discrepancies were noted: work registers for DSO 395 and DSO 625 (Nellore) and the estimate for DSO 508 (Venkatagiri) were not presented at the Nellore Divisional office.

Key Findings

- Mixed results observed. *Syzygium cumini*, *Azadirachta indica*, *Terminalia arjuna*, *Dalbergia latifolia*, and *Sterculia urens* showed good survival, while *Pterocarpus santalinus* exhibited poor survival rates.
- Field verification revealed consistent overestimation in perambulated areas compared to recorded extents.
- Maintenance was undertaken but affected by inadequate signage and grazing pressures. Fire lines and fencing proved effective, though they require regular upkeep.
- Structures were largely functional but impacted by siltation and overflow damage, reducing overall efficiency.
- Cairns aided boundary demarcation but need plastering repairs.
- Comprised a significant portion of activities, executed with financial compliance; however, some record-keeping gaps were noted.

Recommendations

- Prioritize matching species to site conditions to improve survival rates. Avoid repeated planting of *Pterocarpus santalinus* in unsuitable soils.
- Enhance plantation visibility and upkeep through consistent use of signage, boundary stones, and plantation boards.
- Institutionalize regular desilting and timely repairs of Soil and Moisture Conservation (SMC) structures to sustain their functional benefits.
- Ensure systematic maintenance of fire lines and fences to retain their protective effectiveness.
- Strengthen grazing regulation and monitoring by increasing the involvement of Vana Samrakshana Samithis (VSS).
- Address documentation gaps by ensuring all work registers, estimates, and related records are complete and accessible for audit.
- Rebalance financial allocations to reduce over-reliance on "other works" and prioritize activities with greater ecological returns.

6. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KADAPA DIVISION

Introduction

Kadapa division, also known as YSR Kadapa is in the Rayalaseema region of Andhra Pradesh in southern India. Geographically, it lies between 13°50′40″ N to 14°40′37″ N latitude and 78°13′9″ E to 79°14′39″ E longitude. The district is bordered by Annamayya and Chittoor districts to the south, Anantapur to the west, Kurnool to the northwest and Nandyal and Nellore to the east. The Eastern Ghats traverse the region, creating a series of hills and valleys that influence the forest composition and terrain. The Kadapa Forest Division falls within a semi-arid to dry tropical climatic zone, receiving an average annual rainfall of around 660 mm with hot summers and mild winters. The major hill ranges in the region include the Seshachalam, Palkonda, Lankamalai, Veligonda and Nallamalai ranges which support fragmented forest patches. The elevation varies from lowland plains to hilltops reaching over 750 meters. According to the India State of Forest Report (ISFR) and state forest records, Kadapa's forests are predominantly dry deciduous, featuring open canopies and a significant presence of scrub and degraded forests in some parts. One of the most ecologically and economically significant aspects of Kadapa's forests is the presence of Pterocarpus santalinus (Red Sanders) an endemic and highly valuable hardwood species that naturally occurs only in select pockets of southern Andhra Pradesh, especially in Kadapa, Chittoor, and Nellore districts. The flora of the region includes a variety of species adapted to dry conditions. Common tree species include *Hardwickia binata*, *Dolichandrone crispa*, *Sterculia urens*, *Diospyros chloroxylon, Mimusops indica, Strychnos nux-vomica* and *Vitex altissima* among others. These species serve various ecological and economic purposes from timber and firewood to medicinal uses. The undergrowth often includes shrubs and grasses which support biodiversity and soil stability. Although the forest cover in Kadapa accounts for a significant portion of the district's area, a considerable extent is classified as open forest and scrub, reflecting past degradation due to human activity, grazing and fuelwood collection. However, recent protection and afforestation efforts combined with natural regeneration in hilly areas have contributed to the gradual improvement of forest health. With effective management and continued conservation focus, Kadapa's forests hold significant potential for ecological restoration and sustainable resource development.

During the period 2018-19, a total of 116 CAMPA activities were implemented in the Kadapa Forest Division. Of these, 24 activities approximately 20 % were selected for detailed monitoring and evaluation. A range-wise analysis indicates that Vempalli had the highest number of activities with 33, of which 6 were sampled. This was followed by Kadapa and Sidhout ranges, each reporting 28 activities; 7 were sampled in Kadapa and 5 in Sidhout. The Vontimitta range carried out 27 activities, with 6 selected for sampling. With respect to the type of activities, other works constituted the largest share, with 96 activities implemented, of which 19 were evaluated. Maintenance works accounted for 13 activities, with 3 sampled. Protection works included 4 activities, with 1 sampled, while construction works comprised 3 activities, with 1 sampled. Notably, no plantation or Soil and Moisture Conservation (SMC) activities were implemented during this year.

1. Monitoring and Evaluation of Maintenance Activities

During 2018-19, a total of 13 maintenance activities were implemented in Kadapa Division, of which 3 activities were selected for monitoring and evaluation. Range-wise analysis indicates that Vempalli range recorded the highest number with 10 activities, of which 2 were sampled. This was followed by Vontimitta range with 2 activities, not sampled. Kadapa range with one activity, of which 1 sampled. No maintenance activities reported from Sidhout range.

Table 32 Maintenance activities selected for evaluation in Kadapa division

Sl. no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Vempalli range			
1	Second-year maintenance of 2 Ha SMM (NTSH) plantation compartment no-605) of Idupulapaya and Redlacheruvu RF	N 14.333649 E 78.553909	RSO 02 (2018-19)
2	Third-year maintenance of 5.4 Ha SMM (misc) plantation at Gorlapalli beat (compartment no-570) of Gorlapalli section	N 14.38893 E78.701055	DSO 110 (2018-19)
Kadapa range			
3	First year maintenance of 20 Ha R.S. Plantation (SMM) in Suddakona, Dayyalakona Locality, (Compt.No.563, 569) in Kanumalopalli Beat of Bhakarapet Section	N 14.449419 E 78.960325	DSO 113 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. Plantation boards were well maintained. To support better growth and longterm sustainability of the plantations, several general recommendations suggested are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control Lantana and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines, with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Maintain accurate and updated plantation journals, markers, and records to support ongoing identification, monitoring, and accountability.

Idupulapaya beat, Vempalli

Gorlapalli beat, Vempalli

2. Monitoring and Evaluation of Protection Activities

During 2018-19, a total of four protection activities were undertaken in Kadapa division. Out of these, one activity was sampled for evaluation. In Vontimitta range, one protection activity was carried out and it was sampled. Sidhout range also reported one activity, but it was not sampled. Vempalli range accounted for two protection activities, none of which were sampled. Notably, no protection activities were undertaken in the Kadapa range during this period.

2.1 Creation of new fire lines in natural forests at Chintarajupalli section

GPS location: N 14.298128 E 79.001262 **SO no. and year:** RSO 13 (2018-19)

A fire line was created and maintained in Chintarajupalli section under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width - 3 m and length - 2000 rmt. The field measurements matched those in the measurement book, indicating no deviations. The fire line was found to be well maintained with clear visibility throughout as it has been effectively aligned along the inspection path**.** No grass or weed growth was observed reflecting regular upkeep, while the adjoining natural forest areas were also found to be well protected thereby enhancing the functionality of the fire line in preventing fire hazards.

Fire lines in natural forests at Chintarajupalli

3. Monitoring and Evaluation of Construction Activities

During 2018-19, a total of 3 construction activities were carried out in Kadapa Forest Division, of which 1 was sampled. Range-wise, Vontimitta reported 2 construction activities, with 1 selected for sampling. While Sidhout reported 1 activity that was not sampled. No construction works were recorded in Kadapa and Vempalli ranges during this period.

3.1 Construction of R.C.C. cairns in PNWLS area of Vontimitta section in Vontimitta range

GPS location: N 14.451193 E 79.077615 **SO no. and year:** DSO 173 (2018-19)

A construction activity involving the RCC cairns at Vontimitta section was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the RCC Cairns were as follows; Total no of Cairns- 25 with Length – 1.20 m, Width – 0.30 m and height – 1.20 m. The field verification confirmed that measurements matched those in the measurement book, indicating no deviations. The R.C.C. cairns were found to be intact and effectively serve the purposes of demarcating the boundary

between the PN wildlife Sanctuary and adjoining revenue land. A total of 25 cairns has been installed at 100 m intervals ensuring consistent and visible boundary marking for effective forest protection and management. However, it was observed that the base of the cairns is partially covered with soil and the cement plastering has weathered over time.

R.C.C. cairns in PNWLS area of Vontimitta section

4. Monitoring and Evaluation of Other Activities

During 2018-19, a total of 96 activities were implemented under the "Others" category in Kadapa Division, of which 20 were sampled for verification. Kadapa range reported the highest number of activities (27, with 6 sampled), followed by Sidhout (26, 5 sampled), Vontimitta (22, 4 sampled), and Vempalli (21, 4 sampled). Verification of sanction orders, estimation sheets, and work registers, conducted in the presence of Division and Range office staff, confirmed that sanctioned amounts aligned with actual expenditures and funds were utilized appropriately. Internal and external audits ensured transparency and compliance under the CAMPA scheme, and all financial records were properly maintained and authenticated by the concerned officials (DFO, SDO, and FRO).

Key Findings

- No plantations or SMC works were undertaken, limiting ecological impact in this year.
- Maintenance operations were implemented effectively, though more intensive weeding and record upkeep were recommended.
- Fire line creation under protection works was dimensionally accurate and well maintained.
- RCC cairns effectively demarcated boundaries, though weathering reduced plaster durability.
- "Other works" dominated the portfolio, with financial and administrative compliance ensured through regular audits.

Recommendations

- Resume plantation and SMC activities to strengthen ecological restoration in the division.
- Enhance maintenance with targeted weeding of invasive species like *Lantana* and pruning for improved growth.
- Institutionalize routine maintenance of fire lines and cairns to ensure long-term functionality.
- Reduce reliance on "other works" by allocating greater share of CAMPA resources toward plantations and ecological works.
- Continue strict financial discipline and audits, while improving transparency through timely presentation of all records.

7. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN PRODDATUR DIVISION

Introduction

Proddatur Forest Division, located in the western part of YSR Kadapa District, Andhra Pradesh covers an estimated 620 km² of notified forest area. The division falls within the semi-arid zone of the Rayalaseema region with terrain comprising low hill ranges, shallow valleys and plains influenced by the Penna River basin. The forests are primarily of the Southern Tropical Dry Deciduous and Tropical Thorn Forest types. The vegetation is dominated by species such as *Anogeissus latifolia*, *Hardwickia binata*, *Albizia amara*, *Chloroxylon swietenia* and *Terminalia* spp. In addition, pockets of the endemic and valuable Red Sanders (*Pterocarpus santalinus*) are present in suitable habitats. Teak plantations have also been established in parts of the division. The climate is semi-arid with annual rainfall averaging 700-800 mm, mostly from the southwest monsoon. Extended dry spells and high summer temperatures make the forests prone to fires, grazing and biotic pressures. Livestock grazing, fuelwood collection and occasional encroachments are the main challenges affecting regeneration. Ecologically, the forests of Proddatur Division play a key role in soil and water conservation supporting the Penna River catchment and providing habitat for dryland biodiversity. Though wildlife is limited small mammals, reptiles and bird species are common. Management efforts focus on plantation development, soil and moisture conservation works, fire line maintenance, boundary demarcation and community participation through Vana Samrakshana Samithis (VSS). Special attention is given to the conservation of Red Sanders due to its ecological and economic significance. Overall, Proddatur Forest Division represents a fragile but vital dry deciduous landscape, requiring effective protection and sustainable management to maintain its ecological balance and support local livelihoods.

During the period 2018-19, a total of 162 CAMPA activities were implemented in Proddatur Forest Division. Of these, 34 activities, representing approximately 20%, were selected for detailed monitoring and evaluation. Among the five forest ranges, Porumamilla carried out the highest number of activities with 50, of which 9 were evaluated. Onipenta followed closely with 37 activities selecting 8 for evaluation. Badvel implemented 32 activities with 7 included in the evaluation sample. Muddanur carried out 27 activities with 7 sampled, while Proddatur conducted 16 activities, of which 3 were selected for evaluation. In terms of activity type, other works constituted the largest share with 90 activities implemented and 19 sampled. This was followed by maintenance activities (38 implemented; 8 sampled), plantation (22; 4), protection (5;1), SMC (5;1) and construction (2; 1).

1. Monitoring and Evaluation of Plantation Activities

During the period 2018-19, Proddatur Forest Division implemented a total of 22 plantation activities under the CAMPA programme, of which 4 activities were selected for monitoring and evaluation. At the range level, Porumamilla implemented the highest number of plantations with 14 activities, of which 2 were sampled. Muddanur undertook 8 plantation activities with 2 included in the evaluation sample. While no plantation activities reported from Proddatur, Onipenta and Badvel during this period.

1.1 Porumamilla range

During the period 2018-19, a total of 14 plantation activities were implemented under the

CAMPA scheme in Porumamilla range. For monitoring and evaluation, 20 % of these activities equivalent to two plantation sites were randomly selected for assessment.

Table 33 Details of plantations selected in Porumamilla range

Sl. no.	Plantations	SO no. and year
1	Raising of 15 Ha (SMM) plantation at Itukulapadu beat (Akkimgundla CA block) plantation -2 bit-1	DSO 106 (2018-19)
2	Raising of 5 Ha (SMM) plantation at Itukulapadu beat (Akkimgundla CA block) plantation -4 bit-2	DSO 109 (2018-19)

These two plantation sites fall under the tropical dry deciduous forest category which is characterized by seasonal leaf fall and dry climatic conditions. The terrain across both sites is generally flat with variations in soil type. At Itukulapadu (15 & 5 Ha), the soil is predominantly red gravelly with low water retention capacity and limited organic matter content. Such soil conditions are suitable for hardy species like *Azadirachta indica* and other drought-tolerant native species.

Survival Percentage: Itukulapadu 15-hectare plantation exhibited moderate to satisfactory growth performance with *Azadirachta indica* achieving a survival rate of 89.08 %. In the adjacent 5-hectare plantation at Itukulapadu, *Azadirachta indica* recorded a slightly lower survival rate of 83.30 %. These figures indicate relatively good establishment and adaptability of the species under the prevailing site conditions.

Growth Performance: In Itukulapadu 15-hectare plantation, the average tree height ranged from 4.69 to 5.69 m with girth measurements between 32.30 and 34.20 cm. In 5-hectare plantation at the same location the average tree height ranged from 3.02 to 4.66 m and girth measurements varied between 22.80 and 30.48 cm. These figures reflect relatively better growth performance in the 15-hectare site compared to the 5-hectare site, likely due to variations in site conditions or management practices.

Table 34 Details of plantations enumerated in Porumamilla range

Sl. no.	Plantation/ village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Itukulapadu 15 Ha bit-I plantation	1	*Azadirachta indica*	N 15.006616 E 78.842742	87.60	5.65 ±0.57	32.32 ±5.27
		2	*Azadirachta indica*	N 15.007171 E 78.842701	90.08	4.69 ±0.49	32.85 ±4.62
		3	*Azadirachta indica*	N 15.007783 E 78.842656	90.08	5.43 ±0.76	32.30 ±2.66
		4	*Azadirachta indica*	N 15.008083 E 78.842402	89.25	5.69 ±0.51	34.20 ±4.41
		5	*Azadirachta indica*	N 15.008108 E 78.842756	88.42	5.61 ±0.43	32.99 ±3.82
Plantation average					**89.08**	**5.41**	**32.93**
2	Itukulapadu 5 Ha bit-II plantation	1	*Azadirachta indica*	N 14.993519 E 78.851295	83.47	4.09 ±0.37	23.34 ±3.83
		2	*Azadirachta*	N 14.993488	80.16	3.77	23.57

			indica	E 78.850958		±0.57	±3.05
		3	*Azadirachta indica*	N 14.993774 E 78.851473	83.47	4.66 ±0.47	30.48 ±4.95
		4	*Azadirachta indica*	N 14.994114 E 78.850998	81.81	3.02 ±0.38	25.82 ±5.13
		5	*Azadirachta indica*	N 14.993629 E 78.850291	87.6	3.27 ±0.43	22.80 ±3.14
Plantation average					**83.30**	**3.76**	**25.20**

1.2 Muddanur range

During the period 2018–19, a total of eight plantation activities were implemented under the CAMPA scheme in Muddanur range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to two plantation sites, were randomly selected for assessment.

Table 35 Details of plantations selected in Muddanur range

Sl. no.	Plantations	SO no. and year
1	Raising 20 Ha. bit (I) plantation Gandlur beat	DSO 41 (2018-19)
2	Raising 20 Ha. bit (IV) plantation Gandlur beat	DSO 44 (2018-19)

Sites selected for Gandlur (bit I) and Gandlur (bit IV) plantations are located adjacent to the Gandikota reservoir. However, both plantation areas were completely submerged during the rainy season due to a high inflow of water into the reservoir. As a result, the plantations failed with no surviving seedlings observed during the evaluation.

Survival Percentage: In contrast, no surviving trees were observed in either Gandlur (bit I) or Gandlur (bit IV) plantations confirming total failure of the plantations due to submergence during the rainy season.

Growth Performance: No growth measurements were recorded for Gandlur (bit I) and Gandlur (bit IV) plantations due to the complete absence of surviving plantation stock.

GPS Location: N 14.867572 E 78.160864 **SO no. and year:** DSO 41 and 44 (2018-19)

The Gandlur 20-hectare bit IV plantation, established in 2018-19 with 22,220 mixed species (including Teak, Neem, *Pongamia*, *Hardwickia binata* and *Sterculia urens*) was submerged due to backwater from the Gandikota reservoir during its second maintenance year (2020-21). On 23rd September 2020, forest officials noted the plantation was underwater at a reservoir storage level of 13.90 TMC. A follow-up visits by IWST on 11th July 2024 confirmed total loss, with no surviving plants and the area still submerged.

Comparative assessment of plantations in Proddatur division during 2018-19

The comparative assessment of plantations in the Porumamilla and Muddanur ranges highlights a stark contrast in performance. In Porumamilla (Itukulapadu), Azadirachta indica showed strong adaptability with high survival rates of 89.08% in 15 Ha site and 83.30% in the adjacent 5-hectare site. Growth performance was also better in the 15-hectare area with trees reaching heights of 4.69 to 5.69 m and girths of 32.30 to 34.20 cm compared to 3.02 to 4.66 m and 22.80 to 30.48 cm in 5 Ha site likely due to differences in site quality or management. In contrast, Muddanur range plantations at Gandlur (bit I and IV) were complete failures, with no surviving trees due to seasonal submergence, making growth assessment impossible. This comparison

underscores the importance of proper site selection and drainage planning for plantation success.

Verification of plantation area and boundaries

In Proddatur division during 2018-19, measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 36 Details of plantation area perambulation in Proddatur division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 15 Ha. Misc. (SMM) plantation at Itukulapadu beat	15 Ha	18.96 Ha
2	Raising of 5 Ha. Misc. (SMM) plantation at Itukulapadu beat	05 Ha	5.58Ha
3	Raising 20 Ha bit (1) plantation Gandlur beat	20 Ha	20.16 Ha
4	Raising 20 Ha bit (IV) plantation Gandlur beat	20 Ha	33.98 Ha

Perambulation of the plantation area was carried out in the presence of the designated Forest Officer and based on the demarcation indicated by the watcher/guard responsible for each site. During the verification process, it was observed that the perambulated area for two plantations exceeded the officially recorded extent. This variance is primarily attributed to the inclusion of rocky terrain, trenches and barren patches within the plantation boundaries areas that were not accounted for in the original documentation. The actual extent of each plantation was measured using QGIS software, which confirmed the following deviations from the recorded area:

- 15 Ha Misc Itukulapadu plantation (Porumamilla): Exceeded by 3.96 Ha
- 5 Ha Itukulapadu plantation (Porumamilla): Exceeded by 0.58 Ha
- Gandlur bit-I plantation (Muddanur): Exceeded by 0.16 Ha
- Gandlur bit-II plantation (Muddanur): Exceeded by 13.98 Ha

The verification was conducted through physical perambulation using the Geo Tracker mobile application, which facilitated the collection of geotagged photographs and GPS coordinates for accurate documentation. These visual and spatial records are provided below for reference.

Itukulapadu bit-I 18.96 Ha

Itukulapadu bit-II 5.58 Ha

Gandlur bit-I 20.16 Ha

Gandlur bit-II 33.98 Ha

Health Status of Plantation: The overall health condition of the plantations in Itukulapadu (15 Ha and 5 Ha) was found to be satisfactory. No incidences of insect or pest infestations were observed across any of the planted species. The plants appeared healthy exhibiting no visible signs of physiological stress or disease. This suggests that the plantations are being properly maintained and that the prevailing environmental conditions at these sites are conducive to sustained and healthy plant growth. In contrast, at Gandlur (bit-I and bit-IV), the plantations were found to be submerged under water with no live plants observed. Due to the submergence, it was not possible to assess the health status of these plantations.

Protection Measures: In Itukulapadu (15 Ha and 5 Ha) plantations, several protection measures were implemented to safeguard the area from fire and other environmental threats. These included the creation and maintenance of fire lines, development of inspection paths and the deployment of fire watchers. These efforts have generally been effective in reducing the plantations' vulnerability especially during the dry season. However, to ensure continued protection, regular maintenance and clear visibility of these protective features remain essential. In contrast, no protection measures were observed at Gandlur (bit-I and bit-IV) plantations.

Biotic (human/cattle) Pressure on Plantation: Itukulapadu (15 Ha and 5 Ha) plantation areas showed no evidence of grazing or browsing indicating effective protection from both human and livestock interference. This absence of biotic pressure has likely contributed to higher survival rates and robust plantation growth in these areas. In contrast, incidents of grazing and browsing were observed at Gandlur (bit-I and bit-IV) plantations during the field visit. This indicates the presence of biotic pressure which if not addressed, may adversely affect the health and regeneration of the plantations.

Maintenance of Plantation Journals and Records: Plantation journals and records are generally well-maintained at Itukulapadu (15 and 5 Ha), Gandlur (bit-I and bit-IV) plantations with baseline information properly documented. However, there is a need for regular and timely updates of key plantation parameters such as survival rates, growth metrics, and maintenance activities to ensure that the records accurately reflect current field conditions and remain relevant for ongoing monitoring and evaluation. Each plantation is periodically inspected by the concerned forest official and their observations are duly recorded.

Vana Samrakshana Samithi (VSS): At Itukulapadu (15 Ha and 5 Ha) plantation sites, the involvement of the Vana Samrakshana Samithi (VSS) also known as Joint Forest Management Committee (JFMC) was clearly evident. This indicates active community participation in the protection, maintenance and monitoring of plantation activities aligning with the core principles of Joint Forest Management (JFM) which emphasize participatory forest governance. In recognition of this engagement, Focus Group Discussions (FGDs) were conducted at these sites

to gather insights from community members regarding their roles, contributions and the challenges they face in plantation management. In contrast, at Gandlur (bit-I and bit-IV) plantations, the VSS was not involved in either the planning or execution phases of the plantation activities. As a result, FGDs were not conducted at these sites.

15 Ha Itukulapadu plantation

5 Ha Itukulapadu plantation

Gandlur bit-I plantation

Gandlur bit-II plantation

2. Monitoring and Evaluation of Maintenance Activities

During the period 2018-19, a total of 38 maintenance activities were carried out across the Proddatur Division, out of which 8 activities were selected for monitoring and evaluation. Among the various ranges, Porumamilla recorded the highest number of activities with 12, of which 2 were sampled. This was followed by Badvel with 11 activities and 2 sampled, Onipenta with 8 activities and 2 sampled and Muddanur with 6 activities and 2 sampled. Proddatur range had only one activity, which was not selected for evaluation.

Table 37 Maintenance activities selected for evaluation in Proddatur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Muddanur range			
1	First year maintenance of 30 Ha plantation in Settivaripalli beat	N 14.712496 E 78.179812	DSO 53 (2018-19)
2	First year maintenance of 25 Ha plantation in Mallela beat	N 14.524161 E 78.404634	DSO 47 (2018-19)
Onipenta range			
3	First year maintenance of 4.69 Ha medicinal plantation in Gangayapalli beat	N 14.722612 E 78.875723	DSO 68 (2018-19)
4	Second year maintenance of 20 Ha RS plantation in Mudireddipalli beat	N 14.875493 E 78.799207	DSO 70 (2018-19)
Badvel range			
5	Estimate for the first year maintenance of 8 Ha medicinal plantation in Jangamarajupalli beat	N 14.711878 E 78.903476	DSO 135 (2018-19)

6	Estimate for the second year maintenance of 20 Ha RS plantation in Ganugapenta beat	N 14.869052 E 79.06488	DSO 61 (2018-19)
Porumamilla range			
7	First year maintenance of 33.97 Ha plantation (SMM) at Itukulapadu beat	N 14.995776 E 78.845607	DSO 77 (2018-19)
8	Second year maintenance of 20 Ha NTSH plantation at Musalabhayi in Balayapalli beat	N 15.088067 E 78.860928	DSO 81 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), pruning of lower branches, fire line management and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Prioritize weeding, especially along plantation boundaries. Focus on controlling Lantana and bushy grasses to reduce competition and support healthy plant growth.
- Regularly clear fire lines, particularly before the dry season. Ensure visibility and effectiveness in preventing and managing forest fires.
- Place plantation boundary stones and boards for accurate demarcation. This facilitates monitoring, prevents encroachments and complements contingency records.
- Keep plantation journals, markers and records updated and accurate. This supports identification, tracking progress and accountability.
- Replant promptly using healthy, bagged seedlings. Helps maintain uniform density, improves survival rates and strengthens plantation health.
- Improve the frequency and timing of pruning operations to promote healthy plant structure and better bole formation.

Mallela beat, Muddanur

Mudireddypalli beat, Onipenta

Jangamarajupalli beat, Badvel

Itukulapadu beat, Porumamilla

3. Monitoring and Evaluation of Protection Activities

During 2018-19, a total of five protection activities were undertaken in Proddatur Forest Division. Out of these, only one activity was selected for monitoring and evaluation. Among the different ranges, Onipenta implemented the highest number of activities, carrying out three in total with one being sampled. Muddanur and Porumamilla ranges each implemented one activity but neither was selected for sampling. No protection activities were reported from the Proddatur and Badvel ranges during this period.

3.1 Creation of new firelines in Ganjikunta beat of Onipenta Range

GPS location: N 14.882701 E 78.726306 **SO no. and year:** RSO 31 (2018-19)

A fire line measuring 3 m in width and 500 rmt in length was created in Ganjikunta beat under the CAMPA-NPV (Forest Fire Management) scheme. Field measurements matched the specifications in the measurement book with no deviations. However, moderate grass and weed growth has reduced its visibility. Regular clearing is recommended to ensure its effectiveness in fire prevention.

Fire lines at Ganjikunta beat

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During 2018-19, a total of five Soil and Moisture Conservation (SMC) activities were implemented in Proddatur Forest Division. All five activities were carried out in the Badvel range and one of them was selected for monitoring and verification. No SMC works were reported from the other ranges, including Proddatur, Muddanur, Onipenta, and Porumamilla during this period.

4.1 Construction of 3 no's saucer pits at Balayapalli beat under water resource management under BDC-SLMSWLS

GPS location: N 14.65101 E 79.986766 **SO no. and year:** DSO 185 (2018-19)

Three saucer pits were constructed at Balayapalli beat, each measuring 3.14 m in length, 4.51 m in width and 0.93 meters in depth. Field measurements confirmed that the dimensions matched the recorded specifications with no deviations. All three pits were found to be in good condition and well maintained. However, to enhance their storage capacity, it is recommended to remove the accumulated dirt and re-plaster the cement lining of the pits.

Saucer pits at Balayapalli beat

5. Monitoring and Evaluation of Construction Activities

During 2018-19, a total of two construction activities were implemented in Proddatur Forest Division. Both activities were carried out in Badvel range and one of them was selected for monitoring and verification. No construction works were reported from the other ranges including Proddatur, Muddanur, Onipenta and Porumamilla during this period.

5.1 Construction of 16 Nos RCC Cairns at Balayapalli beat under BDC-SLMWLS

GPS location: N 14.66148 E 78.990192 **SO no. and year:** DSO 187 (2018-19)

A construction activity involving RCC cairns at Balayapalli beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the RCC Cairns were as follows; Total no of Cairns- 16 with length - 1.20 m, width - 0.45 m and height - 1.20 m. The field verification confirmed that the measurements on site correspond precisely with those recorded in the measurement book, indicating no deviations. A total of 16 R.C.C. cairns have been installed, all of which were found to be intact and effectively serving their intended purpose of demarcating the boundary. These cairns provide consistent and visible boundary markers, supporting effective forest protection and management. However, it was observed that the bases of the cairns are partially covered with soil, and the cement plastering has deteriorated due to weathering over time. Periodic maintenance is recommended to preserve their visibility and structural condition.

RCC Cairns at Balayapalli beat

6. Monitoring and Evaluation of Other Activities

In Proddatur Forest Division, 90 activities were implemented under the "Others" category during 2018–19, with 19 selected for monitoring and evaluation. Among the ranges, Onipenta had the most activities (26, with 5 sampled), followed by Porumamilla (23, 5 sampled), Proddatur (15, 3 sampled), Badvel (14, 3 sampled), and Muddanur (12, 3 sampled). Document verification was conducted in the presence of Division and Range Office staff. Reviewed documents included sanction orders, estimation sheets, and work registers. Sanctioned amounts matched actual expenditures, and financial records were properly maintained and authenticated by relevant officials (DFO, SDO, and FRO). Fund utilization was found to be appropriate and aligned with sanctioned estimates and CAMPA guidelines. Both internal audits (by the Conservator of Forests) and external audits (by the Accountant General's Office) were conducted, ensuring transparency and accountability. However, some discrepancies were observed during verification. In Proddatur range, mismatches were noted for RSO 1 (2018–19) and DSO 34 (2018–19), attributed to typographical errors in the activity list from the Kadapa Division, as acknowledged by Proddatur authorities. A similar discrepancy was found in Onipenta range for DSO 19 (2018–19), also attributed to typographical errors and acknowledged by range staff. Overall, the evaluation reflects sound financial practices and effective oversight, with minor documentation errors promptly identified and addressed.

Key Findings

- Plantation outcomes varied with *Azadirachta indica* establishing well at Itukulapadu, while plantations at Gandlur failed due to submergence.
- Field verification consistently showed that actual perambulated areas were larger than those recorded.
- While maintenance activities were carried out, signage indicating plantation details was often absent.
- Fire lines existed but were overgrown with vegetation, limiting their effectiveness in fire prevention.
- Soil and Moisture Conservation (SMC) structures like saucer pits were well-constructed but needed desilting and plaster repairs.
- RCC cairns used for demarcation were structurally sound and effective, although their visibility had diminished due to weathering.

- Financial and administrative compliance in "Other Works" was largely satisfactory, with only minor record-keeping discrepancies observed.

Recommendations

- Prioritize careful site selection to prevent plantations in flood-prone or submerged areas, ensuring better survival outcomes.
- Strengthen maintenance protocols by mandating proper signage installation and timely updates of plantation records.
- Institutionalize routine clearance of fire lines and regular desilting of Soil and Moisture Conservation (SMC) structures to maintain functionality.
- Schedule periodic upkeep of RCC cairns to sustain their visibility and structural integrity against weathering.
- Enhance documentation practices to eliminate typographical errors and improve financial record accuracy.
- Ensure consistent involvement of Vana Samrakshana Samitis (VSS) in planning and execution to foster community ownership and accountability.
- Reassess the CAMPA work portfolio to allocate greater emphasis on plantation and SMC activities over "other works" for improved ecological impact.

8. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN ANANTHAPURAMU DIVISION

Introduction

Ananthapuramu Forest Division in Andhra Pradesh, spanning 10,184.85 sq.km, has one of the lowest forest covers in the state with only 245.45 sq.km (2.41%) under forest cover. The area lacks any Very Dense Forests, with just 22.55 sq.km of Moderately Dense Forests and 222.90 sq.km of Open Forests, reflecting widespread degradation and fragmentation. Compared to ISFR 2021, the district recorded a net loss of 0.68 sq.km in forest cover. Major challenges include overgrazing, agricultural encroachments, dependence on fuelwood, poor regeneration, and recurrent forest fires though fire alerts dropped from 261 (2022–23) to 138 (2023–24). Vegetation is dominated by drought-tolerant species such as Acacia nilotica, Neem, Prosopis juliflora, and Hardwickia binata, along with shrubs and medicinal plants that sustain fragile ecosystems. Strengthening afforestation, soil and moisture conservation, fire management, and community-driven eco-restoration through programs like CAMPA and NREGA is critical to improving forest health and resilience in this arid region.

In Ananthapuramu division during 2018-19, total across all activities in six ranges is 216, and among these activities 55 is sampled activities. Plantation activities accounted for 12 (4 sampled), mostly concentrated in Kadiri and Gooty. Maintenance was the most common activity with 115 (24 sampled), especially prominent in Kadiri, Ananthapuramu, and Kalyandurga. Protection activities totalled 12 (4 sampled), primarily in Kadiri and Bukkapatanam. SMC-related work amounted to 24 (7 sampled), distributed evenly across all ranges but highest in Penukonda. Construction activities were minimal at 5 (3 sampled), occurring in Kadiri, Gooty, and Kalyandurga. Other activities made up 48 (14 sampled), with Kalyandurga contributing the most.

During 2018-19, Ananthapuramu range carried out a total of 28 activities (7 sampled), primarily focusing on 22 maintenance activities, (5 sampled), with some efforts in SMC 3 activities (1 sampled) and three other activities (1 sampled). In Bukkapatanam range 25 activities were completed (7 sampled), mostly maintenance 17 activities (4 sampled), along with three protection activity (one sampled) and three SMC activity (one sampled), plus a small number of other activities (2 sampled). Kadiri range had the highest activity level with 69 activities (16 sampled), led by 41 maintenance activities, (8 sampled) and 12 other activities (3 sampled), as well as four plantation activities (1 sampled), 8 protection activities (2 sampled), SMC and construction two activities each and one each sampled. In Gooty range 21 activities were reported (6 sampled), mainly maintenance (10 activities, 2 sampled) and plantation (4 activities, one sampled), along with some three SMC (1 sampled), two construction (1 sampled), and two other activities (1 sampled). In Kalyandurga range 58 activities were taken up (15 sampled), heavily featuring with 22 maintenance activities (4 sampled) and 27 other activities (7 sampled), three plantation (1 sampled), protection (1 sampled), SMC (1 sampled), and construction (1 sampled). Penukonda accounted for 15 activities (4 sampled), mostly SMC with 9 activities (1 sampled) and maintenance (1 sampled), with smaller contributions from plantation (1 sampled) and other activities (1 sampled).

1. Monitoring and Evaluation of Plantation Activities

A total of 12 plantation activities were reported, with 4 sampled during 2018-19 in Ananthapuramu division. Plantation activities were carried out in Kadiri range (4 activities, 1 sampled), Gooty range (4, 1 sampled), Kalyandurga range (3, 1 sampled), and Penukonda range (1, 1 sampled). No plantation activities were reported in Ananthapuramu or Bukkapatanam range during 2018-19.

1.1 Penukonda range

During 2018–19, one plantation activity was implemented under the CAMPA scheme in Penukonda range. For monitoring and evaluation, 100 % of this activity, representing the full scope of the plantation, was selected for assessment.

Table 38 Details of plantation selected in Penukonda range

Sl. no.	Plantation	S.O. no and year
1	Advance cum raising of 10 Ha additional, CA plantation near Gollapalli reservior in Guttur RF during 2018-19	DSO 67(A) (2018-19)

The site chosen for the 10-hectare plantation in Gollapalli is characterized by red soil with a hard gravel substrate. These soil conditions may influence the overall growth performance of the planted species.

Survival Percentage: In Gollapalli plantation, Syzygium cumini demonstrated the highest survival rate among the species planted at the site, indicating its suitability for the prevailing environmental conditions. The observed survival rates for the species are as follows: *Sterculia urens*: 81.81 %, *Hardwickia binata*: 85.12 %, *Phyllanthus emblica*: 73.55 %, *Syzygium cumini*: 90.08 %, *Terminalia arjuna*: 79.33 %.

Growth Performance: In the Gollapalli plantation, the average height of the trees ranged from 0.72 to 2.73 meters, while the average collar girth varied between 7.81 and 15.91 cm. Although survival rates were generally high, overall plant growth was suboptimal. This can be attributed to the site's poor soil quality, low rainfall, and the absence of irrigation facilities, which collectively contributed to stunted development.

Table 39 Details of plantation enumerated in Penukonda range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Gollapalli 10 Ha	1	*Sterculia urens*	N14.213714 E 77.605946	81.81	0.72 ±0.42	7.81 ±1.55
		2	*Hardwickia binata*	N 14.21393 E 77.60635	85.12	2.73 ±0.60	13.94 ±2.39
		3	*Phyllanthus emblica*	N 14.21467 E 77.60608	73.55	1.36 ±0.59	13.09 ±3.35
		4	*Syzygium cumini*	N14.2182 E 77.60618	90.08	0.93 ±0.37	13.30 ±4.14
		5	*Terminalia arjuna*	N 14.21500 E 77.60593	79.33	1.39 ±0.64	15.91 ±5.79
Plantation average					**81.98**	**1.43**	**12.81**

1.2 Kadiri range

A total of twenty-three plantation projects were implemented under the CAMPA scheme in Kadiri range during 2018–19. For evaluation purposes, 20 % of these projects, amounting to five plantation sites, were selected for monitoring and evaluation.

Table 40 Details of plantation selected in Kadiri range

Sl. no.	Plantation	SO no. and year
1	Raising of 3 Ha SMM CA plantation near Kokkanti (V) in Kokkanti beat of Tanakal section in Kadiri range under CAMPA-CA scheme	SDSO 10A (2018-19)

The 3-hectare Kokkanti plantation in the Kadiri range was found to be characterized by red sandy soil, which is well-suited for the species planted under the CAMPA scheme. This soil type was consistently observed across all locations, indicating appropriate site selection based on edaphic suitability for afforestation efforts.

Survival Percentage: The Kokkanti 3-hectare plantation exhibited a strong survival percentage of 84.44% for *Pongamia pinnata*, although survival did not necessarily correspond to strong growth performance.

Growth Performance: Growth assessments in the selected plantations provided insights into the health and development of the species. Kokkanti plantation, despite a good survival rate, exhibited limited growth tree heights ranged from 1.27 to 1.70 m and girths from 17.4 to 18.63 cm due to low rainfall, insufficient water availability, and nutrient deficiencies.

Table 41 Details of plantation enumerated in Kadiri range

Sl. no.	Plantation/ Village name	Plot no	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	3 Ha Kadiri Kokkanti RF	1	*Pongamia pinnata*	N13.956378 E 78.278829	83.33	1.70 ±0.48	18.17±3.10
		2	*Pongamia pinnata*	N13.953605 E 78.27873	83.33	1.47 ±0.35	18.63±1.96
		3	*Pongamia pinnata*	N13.956007 E 78.278485	83.33	1.27 ±0.25	17.43±2.05
		4	*Pongamia pinnata*	N13.955913 E 78.278361	86.11	1.44 ±0.36	18.71±2.25
		5	*Pongamia pinnata*	N13.955826 E 78.278327	86.11	1.40 ±0.35	18.29±1.99
Plantation average					**84.44**	**1.46**	**18.25**

1.3 Gooty range

During the assessment period 2018–19, a total of four plantation activities were undertaken under the CAMPA scheme in Gooty range. As part of the monitoring and evaluation protocol, 20 % of the total activities, i.e., one plantation activity, was selected for field-level evaluation.

Table 42 Details of plantation selected in Gooty range

Sl. no.	Plantation	SO no. and year
1	Advance operations cum raising of 4.05 Ha CA plantation in CA land in Mutchukota RF	DSO 66 (2018-19)

The selected Mutchukota plantation site in the Gooty range provides favorable conditions for plant growth, supported by soil types such as red soil, black cotton soil, and clayey loam. Despite low rainfall and the absence of irrigation facilities, the site has demonstrated an exceptionally high seedling survival rate, reflecting the suitability of site selection and plantation practices.

Survival Percentage: The Mutchukota plantation site in the Gooty range was planted with Sterculia urens and *Pongamia pinnata*, both of which showed encouraging results: *Sterculia urens*: 80.99 % survival rate, *Pongamia pinnata*: 86.77 % survival rate. These survival percentages indicate a high success rate under minimal external input conditions.

Growth Performance: At the Gooty plantation site: average tree height ranged from 1.98 to 2.97 meters and average collar girth ranged from 25.04 to 30.92 cm. Variation in height and girth across different plots was observed, which can be attributed to micro-level differences in soil fertility, topography, and exposure to environmental stresses.

Table 43 Details of plantation enumerated in Gooty range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Mutchukota 4.05 Ha	1	*Sterculia urens*	N 14.771182 E 77.87478	80.99	1.98 ±0.36	30.92 ±5.75
		2	*Pongamia pinnata*	N 14.771163 E 77.874943	84.29	1.99 ±0.36	29.80 ±5.40
		3	*Pongamia pinnata*	N 14.769722 E 77.878478	86.77	2.20 ±0.51	26.58 ±3.78
		4	*Sterculia urens*	N 14.769796 E 77.878032	87.60	2.97 ±0.42	25.04 ±4.04
		5	*Sterculia urens*	N 14.769783 E 77.878598	85.12	2.76 ±0.44	27.03 ±3.14
Plantation average					**84.95**	**2.38**	**27.87**

1.4 Kalyandurga range

Under the CAMPA scheme, the Forest Department of Andhra Pradesh undertook fifteen plantation activities in Kalyandurg range during 2018–19. As part of the monitoring and evaluation process, three plantation sites (20 %) were randomly selected for assessment.

Table 44 Details of plantation selected in Kalyandurg range

Sl no.	Plantation	SO no. and year
1	Raising of 30 Ha NTSH plantation in Beluguppa RF (LIM)	DSO 86 (2018-19)

The 30 Ha plantation site in Belugppa is characterized by red soil, and the planted tree species exhibit good survival and growth rates.

Survival percentage: In the 30 Ha plantation in Belugppa, the survival percentages for *Hardwickia binnata*, *Azadirachta indica*, and *Ficus* are 88.83 %, 91.73 %, and 87.60 %, respectively.

Growth: In the 30 Ha plantation in Belugppa, the average tree height ranges from 2.71 to 3.54 m, and the average girth ranges from 25.36 to 35.88 cm.

Table 45 Details of plantation enumerated in Kalyandurg range

Sl. no.	Plantation / Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Beluguppa 30 Ha	1	*Hardwickia binata*	N 14.69042 E 77.078415	88.42	3.10 ±0.53	-	29.82 ±6.07
		2	*Azadirachta indica*	N 14.690674 E 77.078412	92.56	3.54 ±0.61	-	35.88 ±6.39
		3	*Ficus spp*	N 14.690919 E 77.077832	87.60	2.71 ±0.47	-	26.71 ±5.20
		4	*Azadirachta indica*	N 14.691103 E 77.078663	90.90	2.80 ±0.63	-	25.36 ±4.83
		5	*Hardwickia binata*	N 14.690545 E 77.079149	89.25	3.12 ±0.68	27.19 ±5.51	-
Plantation average					**89.75**	**3.05**	**27.19**	**29.44**

Comparative assessment of plantations in Ananthapuramu division during 2018-19

Among the plantations surveyed, the Belugppa plantation of Kalyandurg range exhibited the best overall performance, with *Azadirachta indica* achieving the highest survival rate of 91.73 %, followed by *Hardwickia binata* (88.83 %) and *Ficus* spp. (87.60 %). Trees at this site also showed robust growth, with heights ranging from 2.71 to 3.54 m and collar girths between 25.36 and 35.88 cm, reflecting favorable site conditions.

The Mutchukota plantation of Gooty range also demonstrated encouraging results, with *Pongamia pinnata* and *Sterculia urens* recording survival rates of 86.77 % and 80.99 %, respectively. Growth was comparatively better than Gollapalli and Kokkanti plantations, with tree heights between 1.98 and 2.97 m and girths from 25.04 to 30.92 cm, although variation across plots indicated micro-level differences in soil fertility, topography, and environmental stress.

In contrast, the Gollapalli plantation of Penukonda range and the Kokkanti plantation (3 ha) of Kadiri range showed good survival rates but limited growth. In Gollapalli, *Syzygium cumini* recorded the highest survival (90.08 %), but trees attained only 0.72–2.73 m in height and 7.81–15.91 cm in girth due to poor soils, low rainfall, and absence of irrigation. Similarly, Kokkanti recorded 84.44 % survival for *Pongamia pinnata*, but growth was constrained, with heights of 1.27–1.70 m and girths of 17.4–18.63 cm, primarily due to water scarcity and nutrient deficiencies.

Overall, while survival rates were generally satisfactory across all plantations, site conditions played a major role in influencing tree growth, with Belugppa performing the best in both survival and development, followed by Mutchukota, and Gollapalli and Kokkanti showing suboptimal growth.

Verification of plantation area and boundaries

In Ananthapuramu division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 46 Details of plantation area perambulation in Ananthapuramu division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Advance cum raising of 10 Ha additional CA plantation near Gollapalli reservoir in Guttur RF	10 Ha	7.38 Ha
2	Raising of 3 Ha. SMM CA plantation near Kokkanti (V) in Kokkanti beat of Tanakal section in Kadiri range	3 Ha	6.42 Ha
3	Advance operations cum raising of 4.05 Ha CA plantation in CA land in Mutchukota RF	4.05 Ha	Bit-1 (3.53 Ha) Bit-2 (1.15 Ha) Total = 4.68
4	Raising of 30 Ha NTSH plantation in Beluguppa RF	30 Ha	31.03 Ha

Perambulation of selected NTSH plantations was carried out with the assistance of the local Forest Beat Officer. In these cases, the perambulated area was found to exceed in some plantations and in some shortfall has been noted due to the presence of rocky terrain, trenches, and barren patches within plantation boundaries. Measurements were therefore taken along the outer boundary of these natural obstructions rather than the precise plantation limits. Plantation-wise findings

- Gollapalli Plantation (Penukonda range) (10 Ha): 7.38 Ha (lesser by 2.62 Ha)
- Kokkanti Plantation (Kadiri range) (3 Ha): 6.42 Ha (exceeded by 3.42 Ha)
- Mutchukota plantation Bit-1,2 (Gooty range) (4.05 Ha): 4.68 Ha (exceeded by 0.63 Ha)
- Belguppa Plantation (Kalyandurga range) (30 Ha): 31.03 Ha (exceeded by 1.03 Ha)

Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.

Gollapalli 7.38 Ha

Kokkanti 6.42 Ha

Belguppa 31.03 Ha


Geo tracker of Mutchukota plantation 4.4.68 Ha (Bit-1, 2)

Health Status of Plantations: Field inspections revealed localized signs of insect and pest damage, while the overall plantation health across most sites remains satisfactory, the observed early-stage pest infestations indicate the need for timely pest management interventions and regular surveillance and health assessments. These measures are crucial to prevent the escalation of pest-related damage and to support healthy growth across all plantation sites.

Protection Measures: To mitigate fire and other environmental threats, the following protection mechanisms were found in place; Creation and maintenance of fire lines, Development of inspection paths and Deployment of fire watchers. These proactive efforts have enhanced the plantation's resilience, especially during fire-prone dry seasons.

Biotic Pressure (Human and Cattle Interference): Evidence of grazing and browsing was observed at multiple sites, involving both wild and domestic herbivores. In some plantations, this biotic stress has led to stunted apical growth in seedlings. Strengthen physical barriers (e.g., fencing), enhance community-based vigilance and sensitization and consider rotational grazing agreements where feasible.

Maintenance of Plantation Journals and Records: Plantation journals were generally well-maintained and included relevant baseline information. However: Periodic updates of key plantation parameters (e.g., survival rates, growth metrics and maintenance of records) are recommended to ensure data accuracy and decision-making relevance. Plantation was inspected by concerned forest official and entries of the observations were found. Plantations are inspected by the concerned forest officials, and their observations are duly recorded.

Vana Samrakshan Samithi (VSS): Across plantations evaluated in the Kadiri and Kalyandurga ranges, no involvement of Vana Samrakshan Samithi (VSS) was recorded during plantation establishment or maintenance. This highlights a significant gap in community participation, which is a critical component for the long-term sustainability and protection of forest assets under the CAMPA framework. However, in Gooty and Penukonda ranges VSS involvement was evident.


Gollapalli plantation, Penukonda range **Kokkanti 3 Ha plantation, Kadiri range**

Mutchukota plantation, Gooty range

Belugppa plantation, Kalyandurga range

2. Monitoring and Evaluation of Maintenance Activities

Maintenance was the most widely implemented activity, with 115 activities, of which 24 were completed. Kadiri range led with 41 activities (8 sampled), followed by Ananthapuramu and Kalyandurga range with 22 each (5 and 4 sampled each range respectively). Bukkapatnam rage had 17 activities (4 sampled), Gooty ranged reported 10 activities (2 sampled), and Penukonda range had 3 activities (1 sampled).

Table 47 Maintenance activities of the plantations selected for evaluation

Sl. no.	Maintenance Activities	GPS co-ordinates	SO no. and year
Ananthapuramu range			
1	Second year maintenance of 26 Ha NTSH plantation in Yellutla RF and beat	N 14.636215 E 77.685802	DSO 95 (2018-19)
2	Second year maintenance of 25.92 Ha CA plantation in Ramagiri additional blocks	N 14.281851 E 77.488033	DSO 198 (2018-19)
3	Fourth year maintenance of CA plantation for 22 Ha (27.66) in bit - 2 Chillavaripalli additional block - I in Dadithota beat	N 14.606902 E 77.932582	DSO 152 (2018-19)
4	Fourth year maintenance of CA plantation for 3 Ha (5.695) in bit – 1 Ramagiri additional block - I in Dadithota beat	N 14.610178 E 77.928500	RSO 09 (2018-19)
5	Fourth Year maintenance of CA plantation for 8 Ha (37.65) in bit - 3 Ramagiri additional block - I in Ramagiri west beat	N 14.304105 E 77.450546	RSO 06 (2018-19)
Gooty range			
6	Third year maintenance of 10.51 Ha CA plantations in CA land in Muchukota additional block -20 in Maddipalli beat	N 14.733991 E 77.919364	RSO 02 (2018-19)
7	Fifth year maintenance of 2.74 Ha CA plantation in Maddipalli beat	N 14.772667 E 77.866011	RSO 04 (2018-19)
Penukonda range			
8	Fourth year maintenance of 100 Ha bund plantation at s.no. 669 in Penukonda beat	N 14.138629 E 77.556432	SDSO 22 (2018-19)
Kadiri range			
9	Second year maintenance of 25 Ha (bit-IV) miscellaneous plantation in CA land near Myrada village	N 14.218731 E 78.377433	DSO 134 (2018-19)
10	Third year maintenance of 14.09 Ha bit - 1 of 3.90 Ha (4 Ha) miscellaneous plantation adjacent to Kokkanti RF near Malameedapalli (V) in Kokkanti beat	N 14.029282 E 78.250553	RSO 09 (2018-19)
11	Third year maintenance of 22 Ha Part of 2.50 Ha. bit - 2 miscellaneous plantation in adjacent to Gorivikanuma RF of Peddannavaripalli beat near Gunduvaripalli (V)	N 14.281292 E 78.340517	RSO 13 (2018-19)

12	Third year maintenance of 15 Ha (16.96 Ha) bits - 2 miscellaneous plantation adjacent to Gorivikanuma RF of Talupula beat near Udumulakurthy (V)	N 14.292616 E 78.275277	RSO 30 (2018-19)
13	Third year maintenance of 16.35 Ha (17 Ha) miscellaneous plantation adjacent to Kokkanti RF of Kokkanti beat near Malameedapalli (V)	N 14.021971 E 78.257668	SDSO 25 (2018-19)
14	Fourth year maintenance of 12 Ha. Part of 22 Ha miscellaneous plantation adjacent to Gorivikanuma RF in Peddannavaripalli beat near Gunduvaripalli (V)	N 14.281302 E 78.340601	SDSO 26 (2018-19)
15	Fifth year maintenance of 5 Ha miscellaneous plantation adjacent to Errappakonda RF of Charupalli beat near Reddivaripalli (V)	N14.181647 E 78.055138	RSO 17 (2018-19)
16	Fifth year maintenance of 15 Ha (3-bits) miscellaneous plantation adjacent to Oruvai RF of Kokkanti beat	N 13.946282 E 78.231892	RSO 23 (2018-19)
Kalyandurga range			
17	First year maintenance of 10 Ha NTSH plantation Budikonda RF	N 14.590578 E 77.039794	SDSO 5 (2018-19)
18	First year maintenance of 20 Ha NTSH plantation in Beluguppa RF	N 14.695811 E 77.077262	DSO 88 (2018-19)
19	Third year maintenance of 20 Ha NTSH plantation at Rayadurg RF	N 14.704785 E 76.791177	DSO 160 (2018-19)
20	Third year maintenance of 20 Ha NTSH plantation in Khairevu RF	N 14.451077 E 77.123518	SDSO 18 (2018-19)
Bukkapatnam range			
21	Third-year maintenance of 9.98 Ha (Bit No. 3, 4) CA plantation adjacent to Jonnavulapalli RF in Gunipalli beat	N 14.227377 E 77.91144	RSO 08 (2018-19)
22	Fourth-year maintenance of 7.00 Ha CA land adjacent to Molakavemula RF in Pamudurthi beat	N 14.268479 E 78.015961	RSO 13 (2018-19)
23	Fifth-year maintenance of 22 Ha CA plantation (Bit No. 1, 2, 3) adjacent to Yerlampalli & Narasimpalli RFs in Yerlampalli beat	N 14.203122 E 77.954793	SDSO 31 (2018-19)
24	Fifth-year maintenance of 17.50 Ha CA plantation (Bit No. 8) adjacent to Yerlampalli & Narasimpalli RFs in Yerlampalli beat	N 14.210058 E 77.968519	RSO 15 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. The works undertaken included casualty replacement, circular weeding and soil working, coppice management, pruning of lower branches, fertilizer application, creation and upkeep of fire lines, and other contingency measures. Verification showed that most of these activities had been properly executed in accordance with sanctioned orders. Circular weeding and soil working reduced weed competition and improved aeration, coppice cutting minimized competition from secondary shoots, and pruning promoted healthier plant structure. Fertilizer application was carried out in several plantations, though in some cases the dosage and distribution were not uniform. Fire lines were created or maintained, but at certain locations they required better clearance to remain effective in peak summer. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring.

Note: Although funds were sanctioned by the Range Office for the third-year maintenance activity under RSO-09 (2018–19), seems to be no field-level activities were carried out under this provision.

Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Regular circular weeding and soil working to reduce nutrient competition and enhance plant growth.
- Timely pruning and well-managed coppice cutting are essential to maintain healthy, uniform regrowth and encourage clear bole formation.
- Fire lines must be regularly cleared and maintained, with their scope extended to adjacent revenue lands for broader protection.
- Accurate demarcation through the installation and maintenance of boundary stones and display boards is necessary,
- Engaging local communities in boundary monitoring helps prevent encroachments and promotes accountability.
- Soil and moisture conservation, especially during dry spells, strengthens plant resilience.
- Fertilizer application, such as DAP, should be maintained to support growth.
- Replanting with healthy seedlings in vacant pits and introducing drought-tolerant species in sensitive areas help improve survival rates.
- Pest and termite control measures must be implemented, especially for vulnerable species like *Sterculia urens*.
- Finally, maintaining up-to-date plantation journals, maps, and records is essential for transparent monitoring and effective decision-making.

Maintenance activities in Yellutla beat

Maintenance activities in Dadithota beat

Maddipalli beat of Gooty range

Penukonda beat of Penukonda range

Peddanavaripalli beat of Kadiri range

Yerlampalli beat of Bukkapatnam range

Belguppa beat of Kalyandurg range

Rayadurg beat of Kalyandurg range

3. Monitoring and Evaluation of Protection Activities

A total of 12 protection activities were recorded, with 4 sampled. These were concentrated in Kadiri (8 activities, 2 sampled), Bukkapatanam (3, 1 sampled), and Kalyandurga (1, 1 sampled). Ananthapuramu, Gooty, and Penukonda had no protection-related activities during 2018-19. List of protection activities taken up during 2017-18 in Ananthapuramu division is as follows;

Table 48 Protection activities selected for evaluation in Ananthapuramu division

Sl. no.	Protections activities	GPS Co-ordinates	S.O. no and year
1	Creation of new fire lines in Eswaramala RF in compt. no.8, 16 of Edurudona beat (forest fire management) scheme	N 13.998205 E 78.327356	RSO 46 (2018-19)
2	Creation of new fire lines in Kadiri RF in compt. no.85 of Motukupalli beat (forest fire management) scheme	N 14.103632 E 78.209509	RSO 49 (2018-19)
3	Creation of fire lines in Jambugumpala RF of Kalyandurg range	N 14.246097 E 77.104373	RSO 10 (2018-19)
4	Formation of the new fire lines in Thummalamula RF area in Mudigubba section of Bukkapatnam range	N 14.137795 E 77.937826	RSO 17 (2018-19)

The creation of new fire lines across natural forest areas in the Edurudona and Motukupalli beats of Kadiri Range, Jambugumpala Reserve Forest of Kalyandurg Range, and Thummalamula beat in Mudigubba Section of Bukkapatnam Range was monitored and evaluated against the specifications recorded in the measurement book and verified through actual field measurements. In Edurudona beat, the fire line was constructed with a width of 10 meters and a length of 2,000 meters, while in both the Motukupalli and Thummalamula beats, fire lines were created with the same width of 10 meters and a length of 1,000 meters each. In Jambugumpala RF, the fire line measured 6 meters in width and 3,000 meters in length. The

field measurements matched the specifications recorded in the measurement book, indicating no deviations. The visibility of the fire lines was clear, as they were aligned along inspection paths, ensuring ease of monitoring. Additionally, no dense grass or weed growth was observed, suggesting that the fire lines are well-maintained throughout the respective forest areas.

Edurudona beat, Kadiri Range

Motukupalli beat, Kadiri range

Thummalamula, Bukkapatnam range

Jambugumpala, Kalyandurga range

4. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

Twenty-four SMC activities were carried out during 2018-19, of which 6 sampled. Penukonda led with 9 activities (1 sampled), followed by Kalyandurga (4, 1 sampled), Ananthapuramu, Bukkapatnam, and Gooty each with 3 (1 sampled each), and Kadiri with 2 (1 sampled).

Table 49 SMC activities selected for evaluation in Ananthapuramu division

Sl. no.	SMC activities	GPS Co-ordinates	SO. no and year
1	Construction of three gully checks (rock fill dams) in the CA land of Kondapalli additional block Atmakur section	N 14.49660 E 77.395341	RSO 20 (2018-19)
2	Construction of new percolation tank at Maddi Chetla Vank in Sy. no. 669 in Kogira block of Penukonda range	N 14.138204 E 77.563782	DSO 306 (2018-19)
3	Digging of CCT in the CA land offered by M/s Sree Vishnu Mines & Minerals adjacent to Muchukota RF of Gooty range	N 14.772889 E 77.866012	DSO 145 (2018-19)
4	Construction of platform (no. 01) for tank in Bondanakal field nursery of Rayadurg beat of Kalyandurg range	N 14.751018 E 76.847597	RSO 30 (2018-19)
5	Construction of new cement check dam at Gorivikanuma RF in Talupula beat of Kurli section in Kadiri range	N 14.277516 E 78.269282	DSO 272 (2018-19)
6	Construction of percolation tank no 1 in CA land in Thummalamala RF area in Nallamada beat Mudigubba section of Bukkapatnam range	N 14.164619 E 77.980121	SDSO 64 (2018-19)

Three Gully Checks (Rock Fill Dams) in Kondapalli Additional Block was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the rock filled dams were: length – 9 m, width – 2.05 m, and depth – 1.00 m with volume of 55.35 m^3. Total number of Rock Fill Dams and their cumulative volume exceed the figures recorded in official records. The field measurements matched those in the measurement book, indicating no deviations. The gully check structure (rock-fill dam) is well maintained, and its measurements align with the recorded specifications. It demonstrates good water storage capacity during the monsoon season. However, regular de-siltation is recommended to enhance its storage capacity, improve water infiltration, and maintain soil moisture levels effectively.

Gully checks (rock fill dams) in the CA land of Kondapalli beat

A single platform constructed for the nursery water tanks in Rayadurga Beat, Kalyandurg Range was inspected and found to be well-maintained. Platform for tank was constructed using cement R.R masonry with a dimension; length: 8 m, breadth: 0.6 m and depth: 1.6 m (All-round above ground level); Length: 8 m, Breadth: 0.6 m and Depth: 0.3 m (All-round below ground level); Overall concrete structure dimension Length: 2.6 m, Breadth: 1.8 m. The structure is functioning as intended, supporting the irrigation infrastructure of the nursery by maintaining water pressure and distribution efficiency. No structural defects or deviations were observed at the time of inspection.

Platform for tank in Bondanakal field nursery of Rayadurg beat of Kalyandurg range

Percolation tanks located at Maddi Chetla Vank in Survey No. 669 of Kogira Block, Penukonda Range, and in the Thummalamala Reserve Forest area, Nallamada Beat, Mudigubba Section of Bukkapatnam Range, were inspected and evaluated against the specifications recorded in the measurement book. Tank Dimensions in Penukonda Range (Maddi Chetla Vank); length: 40 m, width: 3 m, depth: 1 m and volume: 120 cum and in Bukkapatnam Range (Thummalamala RF); length: 23 m, width: 6 m, depth: 1.65 m and net volume: 227.70 cum. The field

measurements for both locations were found to be consistent with the entries in the measurement book, confirming that the construction was carried out as per approved specifications, with no deviations observed. All three tanks are currently in good condition and demonstrate effective water retention during the monsoon season. However, due to their location in low-lying areas, there is noticeable silt accumulation, which may reduce storage capacity over time. Additionally, stone dry packing along the tank edges shows signs of distortion, likely caused by surface runoff or prolonged water exposure.

Maddi Chetla Vank, Kogira block

Thummalamala RF, Nallamada beat

A total of 513 Continuous Contour Trenches (CCTs) excavated in Muchukota Reserve Forest were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The standard dimensions of the trenches are: length: 10 m, Width: 0.50 m, depth: 0.50 m and total volume: 1,283 cum. The field measurements were found to be in full agreement with the recorded specifications, indicating no deviations from the approved design. A minor reduction in depth was observed in some of the lower-lying trenches, primarily due to the accumulation of silt and stony gravels. However, this reduction is negligible and does not significantly impact the overall functionality of the structures.

Continuous contour trenches in the CA land adjacent in Muchukota RF

A newly constructed cement check dam located in Gorivikanuma Reserve Forest, Talupula Beat, was monitored and evaluated with reference to the specifications recorded in the measurement book and actual field measurements. The recorded dimensions of the structure are: Length: 15 m, Width: 1.5 m and Depth: 1.0 m. Field measurements accurately matched the specifications noted in the measurement book, indicating no deviations from the approved design. The structure is currently well maintained and functions effectively. However, the total water holding capacity of the check dam has been reduced due to silt and sediment accumulation. Additionally, minor damage was observed on the apron, requiring repair.

Seepage of water was also noted from both the body wall and the core wall, suggesting the need for structural repairs to these components to prevent further deterioration.

New cement check dam at Gorivikanuma RF in Talupula beat of Kurli section, Kadiri

5. Monitoring and Evaluation of Construction Activities

A total of 5 construction activities were reported, with 3 sampled. These occurred in Kadiri (2 activities, 1 sampled), Gooty (2, 1 sampled), and Kalyandurga (1, sampled). No construction activities were recorded in Ananthapuramu, Bukkapatanam, or Penukonda.

Table 50 Construction activities selected for evaluation in Ananthapuramu division

Sl. no.	Construction activities	GPS Co-ordinates	S.O. no and year
1	Construction of 53 no's RCC boundary pillars around the CA Land of 14 Ha (16.281 Ha) in Kurli beat of Kurli section	N 14.227368 E 78.13105	DSO 243 (2018-19)
2	RCC boundary pillars along the A.P. Transco boundary line in Kalyandurg south RF in Kalyandurg beat of Kalyandurg range	N 14.560089 E 77.104222	SDSO 58 (2018-19)
3	Construction of 21 no's RCC boundary pillars around the CA Land of (M/s Veeraraju) in Muchukota additional block - 21 near Madugupalli village Maddipalli beat Muchukota section	N 14.72667 E 77.90528	DSO 244 (2018-19)

Construction of 53 boundary pillars in Kurli beat of Kurli section of Kadiri range, 16 RCC boundary pillars in Kalyandurg south RF in Kalyandurg beat of Kalyandurg range and 21 RCC boundary pillars in Muchukota additional block - 21 area was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The above-ground dimensions of the RCC boundary pillars at both locations were: height – 1.20 m, top width – 0.30 m, and bottom width – 0.45 m. The field measurements matched those in the measurement book, indicating no deviations. All boundary pillars constructed were found intact and effectively demarcating the boundaries between the reserve forest and revenue land.

A.P. Transco boundary line in Kalyandurg range

Muchukota additional block – 21

Kurli beat of Kurli section, Kadiri range

6. Monitoring and Evaluation of Other Activities

During 2018–19, the Ananthapuramu Division implemented 48 activities categorized as "other activities" under the CAMPA scheme, of which 15 activities (20%) were sampled for detailed monitoring and evaluation. Kalyandurga Range had the highest number with 27 activities (7 sampled), followed by Kadiri Range with 12 activities (3 sampled), while Ananthapuramu, Bukkapatnam, Gooty, and Penukonda reported 2–3 activities each, with 1–2 sampled. Internal and external audits were conducted by the Conservator of Forests and the Auditor General, respectively. Document verification at the Division and Range Offices confirmed that sanctioned amounts generally matched recorded expenditures. Evaluation of the sampled activities revealed that sanctioned amounts were in alignment with actual expenditures, financial records were properly maintained and authenticated by the concerned officials (DFO, SDO, and FRO), and fund utilization was appropriate and consistent with approved estimates and guidelines.

Key Findings

1. Plantations showed contrasting performance: Beluguppa was excellent, Mutchukota encouraging, while Gollapalli and Kokkanti were weak in growth.
2. Maintenance was widespread and largely effective, but inconsistencies in fertilizer use, fire line upkeep, and plantation demarcation reduced impact.
3. Protection measures were technically sound but limited in scope.
4. SMC coverage was broader than in earlier years but threatened by siltation and seepage.
5. Boundary pillars were well executed, strengthening forest demarcation.
6. Financial and technical accountability was robust, though area mismatches persisted.
7. Community participation was partial and inconsistent, weakening sustainability.

Recommendations

1. Consolidate plantations in high-performing sites (Beluguppa, Mutchukota), and avoid unsuitable soils like Gollapalli without irrigation support.
2. Extend maintenance cycles division-wide, with stricter attention to fertilizer, fire lines, and display boards.
3. Expand protection measures, including fencing and wider fire line coverage.
4. Introduce systematic desilting and repair schedules for all SMC structures.
5. Enforce GIS-based verification to reconcile records with field realities.
6. Mandate structured VSS involvement and FGDs across all ranges to foster community participation.

9. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN GIDDALUR DIVISION

Introduction

Giddalur Forest Division, located in southern Prakasam district of Andhra Pradesh, is part of the Eastern Ghats and is classified as Southern Tropical Dry Deciduous Forests. It spans approximately 1,944.51 sq.km, covering around 18.68% of the division's total area. The region experiences a dry, hot climate with temperatures ranging from 19°C to 38°C and receives about 871 mm of rainfall annually. The terrain is undulating, with rocky outcrops and soils composed mainly of sandstone, quartzite, and shale. Forest types include dense, open, and scrub forests, with vegetation adapted to drought through leaf shedding and deep roots. Key tree species include *Wrightia tinctoria*, *Albizia amara*, *Anogeissus latifolia*, *Acacia chundra*, and *Dalbergia paniculata*. The division holds a significant biomass volume of around 7.02 million cubic meters. Timber-rich species like *Terminalia tomentosa*, *Pterocarpus marsupium*, and *Hardwickia binata* contribute to this stock. The understorey includes *Ziziphus*, *Lantana*, *Cassia*, and seasonal grasses that support both wildlife and livestock. Giddalur's forests act as biodiversity buffers and carbon sinks. They also provide NTFPs such as gums, medicinal plants, and fodder to local communities. However, deforestation, overgrazing, and encroachment threaten ecological stability. Conservation and sustainable management are crucial. These forests have ecological and socio-economic value.

During the period 2018-19, a total of 79 CAMPA activities were undertaken in Giddalur Forest Division, of which 16 activities approximately 20 % were selected for detailed monitoring and evaluation. Among three ranges, Turimella reported the highest number of activities with 39, out of which 7 were sampled for evaluation. This was followed by Giddalur and Gundlakamma ranges each implementing 20 activities. In Giddalur, 4 activities were sampled while in Gundlakamma, 5 activities were selected. Among activity types, other works dominated the implementation with 62 activities, of which 12 were sampled, followed by protection (8; 1 sampled), SMC (7; 2 sampled) and plantation (2;1 sampled). No maintenance/construction activities were implemented.

1. Monitoring and Evaluation of Plantation Activities

During 2018-19, Giddalur division carried out a total of 2 plantation activities under CAMPA, with 1 activity (about 50 %) was selected for monitoring and evaluation. Among the ranges, Giddalur reported the highest with 2 activities (1 sampled). No plantation activities were reported from Gundlakamma and Turimella ranges during this period.

1.1 Giddalur range

During 2018–19, a total of two plantation activities were implemented under the CAMPA scheme in Giddalur range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 51 Details of plantation selected in Giddalur range

Sl. no.	Plantation	SO no. and year
1	Advance operations cum raising of 15 Ha ANR plantation of Uyyalawada VSS	DSO 367 (2018-19)

The plantation follows the ANR (Assisted Natural Regeneration) gap plantation model, where degraded natural forest areas are improved by supporting natural regeneration and planting trees in open or degraded patches. This method helps restore forest cover by combining natural growth with targeted planting. A total of 150 trees were planted per hectare under this approach. A 15-hectare plantation site at Uyyalawada was selected for implementation, characterized by sandy loamy soil that provides favourable conditions for the growth of planted species. The site exhibits good soil texture and drainage which are essential for healthy root development and moisture retention. These conditions significantly support the successful establishment and growth of the plantation making it well-suited for ecological restoration efforts.

Survival Percentage: In Giddalur range, Uyyalawada ANR (Assisted Natural Regeneration) plantation has demonstrated strong suitability for *Hardwickia binata* with a maximum survival rate of 100 % recorded in plot 4. The survival rate across other plots ranges from 73.3% to 93.33% indicating generally high survivability of the species in this area. However, despite these encouraging survival figures, the overall growth performance of the plants remains stunted across all plots suggesting potential limitations in site conditions or other ecological factors affecting growth.

Growth Performance: Despite high survival rates, growth remained stunted in all plots. Average recorded height ranged from 2.95 m to 3.10 m with collar girth between 22.21 cm and 23.80 cm. Naturally regenerated species outperformed the planted specimens in growth.

Table 52 Details of plantation enumerated in Giddalur range

Sl. no.	Plantation/ village name	Plot no.	Species Name	GPS Coordinate	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Uyyal awada 15 Ha ANR plantation	1	*Hardwickia binata*	N 15.207227 E 78.853536	93.33	3.04± 0.31	22.21± 2.19
		2	*Hardwickia binata*	N 15.207305 E 78.853195	86.66	3.08± 0.47	23.38± 2.33
		3	*Hardwickia binata*	N 15.208325 E 78.853542	93.33	3.04± 0.13	22.64± 2.27
		4	*Hardwickia binata*	N 15.20852 E 78.855123	100.00	3.10± 0.21	23.80± 2.65
		5	*Hardwickia binata*	N 15.209502 E 78.854644	73.33	2.95± 0.15	22.55± 2.21
Plantation average					**89.33**	**3.04**	**22.91**

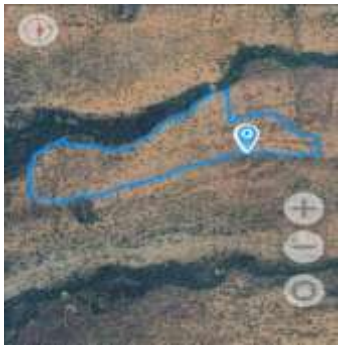
Verification of plantation area and boundaries

In Giddalur division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 53 Details of plantation area perambulation in Giddalur range

Sl no.	Plantation	Area as per records	Area as per field perambulation
1	Advance operations cum raising of 15 Ha ANR plantation of Uyyalawada VSS	15 Ha	17.57 Ha

The Perambulation was done in presence of forest officer and as per the demarcation shown by the watcher/guard working as in-charge of the plantation. It was observed that the perambulated area exceeded the originally recorded extent due to the inclusion of rocky terrain, trenches, and barren patches within the plantation boundary. The perambulation, conducted along the outer boundary rather than the precise plantation lines, measured a total area of 17.57 hectares. Subsequent spatial analysis using QGIS software confirmed that the perambulated area exceeds the recorded plantation area by 2.57 hectares. This discrepancy was further validated using GPS tracking through the Geo Tracker application, in coordination with the Forest Beat Officer. Relevant images and geospatial data from the field verification support these findings.



Uyyalawada 17.57 Ha

Health status of plantation: The overall health status of plantation in Uyyalawada was found to be satisfactory. There were no observed incidences of insect or pest damage affecting any of the planted species. All plants appeared healthy showing no visible signs of infestation or physiological stress which indicates that the sites were well-maintained and provided a favourable environment for healthy and sustained plant growth.

Protection Measures: To safeguard plantations from fire and other environmental threats, several protection measures were implemented, including the creation and maintenance of fire lines, development of inspection paths, and deployment of fire watchers. These measures have proven generally adequate in reducing plantation vulnerability, particularly during the dry season. However, ongoing maintenance and clear visibility of these features are essential to ensure their continued effectiveness.

Biotic (human/cattle) Pressure on Plantation: Very few incidents of grazing and browsing pressure were observed in the plantation areas, primarily due to the entry of cattle from nearby villages. However, this pressure has been partially mitigated through the creation of peripheral trenches and the deployment of plantation watchers to monitor and protect the sites. Despite these efforts, the presence of grazing activity highlights the continued need for stronger physical protection measures such as the installation of protective barriers (e.g., fencing) and greater community sensitization. Engaging local communities and raising awareness about the importance of plantation protection will be crucial to ensuring sustainable plantation development.

Maintenance of Plantation Journals and Records: Plantation journals and records are generally well-maintained with baseline information properly documented. However, there is a need for regular and timely updates of key plantation parameters such as survival rates, growth metrics and maintenance activities to ensure that the records accurately reflect current field

conditions and remain relevant for monitoring and evaluation purposes. Plantation is inspected by concerned forest official and entered the observations.

Vana Samrakshan Samithi (VSS): The involvement of Vana Samrakshan Samithi (VSS) or Joint Forest Management Committee (JFMC) was evident in Uyyalawada plantation located in Giddalur range among the selected plantation sites. Their participation reflects the integration of community-based forest management practices contributing to the protection, maintenance and monitoring of the plantation and supporting the overall objectives of sustainable forest regeneration.

Uyyalawada plantation

1. Monitoring and Evaluation of Protection Activities

During the period 2018-19, a total of 8 protection activities were undertaken in Giddalur division, of which 1 was sampled for detailed monitoring and evaluation. Of these, 3 activities were reported in Gundlakamma range with 1 sampled. Another 3 activities were reported in Turimella range with none sampled and 2 activities were reported in Giddalur none sampling.

1.1 Creation of new fire lines in Iskagundam beat of Gundlakamma range

GPS locations: Stretch 1: (5000 m) Perikalapenta to Gumudu N 15.611534 E 78.812403

Stretch 2: (5400 m) Maddalaravu to Kanamamilla N 15.609533 E: 78.815755

SO no. and year: DSO 200 (2018-19)

A fire line was created and maintained in Iskagundam beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of fire line are: width - 3 m and length - 10400 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was clear with burnt litter and exposed basal stumps of trees. Fire line is well maintained with no growth of dense grass/ weeds.

1.2 Creation of new fire-lines at Bodi beat through Devanagaram VSS of Giddalur

GPS Co-ordinates: **SO no. and year:** RSO 3 (2018-19)

Stretch 1 (4000 m): Parameswar Rasta to Ontibodu N 15.242273 E 78.818543.
Stretch 2 (4000 m): Swamy Cheruvu to Bodswarudu N 15.238362 E 78.848426

A fire line was created and maintained in Bodi beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of fire line are: width -

3 m and length - 8000 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was clear with burnt litter and tree stumps. No dense grass or weed growth was observed indicating that the fire line has been well-maintained.

Fire line at Iskagudem beat

Fire line at Bodi beat

3. Monitoring and Evaluation of Soil and Moisture Conservation

During the period 2018-19, a total of 7 SMC activities were carried out in Giddalur division, with 2 were selected for sampling. The Gundlakamma range reported 4 activities (1 sampled), while Turimella range reported 3 activities (1 sampled). No SMC works were reported in Giddalur range during this period.

3.1 Maintenance of existing saucer pits in Malakondapenta section (construction of 23 no's saucer pits) of Gundlakamma range

GPS location: N 15.492379 E 78.818852 **SO no. and year:** DSO 110 (2018-19)

3.2 Development and maintenance of saucer pits (construction of 14 no's saucer pits) in Papinenipalli beat and section of Turimella range through Ankabhupalem VSS

GPS location: N 15.717684 E 78.852489 **SO no. and year:** DSO 125 (2018-19)

Saucer pits constructed in both Malakondapenta section and Papinenipalli beat were monitored and evaluated against the specifications recorded in the measurement book and actual field measurements. In Malakondapenta section, 23 saucer pits with dimensions of 2 meters in diameter and 0.5 meters in depth were inspected. In Papinenipalli beat, 14 saucer pits measuring 6 meters in diameter and 0.5 meters in depth were evaluated. In both cases, the field measurements matched those recorded in the measurement book, indicating no deviations. All pits were found to be in good condition and well maintained. However, to further enhance their water storage capacity and durability, removal of accumulated silt and re-plaster cracks.

Saucer pits in Malakondapenta

Saucer pits in Papinenipalli beat

4. Monitoring and Evaluation of Other Activities

In the Giddalur Forest Division, a total of 62 activities were implemented under the "Others" category during 2018–19, with 12 activities selected for detailed verification. Turimella range recorded the highest number of activities with 33 (6 sampled), followed by Giddalur with 16 (3 sampled), and Gundlakamma with 13 (3 sampled). Document verification and cross-checking were conducted in the presence of Division and Range Office staff. The types of documents reviewed included sanction orders, estimation sheets, and work registers. Sanctioned amounts were found to be consistent with actual expenditures. All financial records were properly maintained and authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization adhered to approved estimates and CAMPA guidelines. Both internal audits (by the Conservator of Forests) and external audits (by the Accountant General's Office) were conducted. This multi-layered verification approach ensured transparency, accountability, and compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- Plantation survival rates were high, but growth remained poor, primarily due to suboptimal site conditions.
- Persistent area mismatches highlighted the need for GIS-based reconciliation and improved spatial accuracy.
- Fire lines were found to be functional and well maintained, contributing effectively to fire prevention efforts.
- Soil and Moisture Conservation (SMC) structures were structurally intact but required regular upkeep to maintain their effectiveness.

Recommendations

- Conduct thorough site suitability analysis prior to plantation to ensure optimal survival and growth conditions.
- Reconcile discrepancies in plantation areas using GIS-based mapping for accurate documentation and monitoring.
- Improve plantation growth by integrating targeted soil and moisture conservation interventions.
- Maintain regular fire line clearance and strengthen the upkeep of SMC structures to ensure long-term functionality.
- Involve VSS/JFMCs to ensure long-term sustainability.

10. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KURNOOL DIVISION

Introduction

Kurnool division in western Andhra Pradesh covers approximately 12,904 sq.km, of which only 1,202.55 sq.km (9.58%) is officially designated as forest area. However, actual forest cover is much lower, with only 75.98 sq.km (0.39%) classified as forest based on remote sensing data. This includes 5.18 sq.km of moderately dense forest and 70.80 sq.km of open forest. About 767.27 sq.km is scrubland indicating widespread degradation. The division falls under the Tropical Dry Deciduous and Tropical Thorn Forest types per Champion and Seth's classification. These forests are adapted to Kurnool's hot, dry climate with summer temperatures above 45°C and an average annual rainfall of 523 mm. Dominant tree species include *Anogeissus latifolia*, *Albizia amara*, *Hardwickia binata*, *Lannea coromandelica*, *Chloroxylon swietenia*, and *Terminalia* spp. *Pterocarpus santalinus* (Red Sanders) an endemic and valuable species is found in limited hill areas but is threatened by illegal harvesting. The shrub layer includes hardy and invasive species like *Ziziphus*, *Lantana camara*, *Carissa carandas* and *Acacia* spp. Ground cover is sparse due to poor soil and overgrazing. Notable endemic species include *Syzygium alternifolium*, *Terminalia pallida* and *Cycas beddomei*. These species survive mainly in undisturbed hill patches. Habitat fragmentation, encroachment and resource extraction continue to threaten biodiversity. Community participation is promoted through 281 Vana Samrakshana Samitis managing 628.35 sq.km of forest. These committees support afforestation, fire control, and biodiversity conservation. Despite these efforts, forest health remains fragile due to low canopy density and human pressures.

During the period 2018-19, a total of 65 CAMPA activities were implemented in Kurnool Forest Division, of which 16 activities around 24% were selected for detailed monitoring and evaluation. Among the three forest ranges, Adoni reported the highest number of activities, with 25 implemented and 5 selected for sampling. This was followed by both Kurnool and Dhone ranges, each reporting 20 activities. From these, 5 activities were sampled in Kurnool and 6 in Dhone. Among activity types, other works dominated with 40 activities (9 sampled), followed by maintenance (18; 5 sampled), plantations (7; 2 sampled). No protection, SMC and construction activities were implemented during this period.

1. Monitoring and Evaluation of Plantation Activities

During the period 2018-19, a total of 7 plantation activities were carried out under CAMPA in Kurnool division, of which 2 activities (about 28 %) were selected for monitoring and evaluation. Among the ranges, Adoni reported the highest with 5 activities (1 sampled), followed by Kurnool with 1 activity (1 sampled) and Dhone with 1 activity (not sampled).

1.1 Adoni range

During 2018–19, a total of five plantation activities were implemented under the CAMPA scheme in the Adoni Range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was selected randomly for assessment.

Table 54 Details of plantation selected in Adoni range

Sl. no.	Plantation	SO no. and year
1	Advance operations cum raising of 6.60 Ha SMM plantation at Tungabhadra RF of Tungabhadra beat of Adoni section	DSO 61 (2018-19)

The selected plantation site is characterized by flat land with red soil and lies within the same biome, favouring drought-tolerant species.

Survival Percentage: At Tungabhadra plantation, *Pongamia pinnata* exhibited the highest survival rate at 87.26%, suggesting excellent adaptability to the local environment. *Sterculia urens* (81.93%) and *Dolichandrone crispa* (81.81%) also showed favourable survival rates, though *Pongamia pinnata* appears to have a slight edge in terms of resilience and growth consistency.

Growth Performance: At Tungabhadra site, tree height ranged from 2.05 to 3.13 m and girth from 23.88 to 27.04 cm. Growth variability here is likely influenced by similar factors such as soil characteristics, water distribution, species adaptability and local microclimatic conditions.

Table 55 Details of plantation enumerated in Adoni range

Sl. no.	Planation / Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Thungabhadra 6.60 Ha SMM plantation	1	*Sterculia urens*	N 15.924532 E 77.292763	86.36	2.25 ±0.52	26.49 ±6.60
			Pongamia pinnata		90.9	2.45 ± 0.43	26.60 ±6.68
		2	*Sterculia urens*	N 15.924713 E 77.292756	78.78	2.49 ±0.56	24.35 ±4.21
			Pongamia pinnata		89.09	2.50 ±0.48	26.22 ±5.97
		3	*Sterculia urens*	N 15.925024 E 77.292679	83.33	2.56 ±0.68	25.85 ±4.36
			Pongamia pinnata		81.81	3.13 ±0.47	27.04 ±5.85
		4	*Sterculia urens*	N 15.925068 E 77.292669	76.36	2.05 ±0.57	24.14 ±5.69
			Dolichandrone crispa		81.81	2.51 ±0.62	24.78 ±4.56
		5	*Sterculia urens*	N 15.925316 E 77.292273	84.84	2.73 ±0.48	23.88 ±5.28
			Dolichandrone crispa		81.81	2.59 ±0.58	25.51 ±4.89
Plantation average					**83.50**	**2.52**	**25.48**

1.2 Kurnool range

During 2018–19, a total of 1 plantation activity was implemented under CAMPA scheme in Kurnool Range. In this monitoring and evaluation process, 100 % of the activity, equivalent to one plantation site, was selected for assessment.

Table 56 Details of plantation selected in Kurnool range

Sl. no.	Plantation	SO no. and year
1	Raising of 1 Ha plantation safety zone around the M/s Subbamma mines & minerals in emboy RF of Ramallakota beat of Kurnool section	RSO 05 (2018-19)

1 Ha linear plantation at Ramallakota was strategically established around a mining zone to combat environmental pollution, suppress dust and stabilize soil and aid in ecosystem restoration. The location was chosen based on its ecological sensitivity and the need for reclamation.

Survival Percentage: Tree survival was assessed through sampling plots at 200 m intervals across the plantation stretch. The survival rate was recorded at 77.27 % indicating that a substantial proportion of the saplings have successfully established. However, continued maintenance and monitoring are essential to improve long-term survivability particularly in addressing soil quality, moisture availability, and pest-related concerns.

Growth Performance: The plantation exhibited an average tree height of 1.12 m and an average girth of 9.98 cm. Observed variability in growth can be attributed to factors such as species characteristics, local soil fertility, access to water and environmental stressors.

Table 57 Details of plantation enumerated in Kurnool range

Sl. no.	Plantation/ village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Ramallakota	1	*Pongamia pinnata*	N 15.554332 E 78.012873	77.27	1.12 ±0.76	9.98 ±2.11

Comparative assessment of plantations in Kurnool division during 2018-19

Adoni range showed strong plantation success with *Pongamia pinnata* achieving the highest survival rate (87.26%) and good growth (height: 2.05-3.13 m, girth: 23.88-27.04 cm). Other species like *Sterculia urens* and *Dolichandrone crispa* also performed well. In contrast, the Kurnool range had a moderate survival rate (77.27%) but showed poor growth (height: 1.12 m, girth: 9.98 cm), likely due to soil and water limitations. Overall, Adoni outperformed Kurnool in both survival and growth.

Verification of plantation area and boundaries

In Kurnool division during 2018-19, measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 58 Details of plantation area perambulation in Kurnool division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Advance operations cum raising of 6.60 Ha SMM plantation at Tungabhadra RF of Tungabhadra beat	6.60 Ha	10.14 Ha

2	Raising of 1 Ha plantation safety zone around the M/s Subbamma mines and minerals in emboy RF in of Ramallakota beat of Kurnool section	1 Ha	1.11 Ha

Perambulation of the plantation area was carried out in the presence of the designated Forest Officer and based on the demarcation indicated by the watcher/guard responsible for each site. During the verification process, it was observed that the perambulated area for Tungabhadra and Ramallakota plantations exceeded the officially recorded extent. This variance is primarily attributed to the inclusion of rocky terrain, trenches and barren patches within the plantation boundaries areas that were not accounted for in the original documentation. The actual extent of each plantation was measured using QGIS software, which confirmed the following deviations from the recorded area:

- 6.60 Ha Tungabhadra plantation (Adoni): Exceeded by 3.54 Ha
- 1 Ha Ramallakota plantation (Kurnool): Exceeded by 0.11 Ha

The verification was conducted through physical perambulation using the Geo Tracker mobile application, which facilitated the collection of geotagged photographs and GPS coordinates for accurate documentation. The visual and spatial records are provided below for reference.

Tungabhadra 10.14 Ha

Ramallakota 1.11 Ha

Health Status of Plantation: The overall health status of plantation in both Tungabhadra and Ramallakota were found to be satisfactory. There were no observed incidences of insect or pest damage affecting any of the planted species. All plants appeared healthy showing no visible signs of infestation or physiological stress which indicates that the sites were well-maintained and provided a favourable environment for healthy and sustained plant growth.

Protection Measures: To safeguard plantations from fire and other environmental threats, several protection measures were implemented, including the creation and maintenance of fire lines, development of inspection paths, and deployment of fire watchers. These measures have proven generally adequate in reducing plantation vulnerability, particularly during the dry season. However, ongoing maintenance and clear visibility of these features are essential to ensure their continued effectiveness.

Biotic (human/cattle) Pressure on Plantation: During the field verification, no incidents of grazing or browsing pressure were observed in Tungabhadra plantation area. However, evidence of biotic pressure primarily from cattle grazing and browsing was noted in Ramallakota plantation area. This indicates localized human or livestock interference that may

require monitoring and mitigation to ensure the sustained health and regeneration of the plantation.

Maintenance of Plantation Journals and Records: During the field visit, it was observed that plantation journals and records are not being properly maintained and baseline information has not been adequately documented. The beat officer was unable to produce the plantation journals for both Tungabhadra and Ramallakota plantation areas at the time of inspection. There is a clear need for regular and timely updates of key plantation parameters including survival rates, growth metrics and maintenance activities to ensure that records accurately reflect current field conditions. Well-maintained documentation is essential for effective monitoring, evaluation and transparency in plantation management.

Vana Samrakshan Samithi (VSS): The involvement of Vana Samrakshan Samithi (VSS) or Joint Forest Management Committee (JFMC) was evident in both Tungabhadra and Ramallakota plantation located within Adoni and Kurnool range respectively. Their participation reflects the integration of community-based forest management practices contributing to the protection, maintenance and monitoring of the plantation and supporting the overall objectives of sustainable forest regeneration.

Tungabhadra plantation

Ramallakota plantation

2. Monitoring and Evaluation of Maintenance Activities

During the period 2018-19, a total of 18 maintenance activities were carried out in Kurnool division, of which 5 activities were selected for monitoring. Dhone and Adoni had equal number of activities of 9 for each, with 3 and 2 sampled respectively. No maintenance activities were reported from the Kurnool range during this period.

Table 59 Maintenance activities selected for evaluation in Kurnool division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Dhone range			
1	First year maintenance of 25 Ha SMM plantation in Malyala beat Dhone range	N 15.322859 E 77.758895	DSO 26 (2018-19)
2	Fifth year maintenance of Nereducherla block plantation (2.66 Ha) Banaganapalli	N 15.206158 E 77.892944	RSO 04 (2018-19)
3	Fifth year maintenance of safety zone plantation (2 Ha) (safety zone plantation with 7.50 mts wide around the mine lease area	N 15.339987 E 77.960906	RSO 09 (2018-19)
Adoni range			
4	Second year maintenance of 10 Ha plantation in Tuggali beat Pathikonda section	N 15.750776 E 77.222026	DSO 47 (2018-19)

5	Third year maintenance of 20 Ha plantation at Devarathippa locality in Gundlakonda beat	N 15.750776 E 77.222026	DSO 51 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), coppice management, pruning of lower branches, fire line management and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control *Lantana* and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments and complement contingency records.
- Maintain accurate and updated plantation journals, markers and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.
- Improve the frequency and timing of pruning operations to promote healthy plant structure and better bole formation.

Malyala beat, Dhone range

Tuggali beat, Adoni range

3. Monitoring and Evaluation of Other Activities

During 2018-19, under the "Others" category of the CAMPA scheme, 40 activities were undertaken, with 9 selected for sampling. Kurnool accounted for the highest number with 19 activities (4 sampled), followed by Adoni with 11 (2 sampled), and Dhone with 10 (3 sampled). Document verification and cross-checking were carried out in the presence of Division and Range Office staff. Reviewed documents included sanction orders, estimation sheets, and work registers. It was found that sanctioned amounts aligned with actual expenditures. All financial

records were properly maintained and duly signed by relevant officials including the DFO, SDO, and FRO. Fund utilization was appropriate and matched the approved estimates and guidelines. An internal audit was conducted by the Conservator of Forests, and an external audit by the Accountant General's office. These audits confirmed transparency and adherence to protocols. The activities demonstrated sound financial management and administrative compliance under the CAMPA framework.

Key Findings

- Plantation survival rates were generally high; however, growth was noticeably poor in ecologically stressed areas such as mining buffer zones.
- Area mismatches between field conditions and official records declined in 2018-19, indicating improvement in record reconciliation.
- The lack of protective measures and Soil & Moisture Conservation (SMC) activities reduced the plantations' resilience to fire and soil erosion.
- While maintenance activities were largely satisfactory, their impact was limited due to inadequate or poorly maintained documentation.

Recommendations

- Give priority to ecological restoration plantations in mining-affected areas, integrating soil amendments and irrigation to support growth.
- Maintain and enhance area reconciliation efforts by adopting GIS-based monitoring tools for accurate spatial tracking.
- Reintroduce Soil and Moisture Conservation (SMC) measures to improve water retention and prevent soil degradation.
- Institutionalize digital record-keeping systems that include survival rates, growth metrics, and geotagged plantation data.
- Strengthen the role of Vana Samrakshana Samitis (VSS) in fire prevention, grazing regulation, and monitoring, especially in ecologically sensitive areas.
- Create a Plantation Performance Index (PPI) combining survival rate, growth performance, and area accuracy to inform and optimize future CAMPA planning and interventions.

11. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN NANDYAL DIVISION

Introduction

Nandyal Division encompasses a total forest area of 1,109.66 km², with its composition dominated by Moderately Dense Forest (797.10 km²), followed by Open Forest (266.14 km²) and smaller but ecologically significant patches of Very Dense Forest (46.42 km²). Despite this, the division has recently witnessed a forest loss of 2.84 km², reflecting ongoing anthropogenic and ecological pressures. Of particular concern is the vast expanse of 442.63 km² of scrubland, which underscores the fragile and shifting boundary between stable forest cover and degraded open land typical of this semi-arid landscape. Ecologically, Nandyal is characterized by wood lands that are highly fire-prone and interspersed with extensive open forests vulnerable to grazing and degradation. These forests provide critical support to the livestock-based rural economy, serving as a vital source of fodder and fuelwood. However, this dependence also places immense pressure on the ecosystem, leading to recurring challenges of overgrazing, soil erosion, and regeneration failure. Central to these interventions is the role of community-based protection programs, which strengthen local stewardship and ensure that conservation outcomes are aligned with livelihood needs. Collectively, these strategies aim to restore ecological resilience while sustaining the socio-economic fabric of the region.

In Nandyal division, a total of 2 CAMPA activities were carried out, of which 1activities were selected for detailed monitoring and evaluation. In Panyam range, 2 activities were implemented, and 1 were sampled. Among activity types, plantation activity dominated with 2 activities (1 sampled) none of the activities were implemented or sampled.

1. Monitoring and Evaluation of Plantation Activities

In Nandyal division, a total of 2 plantation activities were carried out under CAMPA, of which 1activities (about 21 %) were selected for monitoring and evaluation in the panyam range.

1.1 Panyam range

During 2018–19, a total of two plantation activities were carried out under the CAMPA scheme in Panyam range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was selected randomly for assessment.

Table 60 Details of plantation selected in Panyam range

Sl. no.	Plantation	SO no. and year
1	Raising of 25 HA BHA plantation at Bandlakanuma locality of Panyam RF in Konidedu beat	DSO 44R (2018-19)

The selected site for the 25 Ha plantation at Konidedu is characterized by hard, gravelly soil.

Survival percentage: In the Panyam Range, the 25 Ha plantation at Konidedu demonstrated good suitability for *Tecoma stans*, *Holoptelea integrifolia*, *Pongamia pinnata*, and *Azadirachta indica*, with survival rates of 71.18%, 76.88%, 68.86%, and 77.27% respectively.

Growth: In the Panyam Range, the 20 Ha plantation at Konidedu recorded an average tree height ranging from 1.26 to 2.19 meters and a girth ranging from 15.22 to 19.50 cm.

Table 61 Details of plantation enumerated in Panyam range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average growth	
						Height (m)	GBH (cm)
1	Konidedu 25 Ha BHA plantation	1	*Tecoma stans*	N 15.555121 E 78.194042	67.17	1.32 ±0.33	18.49± 1.85
			Haloptelea integrifolia		78.78	1.39 ±0.40	16.00± 2.63
		2	*Tecoma stans*	N 15.555553 E 78.191026	69.09	1.75 ±0.63	18.29± 2.27
			Haloptelea integrifolia		74.24	1.74 ±0.4	15.22± 3.05
		3	*Tecoma stans*	N 15.555902 E 78.189467	75.75	2.14 ±0.66	18.00± 4.25
			Pongamia pinnata		70.45	1.98 ±0.52	17.65± 3.42
			Azadiracht aindica		77.27	1.88 ±0.44	17.85± 3.49
		4	*Pongamia pinnata*	N 15.556349 E 78.188724	67.27	1.26 ±0.32	16.24± 2.47
			Holoptelia integrifolia		78.78	1.56 ±0.38	17.32± 3.11
		5	*Holoptelia integrifolia*	N 15.554600 E 78.195761	75.75	2.19 ±0.40	19.50± 1.58
			Tecoma stans		72.72	1.85 ±0.28	17.28± 2.57
Plantation average					**73.38**	**1.73**	**17.44**

Verification of plantation area and boundaries

In Nandyal division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 62 Details of plantation area perambulation in Nandyal division

Sl no.	Plantation	Area as per records	Area as per field perambulation
1	Raising of 25ha BHA plantation at Bandlakanuma locality of Panyam RF in Konidedu beat	25 Ha	26.15 Ha

The area verified during perambulation was found to be larger than the area recorded in official documents by 1.15 Ha in Konidedu beat. This discrepancy is likely due to the inclusion of certain patches within the demarcated plantation boundaries that comprise waste, degraded, or rocky land. The verification was carried out by physically Perambulation of the entire area using a Geo Tracker. The Perambulation was done in presence of forest officer and as per the demarcation shown by the watcher/guard working as in-charge of the plantation.

Konidedu 26.15 Ha

Konidedu plantation, Panyam range

Health status of plantations: During the field observations, it was noted that the plantation area showed no visible signs of insect-related damage. This indicates that the plantation is currently free from any major pest outbreaks, suggesting effective natural control or the absence of conducive conditions for insect proliferation.

Protection of plantations: To safeguard the plantations against fires and other environmental risks, protection measures such as the creation and maintenance of fire lines, development of inspection paths, and engagement of fire watchers were implemented.

Biotic (human/cattle) pressure on plantations: Field observations revealed that grazing and browsing pressure from both humans and cattle was minimal within the plantation area. Only a few instances of hoof marks and lightly nibbled foliage were noticed, indicating occasional but not significant biotic interference.

Maintenance of plantation journals and records: The plantation journals were found to be well-maintained, with all baseline information recorded appropriately. However, it was noted that periodic updates to the journals particularly regarding survival rates, growth parameters, and maintenance activities necessary to ensure they reflect current field realities.

Vana Samrakshana Samithi (VSS): In the Panyam range, the plantations at konidedu were developed with the involvement of the Vana Samrakshana Samithi (VSS). Consequently, Focus Group Discussions (FGDs) were conducted at site.

Key Findings

- CAMPA implementation was extremely limited, with only 2 plantation activities in the entire division.
- The sampled plantation showed satisfactory survival (67–77%) and moderate growth despite poor soils.
- Area verification showed a +1.15ha excess due to boundary demarcation inconsistencies.
- Pest incidence was absent, and biotic pressures were minimal.
- Protection measures were adequately in place, with fire lines and watchers.
- Plantation journals were available but not updated regularly.
- Community participation through VSS was evident and positive.

Recommendations

- Expand CAMPA interventions beyond plantation to include maintenance, SMC, and protection works.
- Reconcile plantation records with GIS/KML mapping to eliminate discrepancies.
- Institute periodic updates to plantation journals with current survival and growth data.
- Maintain regular monitoring for pest outbreaks and initiate early interventions if required.
- Sustain community participation through VSS, ensuring their continued involvement in protection and maintenance.
- Regularly inspect and maintain fire lines and boundary markers for long-term plantation sustainability.

12. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN ATMAKUR DIVISION

Introduction

Atmakur Division, as per historical ISFR / AP State Forest Reports, covers a geographical area of approximately 2,154 km², of which about 1,288.81 km² (~ 59.8%) was notified forest area. The forests are typified by Tropical Dry Deciduous, Tropical Moist Deciduous, and Tropical Thorn types, with the bulk (≈ 93.5%) under Reserved or Un-classed Forest categories. Earlier canopy density assessments indicated small patches of Very Dense Forest, more significant portions of Moderately Dense and Open Forest, while scrub areas were also large. Comparatively, recent updated data for the Atmakur Division shows a forest cover of 977.25 km², with 703.10 km² in Moderately Dense Forest, 234.58 km² Open Forest, and 39.57 km² Very Dense Forest. This indicates a shrinkage relative to older notified forest area figures and reflects ongoing environmental pressures including a recorded decline of 3.13 km². Scrubland in the division is now about 86.05 km², signaling degraded or recovering land. These forests are crucial for groundwater recharge, soil and microclimate regulation, and providing essential livelihood resources for forest-dependent communities.At the state level, Andhra Pradesh had ~ 29,784 km² of forest cover in ISFR 2021, about 18.28% of its geographical area, with a net gain of ~ 647 km² over the two-year period 2019-2021. However, ISFR 2023 shows a slight dip in forest cover, underscoring the fragility of gains and the need for sustained conservation effort.

In Atmakur Division during 2018-19, a total of 175 CAMPA activities were carried out, of which 38 activities (around 22 %) were selected for detailed monitoring and evaluation. In Atmakur range, 38 activities were implemented, and 9 were sampled. In Velgode range, 45 activities were implemented, and 9 were sampled. In Nagaluty range, 36 activities were implemented, with 8 sampled. In Bairluty range, 29 activities were implemented, and 6 were sampled. In Srisailam range, 27 activities were implemented, and 6 were sampled. Among activity types, other works dominated with 148 activities (30 sampled), followed by maintenance (10; 3 sampled), Protection (7; 2 sampled), soil and moisture conservation (6; 2 sampled), Construction (4; 1 sampled) there were no Plantation activities were implemented.

1. Monitoring and Evaluation of Maintenance Activities

A total of 10 maintenance activities were carried out in Atmakur division during 2018-19, of which 3 activities were sampled for monitoring. Maximum was counted in Bairluty range with 4 activities 1 sampled, Nagaluty range with 3 activities 1 sampled, Atmakur (1; 1 sampled) and Srisailam range with 2 activities 0 sampled. There was no maintenance activities reported from the Atmakur range.

Table 63 Maintenance activities selected for evaluation in Atmakur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Bairluty range			
1	Second year maintenance of 5 Ha (5"x9" PPS) Bamboo plantation in P.A.Puram south beat	N 15.812298 E 78.646107	RSO 03 (2018-19)
Nagaluty range			
2	Third year maintenance of 75Ha ANR plantation in Deccan cement CA land area of Indireswaram west beat	N 15.923775 E 78.650417	RSO 60 (2018-19)

Atmakur range			
3	Maintenance of river party in Atmakur range	N 15.905437 E 78.659512	DSO 219A (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken in the second and third year of implementation following plantation establishment. These activities include Casualty Replacement, Saucer formation, Weeding Operations, soil working, Fire Line Management and Contingency Measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some plantation sites, plantation boards were found but damaged, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

In Atmakur range the maintenance of river party operations was monitored and evaluated under the CAMPA scheme. As part of conservation and protection efforts, the Forest Department engaged a private boat and appointed five protection watchers. These measures were aimed at safeguarding forest areas and mitigating threats such as forest fires, illegal felling, and poaching. The selected activity specifically involved the procurement and maintenance of the patrol boat. As confirmed by the concerned beat officer, no civil or measurement-based work was undertaken, and hence, the maintenance of a Measurement Book (MB) was not considered necessary. The patrol boat was found to be in good condition, and daily patrolling by the protection watchers is being carried out effectively in the designated stretch of the Krishna River. It is recommended that regular upkeep of the patrol boat be continued to ensure uninterrupted surveillance and enhanced forest protection, particularly in the sensitive border zones between Andhra Pradesh and Telangana.

General recommendations for maintenance activities

- Weeding: Intensify periodic and boundary-focused weeding to eliminate Lantana and invasive grasses, ensuring better survival and growth.
- Fire Protection: Strengthen fire line maintenance with widened lines, regular patrolling, and community involvement for effective fire prevention.
- Replanting: Undertake immediate casualty replacement with healthy, site-suitable seedlings, supported by proper aftercare to maintain stocking density.
- Boundary Demarcation: Replace damaged plantation boards, install durable boundary stones, and adopt geo-tagging for accurate demarcation and monitoring.
- Records Management: Ensure timely updating of plantation journals, supported with GPS/ monitoring for transparency and accountability.
- Site-Specific Action: In waterlogged areas, discontinue bamboo and adopt water-tolerant native species, along with drainage measures.
- River Protection Operations: Maintain the patrol boat in good condition with regular servicing, and continue effective deployment of protection watchers to safeguard forests from fire, poaching, and illegal felling, especially in sensitive border zones.

Indireswaram West beat, Nagaluty range

P A Puram south beat, Bairluty range

Evaluating the maintenance of river party theme at Atmakur range

2. Monitoring and Evaluation of Protection Activities

A total of 7 Protection activities were carried out in Atmakur division during 2018-19, of which 2 activities were selected for monitoring. In Srisailam range 6 activities 2 sampled and in Nagaluty range 1 activity 0 sampled. No Protection activities were reported from other ranges.

2.1 Creation of fire line from main powerline to Pulicheruvu Rasta in Pecheruvu East beat

GPS location: N 15.982178 E 78.862067 **SO no. and year**: RSO 62 (2018-19)

2.2 Formation of view line from district boundary line to biopark of Sundipenta

GPS location: N 16.066833 E 78.910534 **SO no. and year**: DSO 91 (2018-19)

Fire prevention measures were evaluated in Pecheruvu East Beat and Sundipenta, where both a fire line and a view line were established and maintained as per the approved specifications. The fire line from the main power line to Pulicheruvu Rasta measured 3 m in width and 1,035 rmt in length, while the view line from the district boundary line to the Biopark at Sundipenta measured 10 m in width and 4,142 rmt in length. Field verification confirmed that both structures matched the measurement book with no variation recorded. While the lines were found to be clear and effective, moderate to significant growth of weeds and grasses was observed during the monsoon season, which could contribute to the spread of fire in summer. Therefore, annual maintenance is essential to control vegetation growth, sustain visibility, and ensure that these fire prevention structures remain effective for protection and monitoring.

Fire lines in Pecheruvu East beat

Fire lines at Sundipenta

3. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

A total of 6 activities were carried out in Atmakur division during 2018-19, of which 2 activities were selected for monitoring. In Nagaluty range 4 activities 1 sampled and in Velgode range 2 activities 1 sampled. No SMC works were recorded in other ranges of Atmakur division.

3.1 Construction of mini percolation tank at CA land of 37 Ha plantation area of Indireswaram West beat

GPS location: N 15.906264 E 78.661073 **SO no. and year**: RSO 98 (2018-19)

3.2 Construction of basement cum water pit in Velgode West beat

GPS location: N 15.790795 E 78.572808 **SO no. and year**: RSO 60 (2018-19)

A mini percolation tank was constructed in Indireswaram West Beat of Nagaluty Range with dimensions of 10 m × 10 m × 1 m, and a basement-cum-water pit was constructed in Velgode West Beat of Velgode Range with dimensions of 2.6 m × 2.6 m × 0.2 m. Field verification confirmed that both structures matched the measurement book with no variation recorded. The mini percolation tank was found to be functional; however, regular de-siltation is necessary to maintain and enhance its water retention efficiency, as silt accumulation and vegetative growth in and around the tank reduce its storage potential over time. The concrete water pit was observed to be well maintained and in good condition, effectively storing rainwater during the summer and serving as a vital water source for wildlife. To ensure the long-term functionality of both structures, annual maintenance is essential, particularly de-siltation of the percolation tank and upkeep of the water pit, thereby strengthening their role in water conservation and wildlife support.

Mini percolation of Indireswaram West beat

Water pit in Velgode West beat

4. Monitoring and Evaluation of Construction Activities

A total of four activities were carried out during 2018-19 in Nagaluty range, 20 % was sampled which is equivalent to single activity. No Construction works were recorded in other ranges of Atmakur division.

4.1 Construction of RCC boundary pillars in CA land area near current line location of Indireswaram West beat **SO no. and year**: RSO 103 (2018-19)

GPS location: Pillar-1 N 15.900762 E 78.668948**, Pillar-2:** N 15.902275 E 78.66739

A total of two RCC boundary pillars were constructed in the CA land area near the current line location of Indireswaram West Beat in Nagaluty Range, with dimensions as per the measurement book - below ground: 1.20 m × 1.20 m; above ground: height 1.20 m, top width 0.30 m, bottom width 0.45 m. Field verification confirmed that the structures matched the specifications with no variation recorded. The pillars, placed at intervals of 100 m, serve the purpose of clearly demarcating forest land from revenue land to prevent encroachment and illegal entry. However, it was observed that the basal part of these pillars has been submerged under the soil, potentially reducing their visibility and effectiveness. Regular maintenance and clearing around the pillars are therefore necessary to ensure that they remain visible and fully functional for boundary demarcation.

RCC boundary pillars in CA land area near current line location of Indireswaram West beat in Nagaluty range

5. Monitoring and Evaluation of Other activities

During 2018–19, a total of 148 activities were undertaken under the “Others” category, of which 30 were sampled for verification. Velgode recorded the maximum number of activities (43, with 8 sampled), followed by Atmakur (37/8), Bairluty (25/5), Nagaluty (24/5), and Srisailam (19/4). Document verification, conducted in the presence of Division and Range office staff, covered sanction orders, estimation sheets, and work registers. Sanctioned amounts were consistent with actual expenditures, and financial records were properly maintained and authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was found to be in line with approved estimates and guidelines, and both internal (Conservator of Forests) and external (Accountant General’s office) audits confirmed compliance with CAMPA protocols. However, certain discrepancies were noted across ranges: in Atmakur, estimates and work registers for DSO 47, 147, and 219A were not presented, and estimates for DSO 15, 24, 1, and 37 were missing; in Bairluty, estimates for DSO 32, 34, and 29 were not available, while

both estimate and work register for DSO 52 were missing; in Nagaluty, the estimate for DSO 8 and both estimate and work register for DSO 195 were not produced; in Velgode, estimates and work registers for RSO 59, 32, 74, 113, and 60 were missing, along with the work register for DSO 219, which the Forest Range Officer acknowledged; and in Srisailam, both estimate and work register for DSO 10 and 48 were not presented, while the estimate for DSO 91 was also missing.

Key Findings

- No new plantations were raised; the division emphasized maintenance, protection, and support activities.
- Bamboo plantations (*Dendrocalamus strictus*) maintained under CAMPA showed moderate survival but remained vulnerable to grazing and invasive weeds.
- River patrol operations in Atmakur Range proved effective in strengthening protection along the Krishna River.
- Fire lines and view lines were properly constructed but require regular clearance to remain functional.
- SMC structures were effective but need annual desilting and upkeep to retain efficiency.
- RCC boundary pillars demarcated forest land successfully, though soil coverage at the base reduced visibility.
- Financial records were generally sound, but missing estimates and registers in several ranges reduce accountability.

Recommendations

- Bamboo has shown poor adaptability and survival in waterlogged areas. Replace with ecologically suitable native species to improve survival, biodiversity, and long-term sustainability.
- Strengthen plantation survival through contour trenches, check dams, gully plugging, and staggered trenches.
- Enhance groundwater recharge, soil stability, and create supportive habitats for wildlife.
- Ensure routine upkeep through annual work plans and dedicated budgetary allocation.
- Reduce risk of fire, maintain boundary integrity, and prevent encroachments.
- Standardize formats for sanction orders, estimates, and work registers.
- Enforce timely submission of records and adopt digitization to improve transparency and accountability.
- Facilitate smooth internal and external audits by ensuring complete documentation.
- Increase local ownership of plantation protection through capacity-building and incentivized participation.
- Assign responsibility for maintenance, watch and ward activities to VSS.
- Reduce risks of encroachment, illicit felling, and damage through community-driven management.

13. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN MARKAPUR DIVISION

Introduction

Markapur Division in Andhra Pradesh covers a total forest area of 1,603.09 km² as per the *India State of Forest Report (ISFR) 2023*. Of this, 137.84 km² is classified as Very Dense Forest (VDF), 832.15 km² as Moderately Dense Forest (MDF), and 633.10 km² as Open Forest (OF). In addition, the division contains 538.82 km² of scrubland, reflecting areas under degradation or regeneration. A net decline of 10.16 km² in forest cover has been recorded since the previous assessment, pointing to mounting ecological pressures. The forests of Markapur, dominated by dry teak formations, are highly fire-prone and vulnerable to grazing and other anthropogenic disturbances. Ecologically, this division plays a critical dual role by maintaining a sustainable timber base and functioning as a vital wildlife corridor that supports the movement of large mammals, while management interventions such as fire line establishment and assisted natural regeneration are being implemented to safeguard and restore its ecological integrity.

In Markapur Division during 2018-19, a total of 117 CAMPA activities were carried out, of which 30 activities (around 25 %) were selected for detailed monitoring and evaluation. In Dornala range**,** 54 activities were implemented, and 15 were sampled. In Markapur range, 23 activities were implemented, and 5 were sampled. In GV Palli range, 21 activities were implemented, with 5 sampled. In Y Palem range, 16 activities were implemented, and 4 were sampled. In V P South range, 3 activities were implemented, and 1 was sampled. Among activity types, other works dominated with 83 activities (20 sampled), followed by Maintenance (14; 3 sampled), protection (6; 2 sampled), soil and moisture conservation works (6; 2 sampled), construction (7; 2 sampled), and 1 plantation activity was implemented 1 was sampled.

1. Monitoring and Evaluation of Plantation Activities

In the Markapur Division, a total of one plantation activity was carried out under CAMPA in the Dornala Range, of which one activity (approximately 20%) was selected for monitoring and evaluation. No plantation projects were implemented in other ranges of the division.

1.1 Dornala range

During the period 2018-19 a total of 1 plantation activity was carried out under the CAMPA scheme in the Dornala range. In this monitoring and evaluation process, around 20 % of these activities equivalent to one plantation site was selected randomly for assessment. The evaluation was meant to assess the implementation status, ecological outcomes, and overall effectiveness of the selected plantation.

Table 64 Details of plantation selected in Dornala range

Sl. no.	Plantation	SO no. and year
1	Estimate for raising of 3 Ha Gap plantation in CA land of Chilakacherla Beat	DSO 66 R (2018-19)

Note: Monitoring and Evaluation of 3 Ha Gap Plantation at Marrelamodu lodi CA locality in Chilakacherla Beat of Dornala Range was raised 3000 seedlings under the CAMPA-NPV Scheme during 2018-19 (DSO 66 R, 2018-19; GPS: N 15.897733, E 79.034262). During field

verification, no plants were observed, indicating plantation letdown. The letdown is attributed to rocky, hard, red gravelly soil, which was unsuitable for plantation establishment. The plantation board was also missing, further complicating site identification and maintenance.

Verification of plantation area and boundaries

In Markapur division during 2018-19 measurement of plantation area was conducted using KML files for the location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 65 Details of plantation area perambulation in Markapur division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Estimate for raising of 3 Ha Gap plantation in CA land of Chilakacherla Beat	3 Ha	3.27 Ha

Perambulation of the Chilakacherla plantations was conducted with the assistance of the local Forest Beat Officer using a Geo Tracker. The plantation boundaries are surrounded by dense jungle growth and undulating terrain, which necessitated measuring along the outer boundary rather than the precise plantation limits. Using QGIS software, it was determined that the perambulated area exceeds the recorded area by 0.27 Ha. Images of the perambulated areas are provided below.

Chilakacharla 3.27 Ha

Dornala, Chilakacharla plantation

Health Status of Plantation: In Chilakacherla plantation, no live plants were observed indicating that the plantation was unsuccessful. Due to the poor establishment and complete absence of surviving individuals, the health condition of the plantation could not be assessed in detail.

Protection Measures: In Chilakacharla plantation, essential protection measures such as fire lines, inspection paths and the deployment of fire watchers were implemented.

Biotic Pressure: However, despite these efforts, site suffered heavy grazing and browsing pressure by cattle and wild herbivores which adversely affected regeneration and overall plantation success.

Maintenance of Plantation Journals and Records: Plantation journals was not maintained; they were not regularly updated. Additionally, the absence of plantation display board at location reduced visibility and awareness of the plantation sites.

Vana Samrakshan Samithi (VSS): In the Dornala range, the JFMC (VSS) was not involved in the project planning and implementation phases of this plantation.

2. Monitoring and Evaluation of Maintenance Activities

A total of 14 maintenance activities were carried out in the Markapur division during 2018-19, of which 3 activities were sampled for monitoring. In Markapur range11 activities 2 sampled, and in Y Palem 3 activities implemented 1 sampled. There was no maintenance activities reported from the other ranges.

Table 66 Maintenance activities selected for evaluation in Markapur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Markapur range			
1	Estimate for second year maintenance of 2016-17, 20 Ha SMM plantation bit II through Chinnarikatla VSS.	N 15.523647 E 79.474101	DSO 129 (2018-19)
2	Third year maintenance of 2015-16, 9Ha penal CA plantation at Avulamanda VSS of Potlapadu beat	N 15.954825 E 79.545659	DSO 236 (2018-19)
Y Palem range			
3	Third year maintenance of 35 Ha PCA plantation at Suddakurava Thanda VSS of Mallapalem beat	N 16.153048 E 79.367737	DSO 232 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken in the second and third year of implementation following plantation establishment. These activities include weeding operations, soil tilling (inter-ploughing) and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in all the sites plantation boards were not found or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Install boundary stones and plantation boards to ensure clear site demarcation and facilitate effective monitoring.
- Continue consistent pruning and inter-ploughing to promote strong plant structure and healthy growth.
- Implement *Lantana* control strategies to prevent spread and minimize competition with plantation species.
- Maintain consistent schedules for weeding and fertilization to support plant health, survival, and growth.

Chinnarikatla beat, Markpur

Mallapalem beat, Y Palem

3. Monitoring and Evaluation of Protection Activities

A total of 6 Protection activities were carried out in Markapur division during 2018-19, of which two activities were selected for monitoring in Dornala range. No Protection activities were reported from other ranges.

3.1 Estimate for digging of peripheral trench around Inamukkala CA land bit II

GPS Location: N 16.900773 E 78.978152 **SO no. and year:** DSO 73(R) (2018-19)

3.2 Estimate for digging of PPT/WAT around Inamukkala CA land bit IV

GPS Location: N 15.898525 E 79.017365 **SO no. and year:** DSO 75 (2018-19)

A peripheral trench was constructed around the Inamukkala Compensatory Afforestation (CA) land in Bit II and Bit IV, as per the sanctioned specifications recorded in the measurement book. The prescribed dimensions were 2.5 meters in breadth, 3 meters in depth, and lengths of 3,300 running meters (Bit II) and 2,000 running meters (Bit IV). During the field verification, the trench alignment and overall construction were found to be in accordance with the measurement book. The breadth and length were consistent with the prescribed dimensions, indicating satisfactory execution of the sanctioned work. However, in both bits, the depth of the trench was reduced by approximately 0.5 meters due to natural silt deposition, bringing the effective depth to 2.5 meters instead of the planned 3 meters. While the trenches remain structurally visible and intact, grass growth, weed proliferation, and silt accumulation were clearly observed along the trench bed and sides. Peripheral trenches play a crucial role in preventing soil erosion, restricting cattle entry, acting as fire barriers, and improving moisture retention in plantation areas. If left without maintenance, siltation and vegetative growth may progressively reduce their functional efficiency. Therefore, timely interventions are essential to restore their designed capacity.

Peripheral trench around Inamukkala CA land bit II, IV in Dornala range

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

A total of 6 Soil and moisture conservation activities were carried out in Markapur division during 2018-19, of which 2 activities were selected for monitoring in Dornala range. No soil and moisture conservation activities were reported from other ranges.

4.1 Construction of Rock fill dams at Inamukkala CA land of Dornala range

GPS Location: N 15.902267 E 78.983391 **SO no. and year:** DSO 259 (2018-19)

4.2 Estimate for carrying out preferential treatment in Inamukkala CA land during 2018-19 digging of harvesting mini trench land of (1360,4560.3000) (bit I)

GPS Location: N 15.902995 E 78.969574 **SO no. and year:** DSO 67 (2018-19)

At Inamukkala CA land of Dornala section, a rock fill dam was constructed with specifications as per the measurement book comprising a main dam of 5.00 m × 3.00 m × 0.25 m, upstream and downstream side walls of 2.50 m × 0.25 m × 0.60 m each, and an apron of 5.00 m × 0.90 m × 0.60 m. During field verification, the dimensions were largely consistent in length and breadth, but the depth was slightly reduced, resulting in a lower storage capacity. The total volume of the structure was recorded at 647 cum compared to 276 cum in the MB. Major repairs are required for the apron, and de-silting should be undertaken to enhance storage capacity, as seepage was observed both from the main dam and the apron. Additionally, at the same location, 500 mini trenches were created with measurement book dimensions of 1.30 m × 0.45 m × 0.30 m; however, in the field, the depth was reduced to 0.20 m due to siltation. Being situated in a low-lying area, silt accumulation is significant, and the stone dry packing along trench edges has been displaced by water overflow during the monsoon.

Rock fill dam and mini trenches in Dornala range

5. Monitoring and Evaluation of Construction Activities

A total of 7 Construction activities were carried out in Markapur division during 2018-19, of which 2 activities were selected for monitoring. In Dornala range 4 activities implemented, one sampled and in Markapur range (3; 1 sampled). No Construction activities were reported in other ranges.

5.1 Estimate for construction of protection wall in Inamukkala CA land in Chilakacherla beat, Dornala section and range

GPS Location: N 15.895956 E 79.032224 **SO no. & year:** DSO 277 (2018-19)

5.2 Estimate for construction of boundary pillars around Inamukula CA land area (Merrallamotu to Pankumadugu) of Chilakacherla beat

GPS Location: N 15.89547 E 79.039702 **SO no. & year:** DSO 143 (2018-19)

In Inamukkala CA land of Chilakacherla beat in Dornala range, a protection wall was constructed using rock masonry with a length of 400 meters, height of 3 meters, and width of 1 meter. Field verification confirmed that the dimensions matched those recorded in the measurement book, with no variation observed. The wall was found to be in good condition, though dense weed growth was noted along its stretch. Additionally, 60 individual boundary pillars were constructed to demarcate the CA land boundary from Merrallamotu to

Pankumadugu through Inamukkala VSS of Chilakacherla beat in Markapur range. Each pillar measured 1.20 m above ground with a top width of 0.45 m, bottom width of 1.20 m, and 1.20 m below ground. The pillars were also found to be in good condition, effectively marking the boundary, though some require plastering for proper maintenance.

6. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 83 activities were carried out during 2018–19, of which 20 were sampled for verification. The highest number of activities was recorded in Dornala Range with 37 (9 sampled), followed by GV Palli with 21 (5 sampled), Y Palem with 13 (3 sampled), Markapur with 9 (2 sampled), and V P South with 3 (1 sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff, covering sanction orders, estimation sheets, and work registers.

Protection wall in Dornala range

Boundary pillars in Markapur range

The sanctioned amounts were found to be in alignment with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Utilization of funds was appropriate and consistent with approved estimates and guidelines. Further, both internal audit by the Conservator of Forests and external audit by the Accountant General's office confirmed compliance, thereby ensuring transparency and adherence to financial and administrative protocols under the CAMPA scheme.

Key Findings

- Plantation activity was negligible and wholly unsuccessful, with the only site (Chilakacherla) waning.
- Verification again revealed discrepancies between recorded and actual plantation areas, though modest in 2018–19.
- Maintenance was undertaken but poorly supported by signage and boundary markers, reducing visibility and monitoring effectiveness.
- Protection and soil conservation works were functional but compromised by siltation and lack of upkeep.
- Construction works (wall and pillars) were robust and effective, though in need of routine maintenance.
- The overwhelming dominance of "other works" indicates a continuing imbalance in CAMPA investment priorities.

Recommendations

- Select more suitable sites and species, avoid rocky soils, and ensure VSS involvement in planning and aftercare.
- Install and maintain plantation boards, boundary stones, and GPS-based monitoring for all sites.
- Institutionalize de-siltation schedules for trenches, dams, and mini trenches.
- Undertake lantana removal, pruning, and soil conditioning to support plantations.
- Regular plastering of pillars and weed clearance along walls to sustain durability.
- Increase allocation toward plantations, protection, and soil conservation rather than overloading “other works.”

14. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN GUNTUR DIVISION

Introduction

The Guntur Forest Division in Andhra Pradesh, covering 2,508.14 sq.km, has one of the lowest forest covers in the state with only 36.93 sq.km (1.47%) under forests. Of this, 34.63 sq.km is Open Forest and 2.30 sq.km is Moderately Dense Forest, while no Very Dense Forests are present, underscoring the ecological vulnerability of the region. Between ISFR 2021 and 2023, the division recorded a net forest loss of 0.67 sq.km. In addition, the division has 14.34 sq.km of scrubland, which, though degraded, offers potential for restoration. Vegetation is adapted to the semi-arid climate and includes Neem, *Acacia catechu*, *Hardwickia binata*, *Pongamia pinnata*, *Butea monosperma*, and over 60 medicinal plants traditionally used by local communities. Despite limited forests, surveys around Guntur city have recorded over 400 plant species, indicating notable floristic diversity. Major threats include agricultural expansion, overgrazing, fuelwood dependency, illegal harvesting, and forest fires, compounded by the semi-arid climate that hampers natural regeneration. To address these challenges, management must focus on afforestation, scrubland rehabilitation, soil and moisture conservation, and community-based eco-restoration through CAMPA, social forestry, and urban greening programs, thereby improving forest resilience, biodiversity, and local livelihoods.

A total of 188 activities were implemented across the four ranges, of which 42 were sampled during 2018-19. Guntur range recorded the highest number of implemented activities (84) and sampled activities (18), largely contributed by Others (73 implemented, 15 sampled) and Maintenance (10 implemented, 2 sampled). Protection one implemented, one sampled. Vinukonda range had 68 implemented and 16 sampled activities, with major contributions from Maintenance (15 implemented, 3 sampled) and Others (45 implemented, 10 sampled). Protection three implemented, two sampled. Construction five implemented, one sampled. Repalli range implemented 18 activities, of which 4 were sampled, all primarily under Plantation (10 implemented, 2 sampled) and Others (8 implemented, 2 sampled). Macherla range had the least activity, with 18 implemented and 4 sampled, mostly under Maintenance (5 implemented, 1 sampled) and Others (13, 3 sampled). SMC activities were not implemented/sampled in any range.

1. Monitoring and Evaluation of Plantation Activities

Ten plantations were implemented and 2 sampled activities, all concentrated in Repalli range. Plantation activities were not implemented in Vinukonda range, Guntur range, and Macherla.

1.1 Repalli range

During 2018–19, a total of ten plantation activities were undertaken under the CAMPA scheme in Repalle range. For monitoring and evaluation, 20 % of these activities, equivalent to two plantation activities, were randomly selected and evaluated.

Table 67 Details of plantations selected in Repalle range

Sl. no.	Plantations	SO no. and year
1	Raising of 2018 Mangrove plantation Adavuladeevi bit-I 12 Ha	DSO147 (2018-19)

2	Raising of 2018 Tummalapalli VSS 10 Ha Shelterbelt plantation including advance works.	DSO139 (2018-19)

The proposed site for the Adavuladeevi Bit-I mangrove plantation features sandy loam soil, which is moderately well-drained and suitable for mangrove growth under appropriate hydrological conditions.

Survival Percentage: In the Tummalapalli Shelterbelt plantation within the Repalle Range, the species *Casuarina equisetifolia* recorded an average survival rate of 51.95%, indicating moderate establishment success under the prevailing site conditions.

Growth: In the Tummalapalli Shelterbelt plantation, the average tree height ranged from 3.57 to 3.82 meters, while the average girth at breast height (GBH) varied between 18.70 and 21.24 centimeters, reflecting healthy growth performance under the existing environmental conditions.

During the field visit, the entire plantation of *Avicennia officinalis* was found to be submerged, which hindered the collection of growth parameter observations. However, the survival percentage was assessed through ocular estimation and was observed to be below 50%. Additionally, natural regeneration from seeds was evident across the plantation area, resulting in a disturbance of the original planting geometry.

Table 68 Details of plantations enumerated in Repalle range

Sl. no.	Plantation / Village name	Plot no.	Species Name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Tummalapalli Shelterbelt	1	*Casuarina equisetifolia*	N 15.878841 E 80.623833	53.90	3.57 ±0.88	18.70 ±2.89
		2	*Casuarina equisetifolia*	N 15.878799 E 80.624380	50.00	3.82 ±1.05	21.24 ±4.51
Plantation average					**51.95**	**3.70**	**19.97**
2	Mangrove plantation Adavuladeevi	1	*Avicennia officinalis*	N 15.899158 E 80.760041	50.00	Growth parameters were not recorded as trees were submerged in water	

Verification of plantation area and boundaries

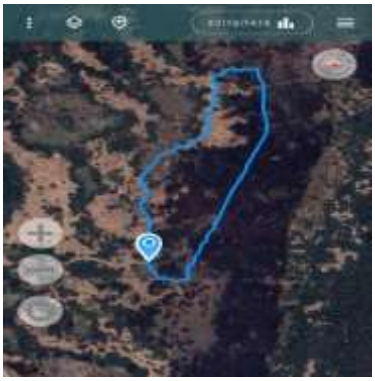
The plantation boundaries and areas were verified using KML files obtained for each site. These files were processed using GIS tools to generate accurate maps and to calculate the actual area covered under each plantation.

Table 69 Details of plantations area enumerated in Guntur division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 2018 Mangrove plantation Adavuladeevi bit-I 12 Ha	12 Ha	12.19 Ha
2	Raising of 2018 Tummalapalli VSS 10 Ha Shelterbelt plantation including advance works.	10 Ha	5.80 Ha

During the verification of mangrove plantation areas at Adavuladeevi it was observed that the perambulated extents exceeded the officially recorded areas. However, Tummalapalli VSS 10 Ha Shelterbelt plantation the perambulated area was less than area in records. The field verification was conducted with the assistance of local forest beat officers, and in all cases, the plantations were surrounded by water. Consequently, the field teams traced the outer boundaries of these physical features, rather than adhering strictly to the originally recorded plantation limits. As a result, the perambulated area was found to be 0.19 hectares larger at Adavuladeevi and 4.2 hectares lesser at Tummalapalli plantation. This discrepancy is attributed to the inclusion of water area without proper boundary pillar markings. Spatial analysis was conducted using QGIS software, and the verification was further supported through physical perambulation using the Geo Tracker mobile application. To substantiate the findings, geo-tagged photographs and GIS-based mapping outputs were generated, providing clear evidence of the verification process. Relevant images documenting this process are provided below.

Adavuladeevi bit-I plantation 12.19 Ha



Tummalapalli plantation 5.80 Ha

Health Status of Plantations: During the field visit, the plantations were thoroughly inspected for signs of biotic stress, particularly insect or pest-related damage. No visible symptoms such as defoliation, boreholes, discoloration, or wilting were observed. It was therefore concluded that the plantations were free from insect or pest infestations at the time of inspection.

Protection of Plantations: As part of the fire prevention strategy, fire lines and inspection paths were established and maintained regularly. However, during field visit the entire area was submerged in water.

Biotic (Human/Cattle) Pressure on Plantations: Only minimal signs of grazing and browsing activity were observed, indicating that biotic pressure from livestock or wild herbivores was negligible during the monitoring period.

Maintenance of Plantation Journals and Records: The plantation journals were found to be well maintained. However, plantation boards were not observed at either of the sites. Regular updating of plantation parameters is recommended to ensure the records remain current, accurate, and comprehensive. Plantations are inspected by the concerned forest officials, and their observations are duly recorded.

Focus Group Discussion (FGD): In Repalle range, the Adavuladeevi bit-I Mangrove and Tummalapalli Shelterbelt plantations did not involve the Vana Samrakshana Samithi (VSS) in the implementation and maintenance of the plantations; hence, the Focus Group Discussion (FGD) activity was not conducted.

Adavuladeevi Mangrove, Repalle range

Tummalapalli Shelterbelt, Repalle range

2. Monitoring and Evaluation of Maintenance Activities

Maintenance included 30 implemented and 6 sampled activities, mainly in Vinukonda range (15 implemented, 3 sampled), Guntur range (10 implemented, 2 sampled) and Macherla range (5 implemented, 1 sampled).

Table 70 Maintenance activities selected for evaluation in Guntur division

Sl. No.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Vinukonda range			
1	Third year Maintenance of 20 Ha NTSHS Plantation in Bridge thanda VSS in Kanumalacheruvu Beat	N 16.139209 E 79.680094	DSO 174 (2018-19)
2	First year Maint of 20 Ha NTSHS Plantation in Gutlapalli VSS of Kanumalacheruvu Beat during 2018-19	N 16.159875 E 79.561629	DSO 95 (2018-19)
3	Third year maint. of 20 Ha NTSH plantation in Neelagangavaram VSS in Tangirala Beat	N 16.268377 E 79.617776	DSO176 (2018-19)
Guntur range			
4	Third year maint. Of 1Ha. NTHS plantation at Mothadaka through Lemalle VSS	N 16.535425 E 80.392532	RSO 42 (2018-19)
5	Third year maint. Of 11.50 Ha. NTHS plantation at Neeleswarapalem VSS	N 16.647461 E 80.072285	DSO 180 (2018-19)
Macherla range			
6	Second Year Maintenance of 20 Ha NTHWS Plantation at Jangameswarapadu VSS of Macherla Range	N 16.354211 E 79.525816	DSO 102 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. The works undertaken included casualty replacement, circular weeding and soil working, coppice management, pruning of lower branches, fertilizer application, creation and upkeep of fire lines, and other contingency measures. Verification showed that most of these activities had been properly executed in accordance with sanctioned orders. Circular weeding and soil working reduced weed competition and improved aeration, coppice cutting minimized competition from secondary shoots, and pruning promoted healthier plant structure. Fertilizer application was carried out in several plantations, though in some cases the dosage and distribution were not uniform. Fire lines were created or maintained, but at certain locations they required better clearance to remain effective in peak summer. However, in some sites, plantation boards were

found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth are as follows;

General recommendations for maintenance activities

- Conduct regular circular weeding and deep soil work to minimize weed growth and promote healthy plant development.
- Replace any damaged or missing boards and stones promptly to maintain accurate documentation and site visibility.
- Maintain clear and consistently visible fire lines to prevent wildfires and protect plantation assets.
- Extend the maintenance period by an additional two years to support continued healthy plant growth and establishment.
- This extended care will ensure optimal plant density, robust growth, and long-term sustainability of the plantation

20 Ha Kanumalacheruvu beat

11.50 Ha NTHS at Neeleswarapale

1 Ha NTHS at Mothadaka

20 Ha NTHWs at Jangameshwarapadu

3. Monitoring and Evaluation of Protection Activities

Protection comprised 4 implemented and 3 sampled activities, predominantly in Vinukonda (3 implemented, 2 sampled) and Guntur (1 implemented, 1 sampled).

3.1 Creation of fire line in Bollapalli RF through Malapadu ST VSS in Bollapalli beat of Vinukonda range

GPS location: N 16.207609 E 79.664172 **SO no. and year:** RSO 26 (2018-19)

3.2 Estimate for creation of fire line in Bollapalli RF through Ravulapuram SC VSS in Ravulapuram beat of Vinukonda range

GPS location: N 16.229622 E 79.642838 **SO no. and year**: RSO 25(2018-19)

3.3 Creation of fire lines in Venkatayapalem Extn-V RF through Konduru VSS of Atchempet beat in Atchempet section of Guntur range

GPS location: N 16.641749 E 80.074188 **SO no. and Year:** RSO 40 (2018-19)

Fire lines were created and maintained across three beats: Bollapalli and Ravulapuram in the Vinukonda Range, and Atchempet in the Guntur Range. The width of the fire line in all the beats was 3 meters, with varying lengths 3000 running meters in Bollapalli, 4000 running meters in Ravulapuram, and 5000 running meters in Atchempet. These fire lines were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The field measurements matched the recorded specifications, indicating no deviations.

In the Bollapalli Beat, a fire line of 3000 running meters was established around the Bollapalli Reserve Forest boundary. The fire line was clearly visible and well-maintained, with minimal growth of grass and weeds observed. However, coppice growth during the monsoon season presents a potential fire hazard in the summer months, highlighting the need for consistent annual maintenance.

In the Ravulapuram Beat, a 4000-meter-long fire line was created along the inspection path within the natural forest. The fire line was clearly visible and effectively maintained, with very low density of grass and weed growth. Similar to Bollapalli, the coppice growth of vegetation during the monsoon could increase the risk of fire in the summer.

Fire line in Bollapalli beat

Fire lines in Ravulapuram beat

In Atchempet Beat of the Guntur Range, a 5000-meter fire line was established along inspection paths within the existing plantations. These fire lines were visible and well-maintained, which helped in controlling the growth of dense grasses and weeds. However, no fire lines were observed in and around the previously established plantations in the Venkatayapalem Extension-V RF area.

Fire line in Venkatayapalem Extn-V RF of Atchempet section and beat in Guntur range

This lack of coverage poses a potential fire risk. In the areas where fire lines were present, their maintenance was effective, although coppice growth during the monsoon season remains a recurring challenge. Overall, while the existing fire lines are effective and constructed as per the prescribed specifications, regular annual maintenance is essential, especially before the summer season, to manage regrowth and prevent fire hazards. It is also recommended that fire lines be established in uncovered areas such as the Venkatayapalem Extension-V Reserved Forest to ensure comprehensive fire protection.

4. Monitoring and Evaluation of Construction Activities

Construction activities 5 implemented and 1 sampled, mostly in Vinukonda range.

4.1 Formation of CC way from back side to aquarium to painted strocks of Kotappakonda through Guravayapalem in Thangedumalli beat of Vinukonda range

GPS location: N 16.145929 E 80.027286 **SO no. and year:** DSO 225 (2018-19)

A cement concrete (CC) pathway was constructed from the rear side to the aquarium and painted stork area at Kotappakonda, passing through Guravayapalem in the Thangedumalli beat of Vinukonda range. The pathway measures 2.5 meters in width and 15 meters in length.

Monitoring and evaluation were carried out by comparing the field measurements with the specifications recorded in the measurement book. The actual field measurements were consistent with the recorded data, indicating no deviations from the specified dimensions.

The constructed CC pathway is structurally sound and undamaged, providing safe and convenient access for visitors to the aquarium and nearby scenic areas. To ensure its long-term durability and usability, regular maintenance of the pathway is recommended.

CC way from back side to aquarium to painted strocks of Kotappakonda

5. Monitoring and Evaluation of Other Activities

In the year 2018–19, a total of 139 activities under the "Others" category were implemented across the division, making it the largest category for that period. Out of these, 30 activities were selected for document verification and cross-checking, which was conducted in the presence of the Division and Range office staff. Among the major contributors, Guntur Range implemented 73 activities, of which 15 were sampled, while Vinukonda Range accounted for 45 implemented activities, with 10 selected for verification.

During the verification process, key documents such as sanction orders, estimation sheets, and work registers were reviewed. It was observed that the sanctioned amounts were in line with actual expenditures, and all financial records were properly maintained and duly authenticated

by the concerned officials, including the Divisional Forest Officer (DFO), Sub-Divisional Officer (SDO), and Forest Range Officer (FRO). The utilization of funds was found to be appropriate and consistent with the approved estimates and CAMPA guidelines. Additionally, both internal auditing (by the Conservator of Forests) and external auditing (by the Accountant General's Office) were carried out. This multi-tiered audit process helped ensure transparency and compliance with all financial and administrative procedures under the CAMPA scheme.

However, a few irregularities were noted during the verification. In Guntur Division, the estimates and work registers for DSO 438 and DSO 424 (2018–19) were not presented for review. In the case of DSO 387 (2018–19), although the work register was available, the expenditure amount was not recorded. Furthermore, with regard to audit-related expenses, payments made to A.M. Reddy and D.R. Reddy for audit services were not linked to any specific RSO/DSO number, and hence lacked proper supporting documentation.

Key Findings

- Plantation outcomes were mixed: *Casuarina equisetifolia* in Tummalapalli showed moderate survival and growth, while *Avicennia officinalis* in Adavuladeevi performed poorly due to submergence.
- Verification revealed discrepancies in plantation extents, with under-reporting at Tummalapalli and slight excess at Adavuladeevi.
- Maintenance activities were implemented but undermined by missing signage and irregular record updates.
- Fire lines were well constructed but required annual clearance to counter coppice regrowth; gaps in coverage increased vulnerability.
- No SMC works were undertaken, limiting ecological contributions.
- Construction of the CC pathway at Kotappakonda was successful, providing recreational benefits.
- "Other works" were implemented with financial compliance, but documentation lapses persisted in estimates, registers, and audit records.

Recommendations

- Strengthen protection measures through effective fencing, clear signage, and active involvement of Vana Samrakshana Samithis (VSS) to improve on-ground accountability.
- Prolong the maintenance period by at least two additional years to ensure full establishment and survival of plantations.
- Institutionalize annual clearance of fire lines and extend coverage to include all plantation areas for comprehensive protection.
- Reintroduce Soil and Moisture Conservation (SMC) interventions to reinforce soil stability and water retention in plantation zones.
- Ensure complete and accurate financial documentation by systematically linking all audit payments to corresponding sanctioned orders.

15. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KRISHNA DIVISION

Introduction

Krishna division encompasses a relatively smaller area of 98.28 km² of forest land, yet it holds significant ecological importance due to its composition and strategic location. The majority of the forest cover falls under the category of Moderately Dense Forest (MDF), accounting for 92.82 km², while a smaller yet critical portion of Very Dense Forest (VDF) covers 5.46 km². In a positive development, Krishna Division has recorded a net gain of 4.29 km² in forest cover, which stands as an encouraging sign of successful forest management. This gain could be attributed to a combination of recent protection initiatives, effective afforestation and restoration projects, and the natural regeneration of mangrove ecosystems along the coastal stretches. The presence of limited scrubland, measured at only 3.56 km², is also a favourable indicator of ecological stability and resilience, suggesting that the division has relatively low levels of degradation. Krishna's forests are characterized predominantly by dry deciduous scrub and mangrove stands, both of which contribute to maintaining the ecological balance of the region. Overall, the Krishna Division reflects a well-preserved forest ecosystem with positive trends in cover and an emphasis on both biodiversity conservation and community-oriented benefits.

In Krishna division, a total of 142 CAMPA activities were carried out, of which 31 activities (around 21 %) were selected for detailed monitoring and evaluation. In Mylavaram range, 56 activities were implemented, and 12 were sampled. In Nuzvid range, 20 activities were implemented, and 5 were sampled. In Vijayawada range, 66 activities were implemented, with 14 sampled. Among activity types, soil and moisture conservation dominated with 57 activities (12 sampled), followed by others (45; 8 sampled), maintenance (32; 6 sampled), plantation (3; 2 sampled), protection (3; 2 sampled), and construction (1; 1 sampled).

1. Monitoring and Evaluation of Plantation Activities

In Krishna division, a total of 4 plantation activities were carried out under CAMPA, of which 2 activities (about 21 %) were selected for monitoring and evaluation. Among the ranges, Nuzvid with 1 (1 sampled), Mylavaram with 3 (0 sampled) and in Vijayawada none were sampled.

1.1 Nuzvid range

During 2018–19, a total of one plantation activity was carried out under the CAMPA scheme in the Nuzvid Range. In this monitoring and evaluation process, 100 % of the activity, equivalent to one plantation site, was selected for assessment.

Table 71 Details of plantation selected in Nuzvid range

Sl.no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSHWS plantation at Katrenipadu beat	DSO 31 (2018-19)

The plantation is established on sandy stone and red sandy loamy soils, which offer good drainage. However, due to lower nutrient retention, supplemental nutrient management is recommended to support long-term plant health and growth.

Survival Percentage: Moderate survival was recorded for: *Terminalia arjuna:* 78.01%, *Azadirachta indica*: 79.33%. High survival was observed for: *Albizia odoratissima*: 84.29%, *Syzygium cumini*: 84.29%.

Growth: Average height: 4.17 to 7.67 meters, average girth: 29.73 to 43.04 cm. The Variation in tree height and girth among plots can be attributed to differences in soil conditions and environmental factors.

Table 72 Details of plantation enumerated in Nuzvid range

Sl. no.	Plantation/ Village name	Plot no	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Katrenipadu	1	*Terminalia arjuna*	N 15.772051 E 80.933785	85.12	4.17 ±0.51	34.09 ±7.59
		2	*Albizia odoratissima*	N16.771863 E 80.933421	84.29	4.31 ±0.79	32.16 ±8.41
		3	*Azadirachta indica*	N 16.769560 E 80.932668	79.33	4.97 ±0.87	29.73 ±6.50
		4	*Syzygium cumini*	N 16.769540 E 80.933177	86.77	5.40 ±0.43	39.11 ±8.60
		5	*Terminalia arjuna*	N 16.768255 E 80.932218	70.9	7.67 ±0.89	40.85 ±4.64
			Syzygium cumini		81.81	6.44 ±0.60	43.04 ±12.63
Plantation average					**81.36**	**5.49**	**36.49**

Verification of plantation area and boundaries

In Krishna division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 73 Details of plantation area perambulation in Krishna division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Raising of 20 Ha plantation at Katrenipadu	20 Ha	24.41 Ha

The area verified during perambulation was found to be larger than the area recorded in official documents by 4.41Ha in Katrenipadu. This discrepancy is likely due to the inclusion of certain patches within the demarcated plantation boundaries that comprise waste, degraded, or rocky land.The verification was carried out by physically Perambulation of the entire area using a Geo Tracker.The Perambulation was done in presence of forest officer and as per the demarcation shown by the watcher/guard working as in-charge of the plantation.Geotagged images captured during the perambulation are provided below for reference.

Katrenipadu 27.07 Ha

Katrenipadu, Nuzvid range

Health Status of Plantation: During the field observations, it was noted that the plantation area showed no visible signs of insect-related damage. The foliage appeared healthy, with no evidence of defoliation, boring marks, or other symptoms typically associated with insect infestation. This indicates that the plantation is currently free from any major pest outbreaks, suggesting effective natural control or the absence of conducive conditions for insect proliferation.

Protection Measures: To safeguard the plantations against fires and other environmental risks, protection measures such as the creation and maintenance of fire lines, development of inspection paths, and engagement of fire watchers were implemented. These interventions contribute to reducing the vulnerability of plantations, especially during dry seasons.

Biotic Pressure on Plantations: Field observations revealed that grazing and browsing pressure from both humans and cattle was minimal within the plantation area. Only a few instances of hoof marks and lightly nibbled foliage were noticed, indicating occasional but not significant biotic interference.

Maintenance of Plantation Journals and Records: The plantation journals were found to be well-maintained, with all baseline information recorded appropriately. However, it was noted that periodic updates to the journals particularly regarding survival rates, growth parameters, and maintenance activities necessary to ensure they reflect current field realities.

VanaSamrakshanSamithi (VSS): Among the plantation sites selected in the Nuzvid range for monitoring and evaluation, no involvement of VanaSamrakshanaSamithi (VSS) was observed in the establishment or maintenance of the plantations. Consequently, the Focus Group Discussion (FGD) activity could not be conducted. This highlights a gap in community participation, which is essential for the longterm sustainability and protection of forest assets under the CAMPA framework.

2. Monitoring and Evaluation of Maintenance Activities

A total of 32 maintenance activities were carried out in Krishna division during 2018-19, of which six activities were selected for monitoring. Mylavaram accounted for the maximum with 11 activities (1 sampled), followed by Vijayavada with 14 (3 sampled) and Nuzvid with 7 (2 sampled).

Table 74 Maintenance activities selected for evaluation in Krishna division

Sl no.	Maintenance activities	GPS Co ordinates	SO no. and year
Mylavaram range			
1	First year mainitennace of 7.20 Ha NTSHWS plantation in Kakarla RF and beat of Mylavaram range	N 17.057651 E 80.606960	DSO 98 (2018-19)
Nuzvid range			
2	Second year maintenance of 15 Ha NTSHWS plantation at Kotapadu RF.	N 17.050246 E 80.950833	DSO 38 (2018-19)
3	Third year maintenance of 15 Ha NTSHWS plantation at Kotapadu RF.	N 17.050137 E 80.951037	DSO 39 (2018-19)
Vijayawada range			
4	First year maintenance of 15.57 Ha NTSHWS strip plantation at Budawada RF, Jaggaiahpeta Section	N 16.867995 E 80.045092	DSO 117 (2018-19)
5	Third year maintenance of 5 Ha. NTSHWS plantation at Gandrai RF bit II, Gandrai beat	N 16.951831 E 80.095016	RSO 27 (2018-19)
6	Third year maintenance of 10 Ha. GAP plantation at Kothuru RF, K Tadepalli beat	N 16.599692 E 80.641040	RSO 32 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), semi lunar trenches, coppice management, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantation. However, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control Lantana and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines, with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments, and complement contingency records.
- Maintain accurate and updated plantation journals, markers, and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.

Kakarla beat Mylavaram range

Kotapadu beat in Nuzvid range

K. Tadepalli beat Vijayawada range

Budawada beat, Vijayawada range

3. Monitoring and Evaluation of Protection Activities

During 2018–19 the Andhra Pradesh Forest Department undertook three protection activities under the CAMPA scheme. For the purpose of monitoring and evaluation, a representative sample of 20 %, comprising two protection activities was selected, in Mylavaram range 1 implemented (1 sampled), Vijayawada 2 implemented 1 sampled and in nuzvid none were selected for detailed assessment.

3.1 Creation of Fire lines in A. Konduru RF and beat of Mylavaram range

GPS location: N 16.955703 E 80.623573 **SO no. and year:** RSO 48 (2018-19)

A fire line was created A.Konduru beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 3300rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line is limited, despite its location within the Reserve Forest (RF). Moderate growth of grass and weeds has been observed along the fire line, indicating the need for regular maintenance. Periodic clearing is recommended to improve visibility and ensure the fire line remains effective in controlling the spread of forest fires.

3.2 Creation of fire lines in comp no. 26 Kondapalli RF, Mulapadu beat

GPS location: N 16.666396 E 80.494593 **SO no. and year:** RSO 80 (18-19)

A fire line was created Mulapadu beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 2500rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line is not clearly evident, suggesting that the fire line might

not be well-maintained or visible enough for effective fire control. Additionally, the growth of dense grass or weeds along the fire line has been observed, which can reduce its effectiveness. Regular maintenance is recommended to clear the vegetation, ensuring the fire line remains functional and capable of preventing the spread of forest fires.

A. Konduru beat Mylavaram range

Mulapadu beat Vijayawada range

4. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

A total of 57 SMC activities were carried out during 2017-18, of which 12 were sampled. The mylavaram range reported 28 activity (6 sampled), Nuzvid range reported 4 activity (1 sampled) and Vijayawada reported 25 activity (5 sampled).

4.1 Digging of percolation tank III in Kakarla RF and beat of Mylavaram range

GPS location: N 17.054429 E 80.612447**SO no. and year:** RSO 03 (2018-19)

4.2 Digging of percolation tank II in Dasullapalem RF, Chandragudem beat

GPS location: N 16.831891 E 80.594393 **SO no. and year:** RSO 17 (2018-19)

4.3 Estimate for digging of mini percolation tank in Katrenipadu forest beat.

GPS location: N 16.768911 E 80.931226 **SO no. and year:** DSO 24 (2018-19)

Percolation tank in Kakarla, katrenipadu and chandragudem beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the perculation tank were: length – 10 m, width – 10m, and depth – 1.00 m with volume of 205 cum as per measurement book. The dimensions in field: length – 10 m, width – 10 m, and depth – 0.80 m with volume less than 205 cum. Due to accumulation of silt, tank capacity has been reduced. Hence, there is a need for de-siltation activity. The percolation tank is generally well maintained; however, being located in a low-lying area, it has experienced significant silt accumulation. Additionally, the stone dry packing along the tank's edges has been displaced due to water overflow during the monsoon season. To preserve the tank's full storage capacity and structural integrity, regular desilting and maintenance of the stone packing are recommended.

4.4 Digging of percolation tank II in Tholukodu RF, Velvadam beat of Mylavaram

GPS location: N 16.824641 E 80.669203 **SO no. and year:** RSO 11 (2018-19)

Percolation tank in Velvadam beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the perculation tank were: length – 10 m, width – 10m, and depth – 1.00 m with volume of 205 cum as per measurement book. The dimensions of the percolation in field: length – 10 m, width

– 10 m, and depth – 0.60 m with volume less than 205 cum.Due to accumulation of silt, tank capacity has been reduced. Hence, there is a need for de-siltation activity. Due to its location in a low-lying area, the percolation tank has experienced increased silt accumulation. The stone dry packing along the tank's length has also been disturbed at the edges as a result of water overflow during the monsoon season. To ensure the tank maintains its full storage capacity and functions effectively, regular desilting and maintenance are essential.

4.5 Digging of percolation tank II in Chandragudem RF and beat of Mylavaram range

GPS location: N 16.816092 E 80.594619 **SO no. and year:** RSO 15 (2018-19)

Percolation tank in Chandragudemwas monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the perculation tank were: length – 10 m, width – 10m, and depth – 1.00 m with volume of 205 cum.The field measurements matched those in the measurement book, indicating no deviations.Due to accumulation of silt, tank capacity has been reduced. Hence, there is a need for de-siltation activity. Since the tank is situated in a low-lying area, some accumulation of silt has been observed. The stone dry packing along the tank's length has been distorted at the edges due to water overflow during the monsoon season. Regular desilting of the percolation tank is necessary to maintain its storage capacity at an optimal level.

4.6 Digging of percolation tank I in Dasullapalem RF, Chandragudem beat

GPS location: N 16.831805 E 80.594423 **SO no. and year:** RSO 16 (2018-19)

Percolation tank in Chandragudem beatwas monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the perculation tank were: length – 10 m, width – 10m, and depth – 1.00 m with volume of 205 cum as per measurement book. The dimensions of the percolation tank in field: length – 10 m, width – 10 m, and depth – 0.70 m with volume less than 205 cum.Due to accumulation of silt, tank capacity has been reduced. Hence, there is a need for de-siltation activity. As the tank is located in a low-lying area, a higher accumulation of silt has been observed. The stone dry packing along the tank's length has been distorted at the edges due to water overflow during the monsoon, and the side bunds have been damaged. Regular desilting and maintenance of the percolation tank are essential to restore and maintain its full storage capacity.

4.7 Digging of percolation tank III in Kakarla RF, Kakarla beat of Mylavaram range

GPS location: N 17.054429 E 80.613595 **SO no. and year:** RSO 38 (2018-19)

Percolation tank in Kakarla beatwas monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the perculation tank were: length – 10 m, width – 10m, and depth – 1.00 m with volume of 205 cum as per measurement book. The dimensions of the percolation tank in field: length – 12m, width – 12 m, and depth – 1 m with volume less than 205 cum. Well maintained and in effective use field measurements were more than the actual measurements noted in the records. The percolation tank is well maintained, and water storage was observed during the visit, owing to its location in a low-lying area. However, the stone dry packing along the tank's length has been distorted at the edges due to water overflow during the monsoon season. Regular desilting is necessary to maintain the tank's storage capacity at its fullest extent.

4.8 Digging of percolation tank at comp.no. 01, Gandrai RF in Gandrai beat, Jaggaiahpeta section of Vijayawada range

GPS location: N 16.964257 E 80.091633 **SO no. and year:** RSO 05 (2018-19)

4.9 Digging of percolation tank at comp.no. 01, Gandrai RF in Gandrai beat, Jaggaiahpeta section

GPS location: N 16.964764 E 80.093126 **SO no. and year:** RSO 06 (2018-19)

4.10 Estimate for desilting of percolation tank at kothuru RF, comp no.58 in Vijayawada range

GPS location: N 16.659428 E 80.647886 **SO no. and year:** RSO 99 (2018-19)

4.11 Digging of percolation tank at comp.no. 01, Gandrai RF in Gandrai beat, Jagaaiahpeta section

GPS location: N 16.963158 E 80.095623 **SO no. and year:** RSO 51 (2018-19)

4.12 Digging of percolation tank at comp no. 60 Kothuru RF in K. Tadepalli beat of Vijayawada section of Vijayawada range

GPS location: N 16.59411 E 80.631397 **SO no. and year:** RSO 78 (2018-19)

Percolation tank in Kothuru RF, Gandrai (RSO 5, 6 and 51) and Tadepalli beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the percolation tank were: length – 10 m, width – 10m, and depth – 1.00 m with volume of 205 cum. The field measurements matched those in the measurement book, indicating no deviations. Due to accumulation of silt, tank capacity has been reduced. Hence, there is a need for de-siltation activity. Well maintained, as the tank is present in a low ground more accumulation of silt is observed. The stone dry packing in the tank length has been distorted at the edges due to the overflow of water in the tank during monsoon. Regular de-siltation of the percolation tank is required to maintain the storage capacity to its fullest extent.

Kothuru RF Vijayawada range

Kakarla beat Mylavaram range

Katrenipadu beat Nuzvid range

Gandrai beat, Vijayawada range

5. Monitoring and Evaluation of Construction Activities

There were one construction activities in the division during 2018-19, of which one was sampled. One activity taken up in the Vijayawada range. No construction activity was recorded in other ranges of Krishna division.

5.1 Construction of boundary pillars at comp no. 26 & 28, Kondapalli RF, Mulapadu beat in Konchikacherla section of Vijayawada range

GPS Location: N 16.639212 E 80.485823 **SO no. and year:** DSO 154 (2018-19)

Construction of boundary pillars at Mulapadu beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the boundary pillars enclosure are as follows; Height-1.20 m, top width-1 m and bottom width-1.30 m. The basal part of the pillar has been submerged under the soil. These pillars are intact and effectively mark the boundary. Furthermore, all the pillars are reported to be in **good condition**, indicating that the construction work was carried out successfully and the pillars are effectively serving their role in preventing encroachments and ensuring proper land management.

Boundary pillars at Mulapadu beat

6. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 45 activities were carried out during 2017–18, of which nine were sampled for verification. The maximum number of activities was reported in Mylavaram with 13 activities (three sampled), followed by Vijayawada with 24 activities (five sampled) and Nuzvid with eight activities (one sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff. The review covered sanction orders, estimation sheets, and work registers. Sanctioned amounts were found to be in alignment with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials, including the DFO, SDO, and FRO. Utilization of funds was appropriate and consistent with approved estimates and CAMPA guidelines. Both internal and external audits—conducted by the Conservator of Forests and the Accountant General's Office, respectively—confirmed transparency and compliance with financial and administrative protocols. However, in Krishna division, estimates for RSO 60 (18-19) and RSO 63 (18-19) were not presented for verification.

Key Findings

- Survival rates exceeded 75%, marking a notable improvement over previous year.
- Mismatches between recorded and actual plantation areas continue, highlighting concerns regarding data accuracy.

- Although Soil and Moisture Conservation (SMC) structures were widely implemented, their effectiveness was limited due to lack of regular desilting.
- Construction of boundary pillars effectively mitigated encroachment risks and enhanced area security.
- Weak participation from Vana Samrakshana Samithis (VSS) impacted long-term sustainability and local ownership of interventions.

Recommendations

- Expand nutrient management practices and introduce appropriate soil amendments, particularly in sandy and red soil areas, to support sustained plantation growth.
- Institutionalize annual desilting of Soil and Moisture Conservation (SMC) structures and timely repairs of stone bunds to maintain their effectiveness.
- Ensure plantation signage and journals are consistently updated. Initiate digitization of plantation records to support real-time monitoring and transparency.
- Regularly clear and maintain fire lines, integrating these efforts with community-based fire-prevention squads for improved responsiveness.
- Strengthen participation of Vana Samrakshana Samithis (VSS), particularly in underperforming areas like Mylavaram and Nuzvid, using successful models such as Gandrai as a reference.
- Link the installation of boundary pillars with geo-referenced cadastral mapping to accurately define plantation extents and proactively prevent encroachments.

16. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN ELURU DIVISION

Introduction

Eluru division encompasses an extensive forest landscape spanning 1,678.11 km², playing a vital role in maintaining the ecological stability of the region. The forest composition within the division is notably skewed toward Open Forest (OF), which occupies the largest share at 826.19 km². This is followed by Moderately Dense Forest (MDF) at 485.22 km² and Very Dense Forest (VDF) at 366.70 km². The dominance of Open Forest is a point of concern, as it makes the division more susceptible to fragmentation, degradation, and biotic pressures such as grazing, illicit felling, and encroachment. Over recent years, the division has suffered a net forest loss of 6.88 km², coupled with the expansion of scrublands over 23.68 km², underscoring the pressing challenges to the sustainability of its forest cover. The landscape predominantly supports Southern Dry Mixed Deciduous Forests, interspersed with extensive plantation areas. In summary, Eluru Division's Forest landscape holds immense ecological significance but faces challenges related to forest loss, scrubland expansion, and fire vulnerability. The proactive management strategies in place, particularly community involvement and preventive fire control measures, are crucial to sustaining and enhancing the health of these forests for long-term ecological balance and watershed security.

In Eluru division, a total of 228 CAMPA activities were carried out, of which 50 activities (around 21 %) were selected for detailed monitoring and evaluation. In Eluru range, 35 activities were implemented, and 8 were sampled. In J R Gudemrange, 46 activities were implemented, and 10 were sampled. In Kannapuram 44 activities were implemented, with 10 sampled. In Kukunoor range, 33 activities were implemented, and 8 were sampled. In Polavaram range 37 activities implemented, with 6 sampled and Amaravaram 33implemeted 8 sampled. Among activity types, others dominated with 115 activities (24 sampled), followed by soil and moisture conservation (79; 19sampled), maintenance (34; 7 sampled) and none were selected from plantation, protection, and construction activities.

1. Monitoring and Evaluation of Maintenance Activities

A total of thirty-four maintenance activities were carried out in eluru division during 2018-19, of which seven activities were selected for monitoring. Eluru accounted for the maximum with 16 activities (3 sampled), JR Gudem 11 (2 sampled), Kannapuram 4 (1 sampled) and Kukunoor 3 (1 sampled).

Table 75 Maintenance activities selected for evaluation in Eluru division

Sl no.	Maintenance Activities	GPS Co ordinates	SO no. and year
Eluru range			
1	Third year maintenance operations in 10.00 ha. 2015 teak wood Plantation in Bhogole	N 16.904136 E 81.048053	DSO 186 (2018-19)
2	First year maintenance operations in 20.00 ha 2017 at Adamilli (V)	N 16.941948 E 81.184420	DSO161 (2018-19)
3	Second year maintenance operations in 10.00 ha 2016 non-teak hard wood plantation in Recherla (V)	N 17.080195 E 81.034402	RSO 08 (2018-19)
JR Gudem range			
4	Second year maintenance of (Bamboo+NTSHW) plantation (20 Ha) at Jeelugumilli beat	N 17.189489 E 81.102081	DSO 177 (2018-19)

5	Second year maintenance of 2016 Bamboo plantation (25 Ha) at Bandarlagudem, Mulagalampalli beat	N 17.214236 E 81.253225	DSO 181 (2018-19)
Kannapuram range			
6	First year maintenance of 2017 NTSHW plantation Karakapadu beat 20 ha	N 17.167026 E 81.508729	DSO 165 (2018-19)
Kukunoor range			
7	First Year maintenance of 20 NTSHW Plantation in Goparajugudem beat of Kukunoor section.	N 17.5314067 E 81.143579	DSO 148 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, formation of saucers, weeding operations, soil tilling (inter-ploughing), coppice management, pruning of lower branches, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control Lantana and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines, with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments, and complement contingency records.
- Maintain accurate and updated plantation journals, markers, and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.

Adamilli, Eluru range

Jeelugumilli JR Gudem range

Goparajugudem, Kukunoor range

Karakapadu, Kannapuram range

2. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

A total of 79 SMC activities were carried out during 2018-19, of which 19 were sampled. The polavarm range reported 18 activity (3 sampled).Thekannapuram range reported 21 activity (5 sampled). The JR Gudem reported 16 (5 sampled), amaravaram (12; 3),kukunoort(12;3).

2.1 Construction of check dam (12Mts) at RepalliKaluvaCheelika of Gullapudi beat

GPS Location: N 17.337336E 81.381049 **SO no. and year:** DSO 68 (2018-19)

2.2 Construction of check dam at ErumaddigudemKaluva Cheelika-1 of Gullapudi

GPS Location: N 17.271868 E 81.372987 **SO no. and year:** DSO 66 (2018-19)

Check dam constructed in Gullapudibeat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 12m, breadth- 1.60 m and depth-1.35 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. Minor repairs are required for the apron wall. Incheelika 1 check dam is completely damaged. De-silting is necessary to enhance the storage capacity, and removal of weed growth is recommended for proper maintenance.

2.3 Construction of check dam (9 m) at KhanaSthalamCheeluka in Doramamidi beat

GPS Location: N 17.33755 E 81.338278 **SO no. and year:** DSO 217 (2018-19)

Check dam constructed in doramamidi beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 9m, breadth- 1.50 m and depth-1.40 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. Minor repairs are required for the apron wall. In cheelika 1 check dam is completely damaged. De-silting is necessary to enhance the storage capacity, and removal of weed growth is recommended for proper maintenance.

2.4 Construction of check dam at Gadha Konda Cheeluka in Doramamidi beat

GPS Location: N 17.339082 E 81.338722 **SO no. and year:** DSO 218 (2018-19)

Check dam constructed in kollumamidi beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 12m, breadth- 1.50 m and depth-1.40 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations.

Minor repairs are required in the apron section of the check dam. Additionally, de-silting is necessary to increase the storage capacity by removing accumulated silt and sediment.

2.5 Construction of 14 m check dam at Chakali Goti Kalava of Sridhara beat

GPS Location: N 17.611939 E 80.907604 **SO no. and year:** DSO 221 (2018-19)

Check dam constructed in Sridhara beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 15m, breadth- 1.5 m and depth-1.50 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The check dam was completely damaged, with only the side walls remaining intact. The main body wall and apron were destroyed, reportedly due to floods. Dense jungle growth and weeds were also observed across the structure.

2.6 Construction of 8 Mts Check dam at Kothuru of Kothuru beat

GPS Location: N 17.58913 E 80.970521 **SO no. and year:** DSO 261 (2018-19)

Check dam constructed in Kothuru beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 8m, breadth- 0.70 m and depth-1.50 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. Minor repairs are required in the apron and wing wall. The structure shows signs of wear and reduced functionality. Additionally, total water holding capacity of the check dam has significantly reduced due to the accumulation of silt and sediment.

2.7 Construction of Check Dam at SudhaKaluva -1 of Vinjaram beat

GPS Location: N 17.572277 E 81.101520 **SO no. and year:** DSO 40 (2018-19)

Check dam constructed in vinjaram beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 14m, breadth- 1.0 m and depth-1.50 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. Minor repairs are required in the apron and wing wall. The structure shows signs of wear and reduced functionality. Additionally, the total water holding capacity of the check dam has significantly reduced due to the accumulation of silt and sediment. Plastering is needed

2.8 Construction of check dam on Saripalli Kaluva-2 of LND Peta beat

GPS Location: N 17.235213 E 81.503818 **SO no. and year:** DSO 25A (2018-19)

Check dam constructed in LND Peta beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 8.50m, breadth- 1.60 m and depth-1.35 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The check dam is in overall good condition; however, minor damage was observed in the apron section. Minor repairs are required to maintain structural integrity. Additionally, de-silting is necessary to enhance the storage capacity by removing accumulated silt and sediment.

2.9 Construction of Check dam on AddakondaKaluva of Kopalli beat

GPS Location: N 17.268267 E 81.465534 **SO no. and year:** DSO 30A (2018-19)

2.10 Construction of check dam on AddakondachiirikaKaluva of Kopalli beat

GPS Location: N 17.268626 E 81.464706**SO no. and year:** DSO 31 (2018-19)

Check dam constructed in kopalli beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 10 m, breadth- 1.60 m and depth-1.35 m. But the length in kopalli beat (DSO 31) is 8 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The check dam is in overall good condition; however, minor damage was observed in the apron section. Minor repairs are required to maintain structural integrity. Additionally, de-silting is necessary to enhance the storage capacity by removing accumulated silt and sediment.

2.11 Construction of check dam on NarsigandiKaluva of PR Gudem beat

GPS Location: N 17.256591 E 81.425543 **SO no. and year:** DSO 235 (2018-19)

2.12 Construction of check dam on Gorrela Lanka Kaluva of Kovvada beat

GPS Location: N 17.25655 E 81.425557**SO no. and year:** DSO 237 (2018-19)

Check dam constructed in gudem and kovvada beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 10 m, breadth- 1.60 m and depth-1.30 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The check dam is in overall good condition; however, minor damage was observed in the apron section. Minor repairs are required to maintain structural integrity. Additionally, de-silting is necessary to enhance the storage capacity by removing accumulated silt and sediment.

2.13 Construction of check dam at Goparajugudem beat of Kukunoor section

GPS Location: N 17.564631 E 81.125713 **SO no. and year:** DSO 223 (2018-19)

2.14Construction of check dam at Goparajugudem beat of Kukunoor section

GPS Location: N 17.564731 E 81.123441 **SO no. and year:** DSO 246 (2018-19)

Check dams constructed in goparajugudem beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 8 m, breadth- 0.20 m and depth-1 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The check dam is in overall good condition; however, minor damage was observed in the apron section. Minor repairs are required to maintain structural integrity. Additionally, de-silting is necessary to enhance the storage capacity by removing accumulated silt and sediment.

2.15 Construction of check dam on Jinnekoyya kaluva-2 in Goparajugudem beat

GPS Location: N 17.548070 E 81.132614 **SO no. and year:** DSO 39 (2018-19)

Check dams constructed in goparajugudem beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The

dimensions were: length- 12 m, breadth- 1 m and depth-1.20 m**.** As confirmed by the concerned beat officer and field observations, the check dam was completely damaged during floods.

2.16 Construction of check dam on Chinna Jalubulaghati Kaluva

GPS Location: N 17.291877 E 81.580964 **SO no. and year:** DSO 191 (2018-19)

2.17 Construction of check dam at Mukkara Konda Kaluva

GPS Location: N 17.289970 E 81.575057 **SO no. and year:** DSO 193 (2018-19)

Check dams constructed in chinnajalubulaghati and Mukkarakonda Kaluvabeat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 10 m, breadth- 1.50 m and depth-1.20 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The check dam is in overall good condition; however, minor damage was observed in the apron section. Minor repairs are required to maintain structural integrity. Additionally, de-silting is necessary to enhance the storage capacity by removing accumulated silt and sediment.

2.18 Construction of check dam on Mulagarlalankakaluva in Nethapakota beat

GPS Location: N 17.293554 E 81.577186 **SO no. and year:** DSO 229 (2018-19)

Check dams constructed in nettapakota beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 15m, breadth- 1.0 m and depth-1.20 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. Minor repairs and plastering are needed in the apron and side walls, along with the removal of weeds. De-silting is also required to restore the check dam's full storage capacity

J R Gudem range

Amaravaram range

Kannapuram range

Kukunoor range

Polavaram range

Addakonda, Kannapuram

3 Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 115 activities were carried out during 2018–19, of which 24 were sampled for verification. The maximum number of activities was reported from Amaravaram (21 activities; 5 sampled), followed by Polavaram (19; 3 sampled), Eluru (19; 3 sampled), Kannapuram (19; 3 sampled), JR Gudem (19; 3 sampled), and Kukunoor (18; 4 sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff. The review covered sanction orders, estimation sheets, and work registers, revealing that sanctioned amounts were in line with actual expenditures. All financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was appropriate and consistent with approved estimates and CAMPA guidelines. Both internal (by Conservator of Forests) and external (by Accountant General's office) audits were carried out, ensuring transparency and compliance with financial protocols. However, certain records were not available during verification: in Amaravaram Range, estimates for DSO 254, DSO 127, RSO 1, RSO 26, and RSO 27 (2018–19) were not presented; in Eluru Division, the work register for DSO 221 (2018–19) was missing; in JR Gudem, estimates and work registers for DSO 122 (2018–19) were not available; in Kannapuram, sanction orders for DSO 142 and DSO 143 (2018–19) were not presented; and in Kukunoor Range, estimates for RSO 35, RSO 21, RSO 24, and DSO 144 (2018–19) were unavailable during verification.

Key Findings

- Maintenance activities were carried out as prescribed, but weakened by missing signage and incomplete record updates.
- SMC works matched design specifications but were severely compromised by siltation, structural damage, and lack of upkeep, with some check dams completely damaged.
- No plantations, protection, or construction activities were implemented, limiting ecological outputs.
- "Other works" dominated the portfolio, executed with financial compliance, though record-keeping gaps were noted in multiple ranges.

Recommendations

- Strengthen maintenance through intensified weeding, coppice regulation, casualty replanting, and consistent updating of plantation journals and signage.
- Institutionalize periodic desilting and repair schedules for check dams and SMC structures to restore and sustain functionality.

- Reintroduce plantations and protection measures to enhance ecological outcomes and balance the activity portfolio.
- Reduce dependence on “other works” by allocating greater resources to ecological interventions.
- Improve record management and mandate submission of all registers and estimates for verification.
- Promote active VSS participation in maintenance and monitoring to reinforce accountability and long-term stewardship.

17. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN ELURU WLM DIVISION

Introduction

WLM Eluru Division is relatively small but ecologically significant, encompassing 82.92 km² of forest area. Its composition includes Very Dense Forest (VDF) covering 44.13 km² and Moderately Dense Forest (MDF) spanning 38.79 km², with no Open Forest (OF) recorded. The division has shown a forest gain of 5.87 km², reflecting effective management and natural regeneration. Notably, scrubland is almost negligible (0.07 km²), indicating excellent forest integrity and possibly intensive protection efforts. Due to its compact size and strategic location, WLM Eluru Division is less fire-prone and plays a vital role in coastal protection, biodiversity conservation, and fishery support.

In Eluru WLM Division during 2018-19, a total of 84 CAMPA activities were carried out, of which 17 activities (around 20 %) were selected for detailed monitoring and evaluation. Among activity types, other works dominated with 82 activities (16 sampled), followed by Maintenance (2; 1 sampled). None of the plantation projects, construction, protection, soil and moisture conservation works were implemented.

6. Monitoring and Evaluation of Maintenance Activities

In the Eluru WLM Division during 2018-19, a total of two maintenance activities were carried out under CAMPA, of which one activity (approximately 20 %) was selected for monitoring and evaluation

1.1 Maintenance of EEC (Environmental Education Centre) at Atapaka in Kaikaluru WLM

GPS location: N 16.568391 E 81.226587 **SO no. and year:** RSO 1 (2018-19

As per the approved maintenance plan, the following activities were committed for execution changes for topographical survey of pelican pond at Atapaka. However, during the monitoring visit, only the following activities were found to have been executed;

- Infrastructure maintenance**:** The infrastructure of the Environmental Education Centre has been well maintained. All statues and structures are in good condition and clean.
- Display boards: Informative display boards providing detailed information about local species have been installed in the surroundings of the EEC, contributing to visitor awareness and education.
- Site map: A clear site map has been installed, providing visitors with orientation and helping them understand the layout of the sanctuary and important points of interest.
- General Upkeep: The premises are clean, well-organized, and maintained to a satisfactory standard.

Conclusion

The Environmental Education Centre at Kolleru Wildlife Sanctuary is being maintained in accordance with the approved plan. Key components such as infrastructure, species information displays, site mapping, and overall cleanliness have been successfully implemented and are contributing positively to the educational and environmental goals of the Centre.

Environmental education center at Atapaka (Kolleru wild life sanctuary) in Kaikaluru range WLM Eluru range

7. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 82 activities were carried out during 2018–19, of which 16 were sampled for verification. The document verification and cross-checking were conducted in the presence of Division and Range office staff. The review covered sanction orders, estimation sheets, and work registers, confirming that the sanctioned amounts were consistent with actual expenditures. All financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). The utilization of funds was found to be appropriate and in accordance with approved estimates and CAMPA guidelines. Both internal audits (by the Conservator of Forests) and external audits (by the Accountant General's office) were conducted, ensuring transparency and compliance with financial and administrative protocols under the CAMPA scheme. However, the work registers for RSO 7, RSO 5, and RSO 9 for the year 2018–19 were not presented during the verification process.

Interaction with DFO of Eluru WLM division

Key Findings

- The Environmental Education Centre at Atapaka was well maintained, with infrastructure, species information boards, and site mapping contributing effectively to education and awareness.
- No plantation, protection, SMC, or construction activities were taken up, limiting ecological outcomes.
- "Other works" dominated the activity profile, implemented with financial discipline, though gaps in submission of registers were noted.

Recommendations

- Strengthen ecological impact by reintroducing plantation, protection, and SMC works in future years.
- Maintain and expand education and awareness facilities like the EEC, ensuring sustained upkeep and visitor engagement.
- Address documentation gaps by ensuring that all registers and records are presented during verification.
- Rebalance CAMPA investments to reduce over-reliance on "other works" and enhance ecological outcomes.
- Involve local communities and schools in EEC activities to build broader awareness and stewardship of conservation values.

18. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN CHINTUR DIVISION

Introduction

Chintur Forest Division, located in eastern Andhra Pradesh within the Alluri Sitarama Raju District, is an ecologically important area at the junction of the Eastern Ghats and Deccan Plateau. Covering about 145,000 hectares, including 25,000 hectares of Papikonda National Park, it is a biodiversity hotspot with predominantly tropical dry deciduous forests. The dominant tree species include Teak, *Terminalia*, *Anogeissus*, *Pterocarpus marsupium* and others with an understory of shrubs and bamboo in moist areas. The Godavari River enriches the ecosystem, supporting both wildlife and tribal communities, including migrant groups like the Guthikoya. The division faces significant threats from encroachment—about 6,000 hectares have been cleared for cultivation and settlement—and shifting agriculture (Podu cultivation), which degrade the forest. Additional challenges include staff shortages, illegal logging, poaching, and smuggling. Despite these pressures, the forest remains vital for local tribal livelihoods, especially through the collection of non-timber forest products like tendu leaves, providing employment to thousands. Overall, Chintur Forest Division is an ecologically rich but vulnerable region requiring strengthened protection and sustainable management to conserve biodiversity and support the socio-economic well-being of its tribal communities.

During the period 2018-19, a total of 140 CAMPA activities were implemented in Chintur Forest Division. Of these, 33 activities, representing approximately 23%, were selected for detailed monitoring and evaluation. Among the five forest ranges, Nellipaka carried out the highest number of activities with 43, of which 9 were evaluated. Lakkavaram followed closely with 36 activities, with 9 selected for evaluation. Chintur implemented 24 activities with 7 included in the evaluation sample. Kunavaram carried out 21 activities with 4 sampled, while V.R. Puram conducted 16 activities, of which 4 were selected for evaluation. In terms of activity type, SMC works constituted the largest share with 94 activities implemented and 19 sampled. This was followed by other activities (21 implemented; 6 sampled), plantation (12; 4), maintenance (10; 3) and protection (3; 1). Notably, no construction works were reported during this period.

1. Monitoring and Evaluation of Plantation Activities

During the period 2018-19, Chintur Forest Division implemented a total of 12 plantation activities under the CAMPA programme, with 4 activities (approximately 33%) selected for monitoring and evaluation. Range-wise, Nellipaka carried out the highest number of plantation activities with 4, of which 1 was sampled. V.R. Puram implemented 3 activities and 1 was sampled. Kunavaram and Lakkavaram each carried out 2 plantation activities; however, only Lakkavaram had 1 activity selected for evaluation, while none were sampled from Kunavaram. Chintur implemented 1 plantation activity which was included in the evaluation sample.

1.1 Chintur range

During 2018–19, a total of one plantation activity was implemented under the CAMPA scheme in Chintur range. For monitoring and evaluation, 100 % of the activity, equivalent to one plantation site, was selected for assessment.

Table 76 Details of plantation selected in Chintur range

Sl. no.	Plantation	SO no. and year
1	Raising of *Bamboo* plantation (10 Ha) at Tellavarigudem beat of Kunduluru section	DSO 40 (2018-19)

The 10-hectare *Dendrocalamus strictus* plantation at Tellavarigudem has performed poorly due to a combination of unsuitable site conditions, lack of community involvement and inadequate maintenance. The plantation is situated on sandy, hard and gravelly soil which has poor water retention and nutrient availability conditions unfavorable for bamboo growth. This has resulted in a low survival rate of just 12.96% with most surviving plants exhibiting stunted growth and limited productivity. Growth observations from the Chintur range indicate an average plant height of 1.50 to 5.75 meters, a clump girth of 5.83 to 8.50 cm and an average of 8 culms per clump each with a culm girth of 1.75 to 2.38 cm.

Table 77 Details of plantation enumerated in Chintur range

Sl no.	Plantation name	Plot no.	Species name	GPS Coordinates	Average growth			Survival (%)
					Avg. Clump Height (m)	Avg. Clump GBH (cm)	Avg. Culm GBH (cm)	
1	Tellavarigudem 10 Ha Bamboo plantation	1	*Dendrocalamus strictus*	N 17.629800 E 81.378944	4.08 ±1.80	5.83 ±2.32	2.17 ±0.41	16.66
		2	*Dendrocalamus strictus*	N 17.630007 E 81.378994	1.50 ±0.41	7.50 ±0.58	2.38 ±0.48	11.11
		3	*Dendrocalamus strictus*	N 17.629950 E 81.379452	5.75 ±0.65	8.50 ±0.58	1.75 ±0.29	11.11
Plantation average					**3.77**	**7.27**	**2.1**	**12.96**

1.2 Lakkavaram range

During 2018–19, a total of two plantation activities were implemented under the CAMPA scheme in Lakkavaram range. For monitoring and evaluation, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 78 Details of plantation selected in Lakkavaram range

Sl. no.	Plantation	SO no. and year
1	Raising of NTSHW plantation (5 Ha) in Dabbagudem north beat of Dabbagudem section	DSO 35 (2018-19)

The 5-hectare plantation at Dabbagudem under the Lakkavaram range has demonstrated poor overall performance, primarily due to a species-site mismatch and high biotic pressure. The site is dominated by black soil, interspersed with patches of red soil, both of which significantly influence moisture retention and nutrient dynamics. However, the selected species Terminalia elliptica, Syzygium cumini, Butea monosperma, and Albizia chinensiswere found to be unsuitable for the prevailing site conditions, leading to very low survival rates of 9.52%, 6.18%,

4.54% and 3.81% respectively. Growth data recorded during the evaluation shows average tree heights ranging from 1.17 to 5.00 meters and girth measurements between 15.67 and 30.00 cm. While a few individuals exhibit moderate growth, the overall plantation health is poor, confirming failure in both establishment and adaptability. During the field assessment of four sample plots, only minimal presence of planted species was observed, further validating the plantation's unsuccessful outcome. Contributing factors include encroachment, excessive grazing and browsing by cattle and lack of community involvement. Interestingly, despite the failure of the planted species, natural regeneration of native species such as *Dalbergia latifolia*, *Lagerstroemia parviflora*, *Syzygium cumini* and *Wrightia tinctoria* was observed indicating the site's potential for supporting native flora under minimal intervention.

Table 79 Details of plantation enumerated in Lakkavaram range

Sl. no.	Plantation name	Plot no	Species name	GPS Co-ordinates	Survival (%)	Average	
						Height (m)	Collar girth(cm)
1	Dabba gudem 5 Ha NTSH plantation	1	*Albizia chinensis*	N 17.767808 E 81.555266	0.82	6.00 ±0	20.00 ±0
		2	*Terminalia elliptica*	N 17.767834 E 81.554484	18.18	3.33 ±0.81	25.50 ±1.37
			Albizia chinensis		6.81	4.67 ±0.28	30.00 ±2.0
			Syzygium cumini		6.81	5.00 ±0.81	30.50 ±1.73
		3	*Terminalia elliptica*	N 17.768335 E 81.554095	5.45	1.17 ±0.28	18 ±2.64
			Butea monosperma		4.54	1.17 ±0.28	15.67 ±4.04
		4	*Terminalia elliptica*	N 17.768325 E 81.554488	4.95	2.50 ±0.31	22 ±4
Plantation average					**6.79**	**3.40**	**18.73**

1.3 VR Puram range

During 2018–19, a total of three plantation activities were implemented under the CAMPA scheme in VR Puram range. For monitoring and evaluation, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 80 Details of plantation selected in V.R. Puram range

Sl no.	Plantation	SO no. and year
1	Raising of *Bamboo* plantation (20 Ha) at Mattapally beat of Buruguwada section	DSO 51 (2018-19)

Note: GPS Location: N 17.624784 E 81.367836

The 20-hectare *Dendrocalamus strictus* plantation established under the CAMPA-NPV scheme in compartment no. 65, Mattapally beat, Buruguwada section, V.R. Puram range has been assessed as a complete failure both in terms of survival and species establishment. The site's red soil proved unsuitable for *D. strictus* which typically requires well-drained loamy soils for optimal growth. A detailed inspection conducted on 05.03.2025 in the presence of forest department staff revealed no surviving bamboo plants with no trace of the species found on

ground. Instead, natural regeneration of native species such as *Terminalia elliptica*, *Madhuca longifolia*, *Chloroxylon swietenia*, *Diospyros melanoxylon*, *Prosopis cineraria* and *Memecylon umbellatum* was recorded reflecting a healthy native ecosystem but complete failure of the plantation objective.

1.4 Nellipaka range

During 2018–19, a total of four plantation activities were implemented under the CAMPA scheme in Nellipaka range. For monitoring and evaluation, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 81 Details of plantation selected in Nellipaka range

Sl. no.	Plantation	SO no. and year
1	Raising of *Bamboo* plantation (15 Ha) at Palamadugu beat of Tunikicheruvu section	DSO 43 (2018-19)

The 15 Ha Dendrocalamus strictus plantation at Palamadugu established on a red soil site has shown very poor performance, both in survival and growth, indicating a clear mismatch between species and site conditions. Red soil, while common in the region, is not ideal for optimal bamboo growth especially for D. strictus which requires better soil structure and moisture retention. A field evaluation revealed that the plantation has an overall survival rate of just 6.94% with only 4 – 5 clumps of bamboo observed in the evaluated plots. Growth parameters were equally unsatisfactory, with an average plant height of 1.50 – 2.00 meters, clump girth ranging from 3.50 – 6.67 cm, culm girth between 1.50 – 2.67 cm and an average of 6 culms per clump all indicating stunted and weak growth. The main causes of poor performance were found to be insufficient maintenance, heavy grazing pressure from cattle and wild herbivores and encroachment into the plantation area.

Table 82 Details of plantation enumerated in Nellipaka range

Sl no.	Plantation name	Plot no	Species name	GPS Coordinates	Average growth			Survival (%)
					Avg. Clump Height (m)	Avg. Clump GBH (m)	Avg. Culm GBH (cm)	
1	Palamadagu 15 Ha Bamboo plantation	1	*Dendrocalamus strictus*	N 17.750405 E 80.992352	1.50 ±0.87	6.67 ±1.53	2.67 ±0.29	8.33
		2	*Dendrocalamus strictus*	N 17.750009 E 80.993225	2.00 ±1.41	3.50 ±0.71	1.50 ±0.0	5.55
Plantation average					**1.75**	**5.08**	**2.08**	**6.94**

Comparative assessment of plantations in Chintur division during 2018-19

Plantations of *Dendrocalamus strictus* and other species across Chintur, Lakkavaram, VR Puram, and Nellipaka ranges have largely failed due to unsuitable site conditions such as poor soil quality (sandy, gravelly, black, and red soils), species-site mismatches, and high biotic pressure. Survival rates were very low (ranging from about 6% to 13%), with stunted growth and poor overall health of the plants. VR Puram plantation was a complete failure with no surviving, though natural native species regenerated well. These outcomes highlight the critical

importance of selecting species that match site-specific soil and climatic conditions for successful plantation establishment.

Verification of plantation area and boundaries: In Chintur division during 2018-19, measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

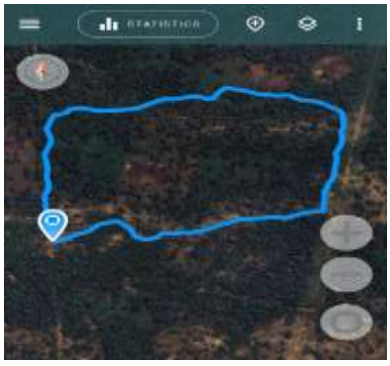
Table 83 Details of plantation area perambulation in Chintur division

Sl no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of *Bamboo* plantation (10 Ha) at Tellavarigudem beat of Kunduluru section	10 Ha	13.64 Ha
2	Raising of NTSHW plantation (5Ha) in Dabbagudem north beat of Dabbagudem section	5 Ha	6.4 Ha
3	Raising of *Bamboo* plantation (20 Ha) at Mattapally beat of Buruguwada section	20 Ha	31.16 Ha
4	Raising of *Bamboo* plantation (15Ha) at Palamadugu beat of Tunikicheruvu section	15 Ha	22.41 Ha

Perambulation of the plantation area was carried out in the presence of the designated Forest Officer and based on the demarcation indicated by the watcher/guard responsible for each site. During the verification process, it was observed that the perambulated area for all five plantations exceeded the officially recorded extent. This variance is primarily attributed to the inclusion of rocky terrain, trenches and barren patches within the plantation boundaries areas that were not accounted for in the original documentation. The actual extent of each plantation was measured using QGIS software, which confirmed the following deviations from the recorded area:

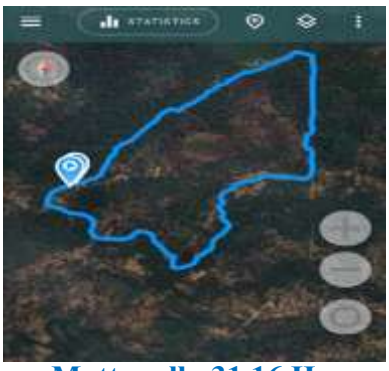
- 10 Ha Bamboo Tellavarigudem plantation (Chintur): Exceeded by 3.64 Ha
- Ha NTSH Dabbagudem north plantation (Lakkavaram): Exceeded by 1.4 Ha
- 20 Ha Bamboo Mattapally plantation (VR Puram): Exceeded by 11.16 Ha
- 15 Ha Bamboo Palamadagu plantation (Nellipaka): Exceeded by 7.41 Ha

The verification was conducted through physical perambulation using the Geo Tracker mobile application, which facilitated the collection of geo-tagged photographs and GPS coordinates for accurate documentation. These visual and spatial records are provided below for reference.

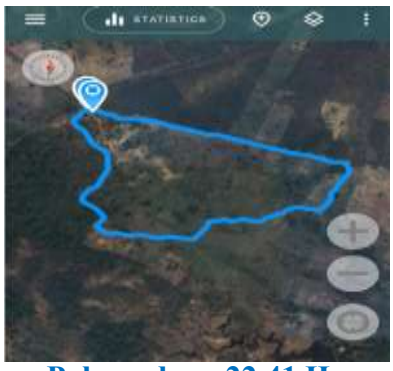


Tellavarigudem 13.64 Ha

Dabbagudem 6.4 Ha



Mattapally 31.16 Ha



Palamadagu 22.41 Ha

Health Status of Plantation: In all four plantations, the overall survival rate and growth performance of the plants were found to be low. Due to poor establishment and limited development of the species, health condition of the plantations could not be assessed in detail. While the naturally regenerated plants showed no visible signs of physiological stress or disease.

Protection Measures: In all four plantations, essential protection measures such as fire lines, inspection paths and the deployment of fire watchers were implemented.

Biotic Pressure on Plantations: Despite the implementation of protection measures, all four plantation sites experienced heavy grazing and browsing by cattle and wild herbivores, which significantly hindered regeneration and compromised overall plantation success.

Maintenance of Plantation Journals and Records: Although plantation journals were maintained at all four sites, they were not regularly updated. Additionally, the absence of plantation display board at all four locations reduced visibility and awareness of the plantation sites. Inspection remarks by department officials are not seen.

Vana Samrakshan Samithi (VSS): At Mattapally and Tellavarigudem, the plantation was implemented and maintained with the involvement of the Vana Samrakshana Samithi (VSS) and a Focus Group Discussion (FGD) was conducted to encourage community participation and assess local perceptions. In contrast, Palamadagu and Dabbagudem plantation lacked VSS involvement, and consequently, no FGD was organized, reflecting limited community engagement in its management.

Tellavarigudem plantation

Dabbagudem plantation

Mattapally plantation

Palamadagu plantation

2. Monitoring and Evaluation of Maintenance Activities

During the period 2018-19, a total of 10 maintenance activities were carried out under the CAMPA scheme across Chintur Forest Division, with 3 of these selected for monitoring and evaluation. Among the ranges, Nellipaka implemented the highest number of maintenance activities with 5, of which 1 was sampled for assessment. VR Puram conducted 4 activities with 1 selected for evaluation, while Chintur reported 1 activity which was also sampled. No maintenance activities were reported from the Lakkavaram and Kunavaram ranges.

Table 84 Maintenance activities selected for evaluation in Chintur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Chintur range			
1	Second year maintenance of Teak plantation (10 Ha) at Kalleru beat of pothampally section	N 17.770628 E 81.430794	DSO 41 (2018-19)
VR Puram range			
2	First year maintenance of 30 ha Bamboo plantation at Maredupudi beat of Jeediguppa section	N 17.521981 E 81.394032	DSO 55 (2018-19)
Nellipaka range			
3	First year maintenance of Teak plantation (25 Ha) in Palamadugu beat	N 17.731227 E 80.999568	DSO 48 (2018-19)

As per the approved maintenance plan, the types of maintenance activities undertaken vary depending on the year following plantation establishment. According to the work register, these operations included casualty replacement, weeding, coppice management, fertilizer application, fire line maintenance, and other contingency measures aimed at promoting plantation survival and growth. However, during the monitoring visit, it was observed that teak growth at the Kalleru plantation was poor with only a few noticeable plants and the plantation board was missing. Similarly, the Maredupudi plantation exhibited average bamboo growth but the plantation board was also not seen. At the Palamadagu plantation, teak plants were not observed and the plantation board was missing as well.

General recommendations for maintenance activities

- Enhance monitoring and maintenance efforts at all plantations to improve plant survival and growth. Specifically, ensure timely replacement of missing or poor-growth plants
- Strictly adhere to the approved maintenance activities such as weeding, fertilization and fire line upkeep.

- Conduct regular site inspections to address any emerging issues promptly and improve overall plantation management effectiveness.

Kalleru beat, Chintur

Maredupudi beat, VR Puram

Palamadagu beat, Nellipaka

3. Monitoring and Evaluation of Protection Activities

During the period 2018-19, Chintur Forest Division carried out a total of 3 protection activities, all within Chintur range. One among these activities was selected for monitoring and evaluation. No protection activities were reported from other ranges during this period.

3.1 Maintenance of fire lines through fire watchers of Chintur section and range

GPS location: N 17.757408 E 81.438482 **SO no and year:** RSO 32 (2018-19)

The fire line established under the CAMPA-NPV scheme in Chintur section measures 3 m in width and 2,500 rmt in length consistent with official records. Although the fire line is present throughout the Chintur section, it is poorly visible due to moderate to dense growth of grass and weeds. Regular maintenance is recommended to ensure the fire line remains functional and effective.

Fire lines at Chintur section

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During the period 2018-19, a total of 94 Soil and Moisture Conservation (SMC) activities were implemented in Chintur Forest Division across five forest ranges. Out of these, 19 activities were selected for monitoring and verification. Specifically, Chintur range had 15 activities implemented with 4 sampled, Kunavaram had 19 activities with 3 sampled, Lakkavaram recorded 31 activities with 7 sampled, VR Puram had 5 activities with 1 sampled, and Nellipaka recorded 24 activities with 4 sampled.

4.1 Staggered trenches in Pothampally beat of Chintur range

GPS location: N 17.758105 E 81.489420 **SO no. and year**: DSO 59 (2018-19)

Staggered trenches constructed at Pothampally beat were monitored and evaluated against the specifications recorded in the measurement book (MB). Field measurements confirmed the dimensions as 10 m in length, 0.5 m in width and 0.5 m in depth fully matching the MB records with no deviations from the approved design. However, heavy accumulation of silt and plant residues was observed in the trenches impairing their capacity and functionality. This build up restricts proper water percolation and soil moisture retention. Regular maintenance has not been evident and immediate de-siltation is necessary to restore the trenches' efficiency.

4.2 Construction of percolation tank at Pothampally beat Chintur range

GPS location: N 17.765506 E 81.483745 **SO no. and year**: DSO 100 (2018-19)

4.3 Construction of percolation tank in Kansuluru beat at Chintur range

GPS location: N 17.759562 E 81.449012 **SO no. and year**: DSO 201 (2018-19)

Percolation tanks at Pothampally and Kansuluru beats were found to match the approved dimensions of 10 meters in length, 10 meters in width, and 1 meter in depth. However, excessive silt, damaged stone packing and weed growth were observed reducing their effectiveness. Regular de-siltation is necessary to maintain full water storage capacity.

4.4 Construction of Check dam at Maddigudem beat of Kunavaram range

GPS location: N 17.742772 E 81.194782 **SO no. and year**: DSO 172 (2018-19)

4.5 Construction of check dam at E.D.Pally beat of Kunavaram range

GPS location: N 17.746487 E 81.195751 **SO no. and year**: DSO 173 (2018-19)

4.6 Construction of Check dam at Tekulaboru beat of Kunavaram range

GPS location: N 17.648700 E 81.2604200 **SO no. and year**: DSO 171 (2018-19)

Check dams constructed across Maddigudem, E.D. Pally, and Tekulaboru beats were monitored and evaluated against the specifications recorded in the measurement book (MB) and verified through field measurements. All three check dams have identical dimensions: 12.00 m in length, 1.40 m in width and 1.20 m in depth. Field verification confirmed that these measurements matched the MB specifications, with no deviations from the approved design. The structures were found to be well maintained; however, their total water holding capacity has been reduced due to silt and sediment accumulation. Additionally, minor repairs are needed in the apron sections. It is recommended that de-silting operations be carried out to restore storage capacity and ensure the continued effectiveness of the check dams.

4.7 Creation of new percolation tank at Thatilanka beat of Kunavaram range

GPS location: N 17.729180 E 81.181742 **SO no. and year**: DSO 196 (2018-19)

Percolation tanks at Thatilanka beat was found to match the approved dimensions of 10 m in length, 10 m in width, and 1 m in depth. However, excessive silt, damaged stone packing and weed growth were observed reducing their effectiveness. Regular de-siltation is necessary to maintain full water storage capacity.

4.8 Construction of mini percolation tank at Gondhigudem beat of Sukumamidi section

GPS location: N 17.791009 E 81.604197 **SO no. and year**: RSO 02 (2018-19)

4.9 Creation of mini percolation tank at Gondhigudem beat of Lakkavaram range

GPS location: N 17.794198 E 81.611507 **SO no. and year**: RSO 03 (2018-19)

4.10 Construction of mini percolation tank-7 at Lakkavaram beat of Lakkavaram range

GPS location: N 17.766464 E 81.557378 **SO no. and year**: RSO 06 (2018-19)

4.11 Construction of mini percolation tank -8 at Lakkavaram beat

GPS location: N 17.766426 E 81.556708 **SO no. and year**: RSO 07 (2018-19)

4.12 Creation of mini percolation tank-11 at Lakkavaram beat Lakkavaram range

GPS location: N 17.761716 E 81.53978 **SO no. and year**: RSO 17 (2018-19)

4.13 Creation of mini percolation tank-20 under CAMPA-CAT Scheme at Dabbagudem North beat of Sukumamidi section of Lakkavaram range

GPS location: N 17.768411 E 81.559123 **SO no. and year**: RSO 36 (2018-19)

All six percolation tanks at Gondhigudem, Lakkavaram and Dabbagudem North beats were found to match the approved dimensions of 10 m in length, 10 m in width, and 1 m in depth. However, excessive silt accumulation, damaged stone packing and weed growth were observed reducing their effectiveness. Regular de-siltation is necessary to maintain full water storage capacity.

4.14 Construction of new check dam at Gondhigudem beat of Sukumamidi section

GPS location: N 17.792571 E 81.609186 **SO no. and year**: DSO 166 (2018-19)

Check dam constructed across Gondhigudem beat was monitored and evaluated against the specifications recorded in the measurement book (MB) and verified through field measurements. The dimensions of the check dam: 14.00 m in length, 1.55 m in width and 1.0 m in depth. Field verification confirmed that these measurements matched the MB specifications, except for a reduced depth compared to the approved design. The structures were found to be well maintained; however, their total water holding capacity has been reduced due to silt and sediment accumulation. Additionally, minor repairs are needed in the apron sections. It is recommended that de-silting operations be carried out to restore storage capacity and ensure the continued effectiveness of the check dams.

4.15 Construction of percolation tank at Darapalli beat of jeediguppa section of VR Puram

GPS location: N 17.548777 E 81.388714 **SO no. and year**: DSO 148 (2018-19)

4.16 Construction of new percolation tank at Vissapuram beat Nellipaka range

GPS location: N 17.730665 E 81.113075 **SO no. and year**: RSO 02 (2018-19)

4.17 Construction of new percolation tank at Vissapuram beat Nellipaka range

GPS location: N 17.728349 E 81.112142 **SO no. and year**: RSO 08 (2018-19)

4.18 Construction of new percolation tank no.37 at Vissapuram beat Nellipaka range

GPS location: N 17.727946 E 81.112859 **SO no. and year**: RSO 12 (2018-19)

4.19 Construction of new percolation tank no.38 at Vissapuram beat Nellipaka range

GPS location: N 17.728648 E 81.113820 **SO no. and year**: RSO 13 (2018-19)

One percolation tank at Darapalli and four at Visapuram beat were found to match the approved dimensions, each measuring 10 m in length, 10 m in width and 1 m in depth. However, excessive silt accumulation, damaged stone packing and weed growth were observed reducing their effectiveness. Regular de-siltation is necessary to maintain full water storage capacity.

Staggered trenches in Pothampally beat

Percolation tank at Pothampally beat

Check dam at Tekulaboru beat

Check dam at E.D Pally beat

New percolation tank at Thatilanka beat

Mini Percolation tank at Gondhigudem

Mini percolation tank-7 of Lakkavaram beat

Mini percolation tank-20 of Dabbagudem

Check dam of Gondhigudem beat

Percolation tank of Darapalli beat

Mini percolation at Vissapuram beat

Mini percolation tank- 38 of Vissapuram

5. Monitoring and Evaluation of Other Activities

Under the "Others" category, a total of 21 activities were implemented during 2018–19 in Chintur Forest Division, of which six were selected for monitoring and evaluation. Among the ranges, Nellipaka recorded the highest number with 10 activities, three of which were sampled. Chintur and VR Puram each implemented four activities, with one sampled from each, while Lakkavaram had three activities with one sampled. No works were reported from Kunavaram. Document verification and cross-checking were conducted in the presence of Division and Range Office staff to assess implementation quality, compliance with guidelines, and the overall effectiveness of the activities undertaken. The review covered sanction orders, estimation sheets, and work registers. Sanctioned amounts were found to be in alignment with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was appropriate and consistent with approved estimates and CAMPA guidelines. Both internal and external audits—conducted by the Conservator of Forests and the Accountant General's Office, respectively—confirmed transparency and compliance with financial and administrative protocols. However, for DSO 188 (2018–19) of Chintur Range, the work register was not presented for verification at the Chintur Division Office.

Key Findings

- Plantations consistently underperformed due to poor site selection, unsuitable soil conditions, and uncontrolled grazing. Many sites were located on degraded or rocky soils with low moisture retention capacity, making them unfit for the chosen species. Inadequate fencing and protection measures further reduced seedling survival rates.
- Large mismatches between recorded and actual plantation areas were observed during field inspections. These discrepancies indicate lapses in documentation, lack of GIS-based mapping, and errors in earlier demarcation or reporting processes, affecting accuracy and transparency in reporting.
- Soil and Moisture Conservation (SMC) structures, including percolation tanks, check dams, and contour trenches, were found to be beneficial but their efficiency was diminished due to siltation. The absence of regular desilting and preventive maintenance has limited their water retention and recharge potential.
- The maintenance quality was poor, with several instances of missing or damaged identification boards, incomplete plantation journals, and inadequate record-keeping. Such deficiencies hinder monitoring, verification, and long-term management of assets.
- Community involvement in plantation protection and maintenance was minimal, especially from Village Forest Committees (VFCs) and Joint Forest Management Committees (JFMCs). This lack of local engagement reduced accountability, oversight, and protection from threats such as grazing, fire, and encroachment.

Recommendations

- Assess soil depth, texture, moisture, slope, and nutrient status before planting to ensure site suitability and improve survival rates.
- Select resilient native species suited to local climate and soil conditions to enhance biodiversity and plantation success.
- Install fencing, involve local communities, and ensure regular monitoring to protect young plantations from grazing damage.
- Schedule regular pre-monsoon desilting of percolation tanks, check dams, and trenches to maintain water retention and recharge capacity.
- Display durable identification boards and maintain updated plantation journals, estimates, and work registers for transparency and verification.
- Involve VSS/JFMCs in all plantation stages to ensure local ownership, protection, and long-term sustainability.

19. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KAKINADA DIVISION

Introduction

Kakinada division, situated in the East Godavari district of Andhra Pradesh, represents a region of rich ecological diversity, encompassing coastal plains, deltaic lowlands, uplands, and parts of the Eastern Ghats. The division experiences a tropical climate with moderate to high rainfall contributing to a varied vegetation profile. According to the India State of Forest Report (ISFR) 2023, the total forest cover in Kakinada district stands at 544.13 sq.km showing a net increase of 4.12 sq. km compared to the previous assessment in 2021. The forest cover is categorized into Moderately Dense Forest (184.33 sq. km) and Open Forest (359.78 sq. km), while Very Dense Forest is minimal, recorded at only 0.02 sq. km. The forests in Kakinada Division are predominantly classified as tropical dry deciduous and moist deciduous with natural forests primarily occurring in the upland and hill areas. The coastal belt, especially near the Godavari estuary, supports mangrove ecosystems, which are ecologically significant for coastal protection, biodiversity conservation, and fishery support. The Coringa Wildlife Sanctuary, located within this region, is home to one of the largest contiguous stretches of mangroves on the east coast of India and harbours a wide range of flora and fauna. The floral composition of the division includes a mix of hardwood and softwood species, as well as economically and ecologically important plants. Prominent tree species include Tectona grandis (Teak), Terminalia tomentosa (Asan), Diospyros melanoxylon (Tendu), Wrightia tinctoria, Chloroxylon swietenia (Satinwood), Anogeissus latifolia, and Lagerstroemia parviflora. These species are typically found in the interior deciduous forests. In the mangrove areas, dominant species include Avicennia marina, Rhizophora mucronata, Sonneratia apetala, Excoecaria agallocha, and Aegiceras corniculatum, which play a crucial role in stabilizing coastal ecosystems and serving as breeding grounds for marine life. Soils across the division range from fertile alluvial loams in the deltaic regions to red sandy loams and lateritic soils in the uplands. In terms of management and protection, the division has been actively implementing forest fire prevention, afforestation and biodiversity conservation measures. Fire lines, check dams, and plantation activities under various schemes have contributed to improved forest conditions in certain areas. However, challenges such as grazing, invasive species, and illegal wood extraction still persist in some pockets, particularly where community involvement is limited. An important aspect of forest governance in Kakinada Division is the involvement of local communities through Vana Samrakshana Samithis (VSSs) or Joint Forest Management Committees (JFMCs). In many parts of the division, their involvement has resulted in better forest health, reduced biotic pressure, and improved community awareness about conservation. Focus Group Discussions (FGDs) conducted with VSS members have highlighted both the successes and the challenges they face in managing forest resources sustainably. Overall, the Kakinada Forest Division represents a significant ecological zone within Andhra Pradesh, combining biodiversity richness, productive forest ecosystem and community-based forest governance. Continued investment in ecological restoration, scientific forest management, and strengthening of community institutions will be key to sustaining the health and productivity of forests in the region.

During 2018-19, a total of 94 CAMPA activities were undertaken in the Kakinada Forest Division, out of which 24 activities, accounting for approximately 25%, were selected for

detailed monitoring and evaluation. A range-wise analysis shows that Rampachodavaram reported the highest number of activities with 31, of which 7 were sampled. This was followed by Rajavommangi with 18 activities and 3 sampled, and Gokavaram with 14 activities, of which 4 were sampled. Both Kakinada and Addatheegala ranges implemented 8 activities each, with 2 and 3 sampled, respectively. Yeleswaram reported 10 activities with 3 selected for evaluation, while Sudikonda recorded the lowest with 5 activities, of which 2 were sampled. In terms of the type of activities, maintenance works constituted the largest share, with 33 activities implemented and 8 evaluated, followed by Soil and Moisture Conservation (SMC) activities with 24 implemented and 5 sampled. Under the others category, 20 activities were carried out, of which 6 were sampled, while plantation activities totaled 17, with 5 selected for evaluation. Notably, no protection or construction activities were implemented during this period.

1. Monitoring and Evaluation of Plantation Activities

Kakinada division implemented a total of 17 plantation activities under CAMPA, of which 5 activities (approximately 29%) were selected for monitoring and evaluation. Range-wise distribution indicates that Kakinada, RC Varam and Rajavommangi each implemented 4 plantation activities, with 1, 2, and 1 sampled, respectively. Yeleswaram range reported 3 activities, with 1 sampled. Both Addatheegala and Gokavaram implemented 1 activity each, but none were selected for evaluation. No plantation activities were reported from the Sudikonda range during 2018-19.

1.1 Kakinada range

A total of four plantation activities were implemented under the CAMPA scheme in Kakinada range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 85 Details of plantation selected in Kakinada range

Sl. no.	Plantation	SO no. and year
1	Raising of 2018 Atchutapuram teak plantation – 1 Ha	RSO 6 (2018-19)

The 1-hectare site selected for teak plantation at Atakivanipalem is characterized by a gentle slope and red soil, with the majority of the area covered by rock.

Survival percentage: Atakivanipalem plantation site shows low suitability for *Tectona grandis* with an average survival rate of 35.15%.

Growth performance: In Atakivanipalem plantation, the average tree height is 0.92 m with a girth of 11.32 cm.

Table 86 Details of plantation enumerated in Kakinada range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Atakivanipalem 1 Ha Teak plantation	1	*Tectona grandis*	N 17.444491 E 82.543248	35.15	0.92 ±0.31	11.32 ±3.84

1.2 Yeleswaram range

A total of three plantation activities were implemented under the CAMPA scheme in the Yeleswaram range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 87 Details of plantation selected in Yeleswaram range

Sl. no.	Plantation	SO no. and year
1	Estimate for raising teak plantation Vathangi beat 2 Ha	SDSO 16 (2018-19)

At Vathangi (2 Ha), the site has red soil which is also well-drained and moderately fertile, reasonably suitable for teak under proper management practices.

Survival Percentage: At Vathangi, the survival rate is higher at 66.66 %, indicating good suitability. The growth parameters also vary between sites.

Growth Performance: At Vathangi, the average tree height ranges from 2.86 to 3.81 m with girth between 22.86 and 25.31 cm.

Table 88 Details of plantation enumerated in Yeleswaram range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Vathangi 2 Ha Teak plantation	1	*Tectona grandis*	N 17.463019 E 82.244130	66.4	3.81 ±1.78	-	22.86 ±6.11
		2	*Tectona grandis*	N 17.463406 E 82.243701	68.35	2.86 ± 0.52	-	23.15 ±5.41
		3	*Tectona grandis*	N 17.463424 E 82.243774	65.23	3.42 ± 0.65	-	25.31 ±6.32
Plantation average					**66.66**	**3.36**	**-**	**23.77**

1.3 Rampachodavaram range

A total of four plantation activities were implemented under the CAMPA scheme in the Rampachodavaram range. In this monitoring and evaluation process, 20 % of these activities, equivalent to two plantation sites, was randomly selected for assessment.

Table 89 Details of plantations selected in Rampachodavaram range

Sl. no.	Plantations	SO no. and year
1	Raising of 2018 Teak plantation 10 Ha at Puttakota west RF, Daragedda beat, Gurthedu section	DSO 118 (2018-19)
2	Raising of 8 Ha NTHW plantation at Puttakota west RF, Daragedda beat, Gurthedu section	DSO 119 (2018-19)

Note: GPS location: N 17.787057 E 81.879550 **SO no. and year:** DSO 118 (2018-19)

The 10-hectare *Tectona grandis* plantation located in the Daragedda beat of Rampachodavaram range was found to be unsuccessful due to encroachment issues and grazing activities. Some stunted Teak plants were observed with an approximate height of 0.5 m and a girth of around 12 cm.

The 8-hectare NTSHW plantation located in Daragedda beat of Rampachodavaram range could not be shown by the beat officers as the land is unavailable due to encroachment issues.

1.4 Rajavommangi range

During 2018–19, a total of four plantation activities were implemented under the CAMPA scheme in Rajavommangi range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 90 Details of plantation selected in Rajavommangi range

Sl. no.	Plantation	SO no. and year
1	Raising of 04 Ha NTHWS Plantation at Rajavommangi RF of Rajavommangi beat	DSO 114 (2018-19)

The 4-hectare NTHWS plantation site at Rajavommangi is characterized by plain terrain with fertile black loamy soil and good natural drainage, without water-logging issues.

Survival percentage: Rajavommangi NTHWS plantation recorded survival rates of 50% (*Hymenodicyton orixense*), 52.45% (*Terminalia elliptica*), 49.18% (*Adina cardifolia*), and 48.65% (*Terminalia arjuna*).

Growth Performance: In 4-hectare Rajavommangi NTHWS plantation, average tree height ranged from 2.72 to 6.40 m with girth between 18.33 and 24.50 cm.

Table 91 Details of plantation enumerated in Rajavommangi range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Rajavommangi 4 Ha NTSH plantation	1	*Hymenodicyton orixense*	N 17.596868 E 82.246159	50.00	2.72 ±0.61	18.80 ±5.45
			Terminalia eliptica		52.45	3.50 ±0.70	24.50 ±4.66
		2	*Terminalia arjuna*	N 17.596827 E 82.245990	50.00	3.02 ±0.80	18.33 ±6.62
			Adina cardifolia		49.18	3.32 ±0.68	21.03 ±3.86
		3	*Terminalia arjuna*	N 17.596276 E 82.245174	55.37	5.19 ±0.56	23.42 ±2.38
		4	*Terminalia arjuna*	N 17.596126 E 82.244212	46.28	6.40 ±0.51	23.25 ±3.57
		5	*Terminalia arjuna*	N 17.596179 E 82.243668	42.97	5.32 ±0.56	22.83 ±2.81
Plantation average					**49.46**	**4.21**	**21.73**

Comparative assessment of plantations in Kakinada division during 2018-19

The comparative assessment of plantation performance across Kakinada, Yeleswaram, Rampachodavaram and Rajavommangi ranges reveals varying levels of suitability for *Tectona grandis* and native tree species based on survival rates and growth metrics. Kakinada range (Atakivanipalem plantation) exhibited low suitability for Teak with a survival rate of only 35.15% and poor growth performance with an average height of 0.92 m and girth of 11.32 cm

indicating unfavourable site conditions. In contrast, Yeleswaram range (Vathangi site) showed good suitability with a higher survival rate of 66.66% and better growth performance with tree height ranging from 2.86 to 3.81 m and girth between 22.86 and 25.31 cm reflecting more favourable conditions for Teak cultivation. In Rampachodavaram range, Daragedda beat plantations faced significant challenges due to encroachment and grazing rendering both 10 Ha Teak plantation and 8 Ha NTHW plantation largely unsuccessful. The few surviving Teak plants were stunted with height around 0.5 m and girth near 12 cm indicating extremely poor growth and viability. Meanwhile, Rajavommangi range focused on a 4 Ha NTHWS plantation with mixed native species such as *Hymenodictyon orixense*, *Terminalia elliptica*, *Adina cordifolia* and *Terminalia arjuna* all of which showed moderate survival rates (ranging from 48.65% to 52.45%). Growth performance was relatively better with tree height between 2.72 and 6.40 m and girth ranging from 18.33 to 24.50 cm suggesting moderate success and potential for native species development in the area. Overall, Yeleswaram range displayed the best performance for Teak among the assessed locations while Kakinada showed poor suitability. Rampachodavaram's plantations suffered heavily due to land-related challenges and Rajavommangi showed moderate promise for native species plantations despite average survival percentages.

Verification of plantation area and boundaries

In Kakinada division during 2018-19, measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 92 Details of plantation area perambulation in Kakinada division

Sl no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 2018 Atchutapuram Teak plantation	1 Ha	0.89 Ha
2	Estimate for raising teak plantation Vathangi beat 2 Ha	2 Ha	2.4 Ha
3	Raising of 2018 teak plantation 10 Ha at puttakota west RF, Daragedda beat, Gurthedu section	10 Ha	13.19 Ha
4	Raising of 04 Ha NTHWS Plantation at Rajavommangi RF of Rajavommangi beat	4 Ha	4.22 Ha

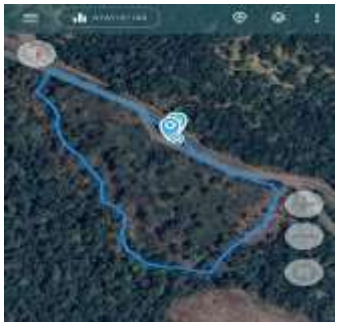
Perambulation of the plantation area was carried out in the presence of the designated Forest Officer, based on the demarcation indicated by the respective watcher or guard responsible for each site. During the verification process, it was observed that the perambulated area for three plantations exceeded the officially recorded extent, while one plantation showed a lesser extent than documented. The variance in area is primarily attributed to the inclusion of rocky terrain, trenches and barren patches within the plantation boundaries features that were not accounted for in the original records. The reasons for the reduced area in three plantations could not be conclusively determined. Actual extents were measured using QGIS software, which confirmed the following deviations from the recorded figures.

- 1 Ha Teak Atchutapuram plantation (Kakinada)**:** Lesser by 0.11 Ha
- 2 Ha Teak Vathangi plantation (Yeleswaram)**:** Exceeded by 0.4 Ha

- 10 Ha Teak Daragedda plantation (RC Varam)**:** Exceeded by 3.19 Ha
- 4 Ha NTHWS Rajavommangi plantation (Rajavommangi)**:** Exceeded by 0.22 Ha

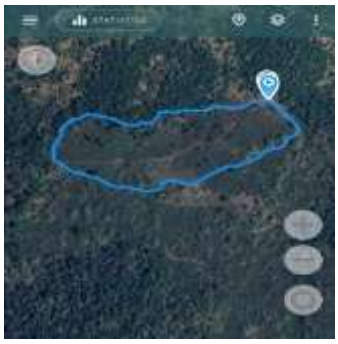
The verification was conducted through physical perambulation using the Geo Tracker mobile application which facilitated the collection of geotagged photographs and GPS coordinates for accurate documentation. These visual and spatial records are provided below for reference.

Atchutapuram 0.89 Ha



Vathangi 2.4 Ha

Daragedda 13.19 Ha



Rajavommangi 4.22 Ha

Health status of plantation: Based on field observations across five evaluated plantations- no signs of insect or pest damage were observed. This plantation was generally found to be in healthy condition exhibiting good survival rates and vigorous growth. However, Atchutapuram and Vathangi plantation showed evidence of damage caused by pests and insects, indicating compromised plant health in that area.

Protection Measures: To safeguard the plantations from fire and other environmental threats, various protection measures were implemented including the creation and maintenance of fire lines, development of inspection paths and the engagement of fire watchers during vulnerable periods. These efforts contribute significantly to the overall protection of the plantations.

Biotic (human/cattle) pressure on plantation: Minimal incidents of grazing and browsing pressure were observed across three plantations among five. However, these pressures have been effectively mitigated through the construction of peripheral trenches and the deployment of plantation watchers. These measures have significantly restricted the entry of cattle from nearby villages, thereby reducing potential damage to the plantation areas.

Maintenance of plantation journals and records: Plantation journals and records are generally well-maintained with baseline information properly documented. However, periodic updating of key plantation parameters such as survival rates, growth metrics and maintenance activities needs improvement to ensure the records accurately reflect current field conditions and remain relevant for monitoring and evaluation. It was noted that inspections are being

carried out by the concerned forest officials with their observations entered into the journals. However, during the field visit, journals for three plantations among five were presented for verification. However, it was observed that plantation boards were missing at the all five plantation sites. It is recommended that proper signage be installed at each site to facilitate plantation identification, enhance visibility and support effective monitoring and oversight.

Vana Samrakshana Samithi (VSS): The involvement of the Vana Samrakshana Samithi (VSS) or Joint Forest Management Committee (JFMC) was observed at three plantation sites among five indicating active community engagement in the protection, maintenance and monitoring of plantation activities. This reflects the core principles of Joint Forest Management (JFM) which emphasize participatory forest governance. In recognition of this involvement, Focus Group Discussions (FGDs) were conducted at Atchutapuram, Vathangi and Rajavommangi plantations to gather insights from community members regarding their roles, contributions and challenges in plantation management. However, in case of Daragedda plantation under Rampachodavaram range, VSS participation was not observed; hence, Focus Group Discussion was not conducted at this site.

Atchutapuram 1 Ha, Kakinada

Vathangi plantation, Yeleswaram

Daragedda plantation, RC Varam

Rajavommangi plantation, Rajavommangi

2. Monitoring and Evaluation of Maintenance Activities

During 2018-19, a total of 33 maintenance activities were implemented across the Kakinada Forest Division, with 8 activities selected for monitoring and evaluation. Range-wise analysis reveals that Rajavommangi range carried out the highest number of maintenance activities, implementing 10 activities with 1 sampled. This was followed by the Addatheegala range, which undertook 6 activities, of which 2 were sampled. The RC Varam range implemented 5 activities, with 1 selected for evaluation, while Kakinada range carried out 4 activities, with 1 sampled. Both Yeleswaram and Sudikonda ranges reported 3 activities each, with 1 sampled from each. The Gokavaram range reported the lowest number of activities, with 2 implemented and 1 included in the evaluation.

Table 93 Maintenance activities selected for evaluation in Kakinada division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Kakinada range			
1	First year maintenance of 2017 Atchutapuram teak plantation	N 17.383342 E 82.537284	RSO 07 (2018-19)
Yeleswaram range			
2	First year maintenance of bamboo plantation at Komarapuram, Vathangi beat	N 17.470686 E 82.237005	RSO 06 (2018-19)
Rampachodavaram range			
3	First year maintenance of bamboo plants along the stream in Devarapalli beat of Rampachodavaram range	N 17.505632 E 81.711732	RSO 05 (2018-19)
Addatheegala range			
4	First year maintenance of 5.00 Ha teak plantation in Addatheegala RF	N 17.474866 E 82.026927	SDSO 08 (2018-19)
5	First year maintenance of 5.00 Ha linear bamboo plantation in Vedullakonda beat	N 17.632601 E 81.916976	RSO 11 (2018-19)
Gokavaram range			
6	First year maintenance of teak plantation (3 Ha) in P. Patnam beat	N 17.226659 E 81.706420	RSO 06 (2018-19)
Sudikonda range			
7	First year maintenance of bamboo gap plantation at Burugubanda area bit - I	N 17.336547 E 81.775775	RSO 06 (2018-19)
Rajavommangi range			
8	Second year maintenance of 05 ha teak plantation in V B Puram RF, Thimmapuram beat	N 17.428433 E 82.119417	RSO 13 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, fertilizer application, weeding operations, soil tilling (inter-ploughing), coppice management, pruning of lower branches, fire line management and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control *Lantana* and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments and complement contingency records.

- Maintain accurate and updated plantation journals, markers and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.
- Improve the frequency and timing of pruning operations to promote healthy plant structure and better bole formation.

Atchutapuram beat, Kakinada

Vathangi beat, Yeleswaram

Devarapalli beat, RC Varam

Addatheegala beat, Addatheegala

P. Patnam beat, Gokavaram

Thimmapuram beat, Rajavommangi

3. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During 2018-19, a total of 24 Soil and Moisture Conservation (SMC) activities were implemented in Kakinada Forest Division, of which 5 activities were selected for monitoring and verification. RC Varam range carried out the highest number with 16 SMC activities, of which 3 were sampled for review. The Gokavaram range reported 8 activities, with 2 sampled. No SMC activities were reported from the Kakinada, Yeleswaram, Addatheegala, Sudikonda and Rajavommangi ranges during this period.

3.1 Digging of staggered trenches in Pindukuruvalasa beat of Rampachodavaram range

GPS Location: N 17.573287 E 81.628722 **SO no. and year:** RSO 12 (2018-19)

3.2 Digging of staggered trenches in Kutrawada beat of Rampachodavaram range

GPS Location: N 17.712189 E 81.682696 **SO no. and year:** RSO 17 (2018-19)

3.3 Digging of Staggered Trenches in Kakuru beat of Rampachodavaram range

GPS Location: N 17.682759 E 81.708597 **SO no. and year:** RSO 18 (2018-19)

3.4 Digging of Staggered Trenches in Dandangi North Beat of Gokavaram range

GPS Location: N 17.682759 E 81.708597 **SO no. and year:** RSO 2 (2018-19)

3.5 Digging of Staggered Trenches in Dandangi (S) Beat of Gokavaram range

GPS Location: N 17.302375 E 81.735262 **SO no. and year:** SDSO 10 (2018-19)

The staggered trenches constructed at Pindukuruvalasa, Kutrawada, Kakuru and Dandangi (North and South) beats were monitored and evaluated against the specifications recorded in the measurement book (MB). Field measurements confirmed the trenches to be 10 m in length, 0.5 m in width and 0.3 m in depth consistent with the MB records, although depth deviations from the approved design were noted. Due to their location in a low-lying plantation area, significant accumulation of silt and dried plant residue was observed. While the trenches remain visible, they are largely filled, likely because of water overflow during rains. It is recommended that regular de-siltation be carried out to restore and maintain their full water-holding capacity.

Staggered trenches Kutrawada

Staggered trenches in Kakuru

Staggered trenches in Dandangi South

Staggered trenches in Dandangi North

Staggered trenches in Pindukuruvalasa

4. Monitoring and Evaluation of Other Activities

In Kakinada division, 20 activities were implemented under the "Others" category during 2018-19, with 6 selected for monitoring and evaluation. Range-wise, RC Varam had the highest number (6 activities, 1 sampled), followed by Yeleswaram and Rajavommangi (4 each, 1 sampled each), Gokavaram (3, 1 sampled), Sudikonda (2, 1 sampled), and Addatheegala (1, sampled). No additional "Other works" were reported in the division for the year. Document verification and cross-checking were conducted in the presence of Division and Range Office staff. Reviewed documents included sanction orders, estimation sheets, and work registers. Sanctioned amounts matched actual expenditures, and financial records were well maintained and authenticated by the DFO, SDO, and FRO. Fund utilization adhered to approved estimates and CAMPA guidelines. Both internal (Conservator of Forests) and external (Accountant General's Office) audits were conducted, ensuring transparency and compliance. However, some documentation gaps were noted. In Rampachodavaram range, records for SDSO 32 (2017–18), DSO 199 (2017–18), and RSO 23 (2018–19) were not made available for verification. Similarly, the work register for RSO 1 (2018–19) in Gokavaram range and the estimate for SDSO 8 (2018–19) in Sudikonda range were missing. These gaps highlight the need for improved documentation practices despite overall adherence to financial protocols.

Key Findings

- Plantation outcomes were mixed, with success at Vathangi and partial establishment at Rajavommangi, contrasted by failures at Daragedda and poor survival at Atchutapuram.
- Verification revealed consistent discrepancies between recorded and actual plantation areas.
- Maintenance works were executed but weakened by missing signage and incomplete updates of plantation records.
- SMC trenches matched design but were heavily silted, requiring desilting and repairs.
- No protection or construction activities were undertaken, limiting ecological outputs.
- "Other works" were financially compliant, but documentation gaps persisted in several ranges.

Recommendations

- Improve site-species alignment by avoiding unsuitable rocky soils for teak (*Tectona grandis*), and mitigate encroachment risks before plantation establishment.
- Institutionalize regular record updates, signage, and plantation board installation for improved monitoring.
- Strengthen maintenance operations with intensive weeding, coppice regulation, and replanting of casualties.

- Establish systematic desilting and upkeep schedules for trenches to restore water retention capacity.
- Reduce reliance on “other works” by prioritizing ecological interventions such as plantations, SMC, and protection measures.
- Address record-keeping lapses to ensure all registers and estimates are submitted during audits.
- Enhance community engagement by expanding VSS involvement across all plantations and SMC sites.

20. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN NARSIPATNAM DIVISION

Introduction

Narsipatnam Division is renowned for its rich mosaic of dry deciduous forests, which form one of the most ecologically significant landscapes in the region. The forests are dominated by teak (Tectona grandis) and a variety of mixed hardwood species, creating a unique and diverse canopy structure. This heterogeneous landscape supports not only moderately dense forest stands that provide crucial ecosystem services, but also extensive stretches of open forests that offer grazing grounds, enhance habitat connectivity, and support a wide range of wildlife. Additionally, the division hosts valuable plantations of teak and red sanders (Pterocarpus santalinus), contributing significantly to both ecological restoration and the local economy. A defining strength of Narsipatnam Division lies in the active participation of local communities in forest management. Through participatory frameworks such as Joint Forest Management Committees (JFMCs) and Vana Samrakshana Samithis (VSS), communities are engaged in protection, regeneration, and sustainable use of forest resources. From an ecological perspective, these forests serve as an important buffer against seasonal water scarcity, playing a key role in soil conservation, watershed protection, and groundwater recharge. Socio-economically, the forests of Narsipatnam are a lifeline for local livelihoods. The combination of ecological richness, economic value, and community participation underscores the importance of continued protection, sustainable harvesting practices, and capacity-building initiatives to ensure the long-term health and productivity of these forests.

In Narsipatnam division, a total of 84 CAMPA activities were carried out, of which 19 activities (around 21 %) were selected for detailed monitoring and evaluation. In Narsipatnam range, 25 activities were implemented, and 4 were sampled. In K D Peta range, 14 activities were implemented, and 4 were sampled. In Chintapalli range, 19 activities were implemented, with 6 sampled. In Lothugedda range 6 activities were implemented with 1 were sampled. In sileru 20 activities were implemented, with 4 were sampled and in R V nagar and Marripakala ranges none were implemented or sampled. Among activity types, others dominated with 39 activities (8 sampled), followed by maitenance (30; 5 sampled), plantation (10; 3 sampled), protection (5; 3 sampled), none were implemented or sampled from soil and moisture conservation and construction activity.

1. Monitoring and Evaluation of Plantation Activities

In Narsipatnam division, a total of 10 plantation activities were carried out under CAMPA, of which 3 activities (about 21 %) were selected for monitoring and evaluation. Among the ranges, Narsipatnam with 4 (1 sampled), KD Peta with 2 (1 sampled), Chintapalli with 2 (1 sampled), Sileru with 2 (0 sampled) and none of the plantation activity were implemented in Maaripakala, lothugedda and R V nagar.

1.1 Narsipatnam range

During 2018–19, a total of ten plantation activities were carried out under the CAMPA scheme in Narsipatnam range. In this monitoring and evaluation process, 20 % of these activities, equivalent to three plantation sites, was randomly selected for assessment.

Table 94 Details of plantation selected in Narsipatnam range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 ha. (NTSH) Plantation at Kondasantha of Narsipatnam Range during 2018-19 Under CAMPA (NFM) Scheme	DSO 71 (2018-19)

The proposed 10-hectare site selected for the NTSH plantation at Kondasantha is characterized by red soil mixed with stones, giving it a moderately coarse texture. While the stony nature of the soil provides good natural drainage, it may require additional effort during site preparation for pit digging and planting.

Survival percentage: The 10-hectare NTSH plantation site at Kondasantha also showed low suitability for *Terminalia arjuna*, *Pterocarpus marsupium*, and *Syzygium cumini*, with average survival rates of 33.47%, 26.44%, and 23.96% respectively.

Growth: In the Kondasantha NTSH plantation, the average tree height ranged from 2.46 to 5.21 meters, with girth values ranging from 25.86 to 42.46 cm.

Table 95 Details of plantation enumerated in Narsipatnam range

Sl. no.	Plantation / Village name	Plot no	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Konda Santha 10 Ha plantation	1	*Terminalia arjuna*	N 17.892518 E 82.015129	32.23	5.15 ±0.85	33.46 ±8.70
		2	*Pterocarpus marsupium*	N 17.790653 E 82.561695	30.57	5.16 ±0.83	42.46 ±4.65
		3	*Syzygium cumini*	N 17.791608 E 82.015169	23.96	3.57 ±0.53	25.86 ±3.30
		4	*Pterocarpus marsupium*	N 17.791711 E 82.562314	22.31	2.46 ±0.46	39.67 ±3.27
		5	*Terminalia arjuna*	N 17.792311 E 82.56276	34.71	5.21 ±0.75	41.81 ±5.04
Plantation average					**28.75**	**4.31**	**36.65**

1.2 Chintapalli range

A total of two plantation activities were carried out under the CAMPA scheme in Chintapalli range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 96 Details of plantation selected in Chintapalli range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 ha. NTSH plantation at Jajulapalem Village	DSO 58 (2018-19)

At Jajulapalem, the 10-hectare plantation site is predominantly black soil interspersed with scattered pebbles, and in certain patches the soil depth is considerably good, making it suitable for plantation activities.

Survival percentage: The plantation site at Jajulapalem has shown good suitability for *Syzygium cumini*, *Terminalia arjuna*, *Pterocarpus marsupium* and *Dalbergia latifolia*, with corresponding average survival rates of 79.74%, 76.85%, 62.8% and 80.99%.

Growth: At Jajulapalem, the average height of trees ranged from 1.29 to 2.91 meters, with girth values between 12.08 and 23.33 cm.

Table 97 Details of plantation enumerated in Chintapalli range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth	GBH (cm)
1	Jajulapalem 10 Ha NTSH plantation	1	*Syzygium cumini*	N 17.867973 E 82.530873	79.33	2.89 ±0.80	-	17.11 ±5.55
		2	*Terminalia arjuna*	N 17.86779 E 82.530737	76.85	2.91 ±0.79	-	19.34 ±6.49
		3	*Pterocarpus marsupium*	N 17.867612 E 82.530745	62.8	1.29 ±0.26	12.08 ±2.13	-
		4	*Dalbergia latifolia*	N 17.86797 E 82.530872	80.99	2.88 ±0.78	-	23.33 ±7.35
		5	*Syzygium cumini*	N 17.892037 E 82.015025	80.16	2.75 ±0.75	-	22.58 ±5.03
Plantation average					**76.02**	**2.54**	**12.08**	**20.59**

1.3 K D Peta range

During 2018–19, a total of two plantation activities were carried out under the CAMPA scheme in K D Peta range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 98 Details of plantation selected in K D Peta range

Sl. no.	Plantation	SO no. and year
1	Raising 10ha. Teak Plantation at B. Kothuru in Krishnadevipeta Range	DSO 53 (2018-19)

The proposed 10-hectare site selected for the teak plantation at B. Kothuru is also characterized by red soil interspersed with sandy loam, offering moderate fertility and good aeration for root growth. The soil texture supports adequate moisture retention while allowing proper drainage, creating favourable conditions for teak establishment. The terrain is gently sloping, further aiding plantation development.

Survival percentage: The 10-hectare teak plantation site at B. Kothuru showed very good suitability for *Tectona grandis*, with an average survival rate of 92.41%.

Growth: In the B. Kothuru teak plantation, the average tree height ranged from 8.46 to 10.50 meters, with girth measurements ranging from 37.01 to 45.27 cm.

Table 99 Details of plantation enumerated in KD Peta range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	B. Kothuru (Teak)	1	*Tectona grandis*	N 17.619617 E 82.416537	89.84	8.46 ±1.09	37.01 ±5.72
		2	*Tectona grandis*	N 17.619598 E 82.416884	93.75	9.98 ±1.46	45.27 ±9.43

		3	*Tectona grandis*	N 17.619938 E 82.417075	90.62	10.50 ±1.09	43.35 ±11.30
		4	*Tectona grandis*	N 17.619922 E 82.417056	95.31	9.33 ±1.09	44.98 ±10.46
		5	*Tectona grandis*	N 17.620583 E 82.417525	92.57	9.53 ±1.68	41.97 ±12.66
Plantation average					**92.41**	**9.56**	**42.51**

Comparative assessment of plantations in Narsipatnam division during 2018-19

Survival performance: Among the evaluated sites, B. Kothuru teak plantation demonstrated the highest survival (92.41%) and superior growth performance (height: 8.46–10.50 m; girth: 37.01–45.27 cm). In contrast, the Kondasantha NTSH plantation showed low survival rates for most species (23.96–33.47%) despite moderate growth (height: 2.46–5.21 m; girth: 25.86–42.46 cm). The Jajulapalem plantation exhibited good survival for several species (62.8–80.99%), though its growth remained relatively lower (height: 1.29–2.91 m; girth: 12.08–23.33 cm).

Verification of plantation area and boundaries

In Narsipatnam division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 100 Details of plantation area perambulation in Narsipatnam division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 10 ha. (NTSH) Plantation at Kondasantha of Narsipatnam Range	10 Ha	10.11 Ha
2	Raising of 10 ha. NTSH plantation at Jajulapalem Village of Chintapalli Range	10 Ha	11.56 Ha
3	Raising 10ha. Teak Plantation at B. Kothuru in Krishnadevipeta Range	10 Ha	8.08 Ha

Perambulation of selected plantations was carried out with the assistance of the local Forest Beat Officer. In these cases, the perambulated area was found to exceed in some plantations and in some shortfall has been noted due to the presence of rocky terrain, trenches, and barren patches within plantation boundaries. Measurements were therefore taken along the outer boundary of these natural obstructions rather than the precise plantation limits. Plantation-wise findings

- Kondasanatha Plantation (Narsipatnam range) (10 Ha): 10.11 Ha (Exceeded by 0.11 Ha)
- Jajulapalem Plantation (Chintapalli range) (10 Ha): 11.56 Ha (Exceeded by 1.56 Ha)
- B. Kothuru Plantation (K.D Peta range) (10 Ha): 8.08 Ha (Lesser by 1.92 Ha)

Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.

0

10.11 Ha Kondasantha

11.56 Ha Jajulapalem

8.08 Ha B. Kothuru

Health Status of Plantation: During the field observations, it was noted that the plantation area showed no visible signs of insect-related damage. The foliage appeared healthy, with no evidence of defoliation, boring marks, or other symptoms typically associated with insect infestation. This indicates that the plantation is currently free from any major pest outbreaks, suggesting effective natural control or the absence of conducive conditions for insect proliferation.

Protection of Plantation: To safeguard the plantations against fires and other environmental risks, protection measures such as the creation and maintenance of fire lines, development of inspection paths, and engagement of fire watchers were implemented. These interventions contribute to reducing the vulnerability of plantations, especially during dry seasons.

Biotic pressure on Plantations: Field observations revealed that grazing and browsing pressure from both humans and cattle was minimal within the plantation area. Only a few instances of hoof marks and lightly nibbled foliage were noticed, indicating occasional but not significant biotic interference.

Maintenance of Plantation Journals and Records: The plantation journals were found to be well-maintained, with all baseline information recorded appropriately. However, it was noted that periodic updates to the journals particularly regarding survival rates, growth parameters, and maintenance activities necessary to ensure they reflect current field realities. Plantation board was not seen at Narsipatnam range.

Vana Samrakshan Samithi (VSS): Among the plantation sites selected in the Narsipatnam division for monitoring and evaluation, involvement of Vana Samrakshana Samithi (VSS) was observed in the establishment or maintenance of the plantations. Consequently, the Focus Group Discussion (FGD) activity was conducted in three ranges

Kondasantha, Narsipatnam

Jajulapalem, Chintapalli

B. Kothuru, KD peta

2. Monitoring and Evaluation of Maintenance Activities

A total of 30 maintenance activities were carried out in Narsipatnam division during 2018-19, of which 5 activities were selected for monitoring. Narsipatnam accounted for the maximum with 8 activities (1 sampled), followed by Sileru with 7 (1 sampled), K D Peta with 6 (1 sampled), Chintapalli with 6 (2 sampled) and Lothugedda with 3 (1 sampled). None of the activities implemented or sampled in Marripakala and R V Nagar ranges.

Table 101 Maintenance activities selected for evaluation in Narsipatnam division

Sl. no.	Maintenance activities	GPS Co ordinates	SO no. and year
Narsipatnam range			
1	Second year maintenance of 10 Ha Teak plantation at M K Patnam	N 17.773819 E 82.58469	DSO 73 (2018-19)
K D Peta range			
2	Second year maintenance of 10 Ha Teak plantation at Nimmagedda village	N 17.717728 E 82.495809	DSO 65 (2018-19)
Chintapalli range			
3	First year maintenance 10 Ha NTSH plantation at Goppulapalem of Lammasingi section	N 17.878359 E 82.488322	DSO 85A (2018-19)
4	Second year maintenance of 10 Ha Bamboo and Miscellaneous plantation at Damanapalli of Chintapalli section	N 17.796471 E 82.348581	DSO 87 (2018-19)
Sileru range			
5	First year maintenance of 10 Ha Teak plantation near Pentalagedda village	N 17.988629 E 82.097613	DSO 79 (2018-19)
6	Second year maintenance of 10 Ha Bamboo and miscellaneous plantation near Kommuluwada village	N 18.002734 E 82.085085	DSO 83 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), saucer formation, coppice management, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantation. However, plantation boards were found to be damaged or

missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control Lantana and bushy grasses, minimizing competition and ensuring healthy plant growth
- Continue maintaining clear and effective fire lines, with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments, and complement contingency records. • Maintain accurate and updated plantation journals, markers, and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.

M K Patnam, Narsipatnam range

Nemmagedda, K D Peta range

Goppulapalem, Chintapalli range

Pentalagedda, Sileru range

3. Monitoring and Evaluation of Protection Activities

During 2018–19 Andhra Pradesh Forest Department undertook five protection activities under the CAMPA scheme in the narsipatnam division. For monitoring and evaluation, a representative sample of 20 %, comprising three protection activities, was selected for detailed assessment. Narsipatnam with 3 (1 sampled), K D Peta 1 (1 sampled) and Lothugedda 1 (1 sampled).

3.1 Creation of new fire lines in old plantations and RF areas of Narsipatnam beat and section of Narsipatnam range

GPS location: N 17.687429 E 82.537514 **SO no. and year:** RSO 21 (2018-19)

3.2 Estimate for creation of new fire lines in old plantations and RF areas of K D Peta range

GPS location: N 17.730479 E 82.376547 **SO no. and year:** DSO 145 (2018-19)

A fire line was created and maintained in narsipatnam and KD Peta beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 1000 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was not clear, as it was established along the inspection path. Dense grass or weed growth was observed, indicating that the fire line has been not well-maintained throughout the natural forest area.

3.3 Creation of new fire lines in plantations and RF areas of Lothugedda range

GPS location: N 17.998195 E 82.375869 **SO no. and year:** SDSO 07 (2018-19)

A fire line was created and maintained in Lothugedda under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 2000 rmt. The visibility of the fire line was not clear, Dense grass or weed growth was observed, it is recommended that the fire line has be maintained regularly to avoid forest fires and sustainable growth of the forest.

Narsipatnam range

K D Peta range

Lothugedda range

4. Monitoring and Evaluation of Other activities

Under the “Others” category, a total of 39 activities were carried out during 2018–19, of which eight were sampled for verification. The highest number of activities was reported in Chintapalli with 11 activities (three sampled), followed by Sileru with 11 activities (three sampled), Narsipatnam with 6 activities (one sampled), K.D. Peta with 5 activities (one sampled), and Lothugedda with 2 activities (none sampled). No activities were implemented or sampled in

R.V. Nagar and Marripakala ranges. Document verification and cross-checking were conducted in the presence of Division and Range Office staff. The review covered sanction orders, estimation sheets, and work registers. Sanctioned amounts were found to be in alignment with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Utilization of funds was appropriate and consistent with approved estimates and CAMPA guidelines. Both internal and external audits conducted by the Conservator of Forests and the Accountant General's Office, respectively confirmed transparency and compliance with financial and administrative protocols. However, in Chintapalli Range, estimates for DSO 142, 34, and 179 (2018–19) were not made available for verification, and in K.D. Peta Range, the work registers for DSO 349 (2018–19) was also not presented for verification.

Key Findings

- Plantation results varied: poor survival in Kondasantha, good in Jajulapalem, excellent in B. Kothuru teak.
- Area verification showed both deficits and excesses, reflecting record inconsistencies.
- Plantations were largely healthy, pest-free, and faced minimal grazing pressure.
- Maintenance works were properly executed but weakened by missing boards and infrequent journal updates.
- Fire line protection was inconsistent, strong in Narsipatnam but poor in KD Peta and Lothugedda.
- Financial transparency was good overall, but gaps in estimates and registers persisted.
- VSS involvement was positive, with FGDs conducted in several ranges.

Recommendations

- Improve alignment of species selection with site conditions to prevent poor survival rates, as observed at Kondasantha.
- Reconcile plantation records with GIS/KML-based verification to eliminate area discrepancies and ensure accuracy.
- Maintain up-to-date plantation journals and install appropriate signage at all sites to enhance traceability and field visibility.
- Implement pre-summer clearance of fire lines to maintain clear visibility and reduce fire risk consistently across all sites.
- Ensure all sanction orders, estimates, and work registers are properly maintained and readily available for audit purposes.
- Sustain and strengthen the involvement of Vana Samrakshana Samithis (VSS) across all ranges to enhance long-term protection and stewardship.
- Continue regular pest monitoring even in currently healthy plantations to ensure early detection and rapid response.
- Provide targeted interventions such as fertilizer application, gap filling, or replanting in sites with poor performance.

21. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN PADERU DIVISION

Introduction

Paderu division, located in the hilly tracts of the Eastern Ghats, covers a total forest area of 1,219.39 km², comprising 507.03 km² of Very Dense Forest (VDF) and 712.36 km² of Moderately Dense Forest (MDF), with no Open Forest reported. In addition, the Division has 572.09 km² of scrubland, reflecting areas under disturbance or natural secondary succession. As per the latest assessment (ISFR-2023), the Division has recorded a net forest cover loss of 8.20 km², which is a matter of concern given its ecological significance.

The forests of Paderu Division are predominantly Southern Moist Mixed Deciduous, harboring rich biodiversity and providing critical ecological services. The Division is categorized under very high fire-prone zones, necessitating robust fire management interventions. The forests also play a vital socio-economic role, supporting the livelihoods of tribal communities through bamboo harvesting, honey collection, and traditional use of plant resources. Conservation and management efforts in Paderu are therefore focused on sustaining biodiversity, ensuring habitat continuity, and strengthening fire protection measures.

In Paderu division during 2018-19, a total of 203 CAMPA activities were carried out, of which 51 activities (around 25 %) were selected for detailed monitoring and evaluation. In Paderu (T) range, 43 activities were implemented, and 12 were sampled. In Araku (T) range, 34 activities were implemented, and 6 were sampled. In Pedabayalu (T) range, 36 activities were implemented, with 7 sampled. In Paderu FRO-I range, 19 activities were implemented, and 8 were sampled. In Araku FRO-II range, 17 activities were implemented, and 5 were sampled, In Paderu FRO-III range, 15 activities were implemented, and 5 were sampled. In Paderu FRO-IV range, 16 activities were implemented, and 3 were sampled, In Pedabayalu FRO-V range, 13 activities were implemented, and 2 were sampled. In Paderu FRO-VI range, 10 activities were implemented, and 3 were sampled. Among activity types, other works dominated with 138 activities (34 sampled), followed by maintenance (43; 12 sampled), plantations (20; 4 sampled), Protection (2; 1 sampled), there were no soil and moisture conservation works and construction activities were implemented.

1. Monitoring and Evaluation of Plantation Activities

In Paderu division, a total of 20 plantation activities were carried out under CAMPA, of which 4 activities (about 20 %) were selected for monitoring and evaluation. Among the ranges in Paderu (T) range, 3 activities (1 sampled), in Araku (T) range, (3; 1 sampled), in Pedabayalu (T) range, (3; 0 sampled), in Paderu FRO-I range, (2; 1 sampled), in Araku FRO-II range, (2; 1 sampled), in Paderu FRO-III range, (2; 0 sampled), in Paderu FRO-IV range, (2; 0 sampled), in Pedabayalu FRO-V range, (2; 0 sampled), in Paderu FRO-VI range, (1; 0 sampled).

1.1 Paderu (T) range

During 2018–19, a total of three plantation activities were carried out under the CAMPA scheme in Paderu (T) range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 102 Details of plantation selected in Paderu (T) range

Sl. no.	Plantation	SO no. and year
1	Raising NTSH plantation over 20 Ha at Tulabarangi of Bademela beat G. Madugula section	DSO 56 A (2018-19)

The selected plantation site features optimal conditions conducive to plant growth, being characterized by hilly and sloping terrain with gravelly red soil that provides a suitable environment for the species planted.

Survival percentage: In Tulabarangi plantation has shown good adaptability for Acrocarpus fraxinifolius and Grevillea robusta species, with survival rates recorded at 85.12% and 79.33% respectively, indicating satisfactory establishment of both species under local conditions.

Growth: Growth measurements further reveal healthy development within this plantation, with the average tree height ranging between 7.66 metres and 10.78 metres and the average girth ranging between 30.73 centimetres and 42.41 centimetres, reflecting promising growth performance.

Table 103 Details of plantation enumerated in Paderu (T) range

Sl. no.	Plantation/ Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Tulabarangi 20 Ha NTSH plantation	1	*Acrocarpus fraxinifolius*	N18.130040 E 82.571728	85.12	7.83 ±0.83	36.44 ±9.36
		2	*Gravillea robusta*	N 18.129181 E 82.571820	79.33	10.72 ±1.29	42.41 ±7.28
		3	*Acrocarpus fraxinifolius*	N 18.127437 E 82.572430	73.55	9.49 ±0.97	37.07 ±6.49
		4	*Grevillea robusta*	N 18.127236 E 82.572924	76.85	7.66 ±0.72	30.73 ±5.21
		5	*Acrocarpus fraxinifolius*	N 18.126159 E 82.373856	62.80	7.88 ±0.53	38.21 ±7.07
Plantation average					**75.53**	**8.71**	**36.97**

1.2 Araku (T) range

A total of three plantation projects were implemented under the CAMPA scheme in Araku (T) range during 2018–19. For evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 104 Details of plantation selected in Araku (T) range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSH plantation at Jangadivalasa village	DSO 61A (2018-19)

The selected plantation site at Jangadivalasa is located on sloping terrain and is characterized by red and black loam with hard gravelly soil. These soil conditions provide a moderately

suitable to good environment for plantation activities, supporting both establishment and growth of the selected species.

Survival percentage: In Jangidivalasa plantation demonstrates favourable growing conditions for the species *Acrocarpus fraxinifolius* and *Grevillea robusta*. The survival rates recorded were 83.47 percent and 81.81 percent, respectively, reflecting effective establishment and maintenance practices.

Growth: The recorded growth parameters indicate healthy vegetative development of the plantations. The average height of the species ranges between 4.11 and 8.59 meters, while the average girth spans 21.84 to 25.44 centimetres. These results suggest satisfactory growth performance under the CAMPA scheme and proper maintenance of the site.

Table 105 Details of plantation enumerated in Araku (T) range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Jangadivalasa 20 Ha NTSH plantation	1	*Acrocarpus fraxinifolius*	N 18.313297 E 82.810021	83.47	8.32 ±0.78	25.44 ±4.73
		2	*Acrocarpus fraxinifolius*	N 18.312800 E 82.809825	75.20	8.59 ±0.96	25.19 ±5.10
		3	*Acrocarpus fraxinifolius*	N 18.312365 E 82.809741	73.55	4.11 ±0.63	21.84 ±3.46
		4	*Acrocarpus fraxinifolius*	N 18.312154 E 82.809359	80.99	7.92 ±1.20	22.46 ±3.34
		5	*Grevillea robusta*	N 18.312261 E 82.809359	81.81	7.32 ±1.18	22.25 ±2.30
Plantation average					**79.00**	**7.25**	**23.43**

1.3 Paderu FRO-I range

A total of two plantation projects were implemented under the CAMPA scheme in Paderu FRO-I range during 2018–19. For evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 106 Details of plantation selected in Paderu FRO-I range

Sl. no.	Plantation	SO no. and year
1	Raising of NTSH 20 Ha plantation work at Munthamamidi village.	DSO 63 A (2018-19)

The selected site for the plantation offers optimal conditions for plant survival and growth, being characterized by sloping terrain and red soil type.

Survival percentage: In Munthamamidi plantation has shown good suitability for *Acrocarpus fraxinifolius*, with a survival rate of 85.95 %, reflecting a satisfactory level of establishment and moderate growth performance.

Growth: Within this plantation, the average tree height was observed to range from 7.42 to 8.86 metres, while the average girth varied between 25.22 and 36.26 centimetres, indicating healthy development.

Table 107 Details of plantation enumerated in Paderu FRO I range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Munthamamidi 20 Ha NTSH plantation	1	*Acrocarpus fraxinifolius*	N 18.148157 E 82.601549	85.95	7.83 ±1.30	26.37 ±5.95
		2	*Acrocarpus fraxinifolius*	N 18.148005 E 82.601598	69.42	8.42 ±0.53	28.93 ±6.42
		3	*Acrocarpus fraxinifolius*	N 18.147743 E 82.601028	72.72	7.42 ±0.54	25.22 ±6.65
		4	*Acrocarpus fraxinifolius*	N 18.149247 E 82.601761	73.55	8.86 ±0.69	27.97 ±5.95
		5	*Acrocarpus fraxinifolius*	N 18.149381 E 82.601707	73.55	8.16 ±0.48	36.26 ±4.79
Plantation average					**75.03**	**8.13**	**28.95**

1.4 Araku FRO-II range

A total of two plantation projects were implemented under the CAMPA scheme in Paderu FRO-I range during 2018–19. For evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 108 Details of plantation selected in Araku FRO-II range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSH plantation at Vanthomoru village.	DSO 66 A (2018-19)

The selected plantation site in Vanthomoru is characterized by sloping terrain with black-red gravelly soil, offering moderate conditions for plantation activities.

Survival percentage: In Vanthomoru plantation, under Araku Valley FRO-II range, shows good adaptability for *Acrocarpus fraxinifolius*, achieving a survival rate of 87.5%, though moderate growth rate is observed.

Growth: The average height of trees in this plantation ranges from 8.32 to 11.91 meters, with an average girth ranging from 31 to 40.44 centimetres.

Table 109 Details of plantation enumerated in Araku valley FRO- II range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Vanthomoru 20 Ha NTSH plantation	1	*Acrocarpus fraxinifolius*	N 18.27977 E 82.876179	75.20	11.34 ±0.98	40.44 ±7.56
		2	*Acrocarpus fraxinifolius*	N 18.279562 E 82.875962	76.85	10.96 ±1.01	36.32 ±8.71
		3	*Acrocarpus fraxinifolius*	N 18.279092 E 82.876245	85.95	11.91 ±2.47	31.16 ±8.08

		4	*Acrocarpus fraxinifolius*	N 18.278377 E 82.875788	84.29	8.32 ±0.75	31.00 ±6.96
		5	*Acrocarpus fraxinifolius*	N 18.278253 E 82.875449	84.29	11.21 ±8.57	37.49 ±7.33
Plantation average					**81.31**	**10.74**	**35.28**

Comparative assessment of plantations in Paderu division during 2018-19

All four plantations showed good adaptability of *Acrocarpus fraxinifolius* and *Grevillea robusta* with survival rates above 79%. Tulabarangi (85.12% & 79.33%) and Vanthomoru (87.5%) recorded strong survival with robust growth (7.66–11.91 m height; 30.73–42.41 cm girth). Munthamamidi showed high survival (85.95%) with healthy growth (7.42–8.86 m; 25.22–36.26 cm). Jangidivalasa had good survival (83.47% & 81.81%) but comparatively lower girth (21.84–25.44 cm). Overall, survival was uniformly high, with Tulabarangi and Vanthomoru reflecting the best growth performance.

The verification of plantation area and boundaries

In Paderu division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 110 Details of plantation area perambulation in Paderu division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising NTSH plantation 20 Ha at Seekari village of Aradakota beat, Pedabayalu section and range.	20 Ha	21.77 Ha
2	Raising of NTSH plantation at Peddapadu village over 20 Ha in range no. III, Paderu.	20 Ha	29.05 Ha
3	Raising of NTSH 20 Ha plantation work at Munthamamidi village.	20 Ha	24.78 Ha
4	Raising of 20 Ha NTSH plantation at Vanthomoru village.	20 Ha	20.40 Ha

Perambulation of selected NTSH plantations was carried out with the assistance of the local Forest Beat Officer. In all cases, the perambulated area was found to exceed the recorded plantation area due to the presence of rocky terrain, trenches, and barren patches within plantation boundaries. Measurements were therefore taken along the outer boundary of these natural obstructions rather than the precise plantation limits.

- Tulabarangi (20 Ha): 20.38 Ha (exceeded by 0.38 Ha)
- Jangadivalasa (20 Ha): 25.76 Ha (exceeded by 5.76 Ha)
- Munthamamidi (20 Ha): 24.78 Ha (exceeded by 4.78 Ha)
- Vanthomoru (20 Ha): 20.40 Ha (exceeded by 0.40 Ha)

Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.

Tulabarangi plantation 20.38 Ha

Jangadivalasa plantation 25.76 Ha

Munthamamidi plantation 24.78 Ha

Vanthomoru plantation 20.40 Ha

Health Status of Plantations: Field inspections across plantation sites revealed no incidence of insect or pest damage affecting any species. All plants appeared healthy, with no visible signs of infestation, stress, or pest-related deterioration.

Protection Measures: Protection measures, including the creation and maintenance of fire lines and inspection paths, along with the deployment of fire watchers, were effectively in place to safeguard the plantations from fire hazards and other environmental risks.

Biotic Pressure on Plantations: The plantations were found to be under negligible biotic pressure. Field observations revealed very limited evidence of grazing and browsing by cattle or other herbivores. Human interference was also minimal. This low level of disturbance is a positive indicator, as it reduces the risk of seedling mortality, soil compaction, and other negative impacts that typically arise from anthropogenic and livestock activities. The minimal biotic stress provides a conducive environment for healthy plantation establishment and growth.

Maintenance of Plantation Journals and Records: Plantation journals were found to be properly maintained; however, periodic updating of plantation parameters is advised to ensure accuracy and reliability for future monitoring. With respect to signage, a boundary board marking the initial point of the plantation was present at all sites, aiding in proper identification, Plantation is inspected by concerned forest official and entered the observations.

Vana Samrakshan Samithi (VSS): Among the four plantations evaluated in the Paderu Division, the involvement of Vana Samrakshana Samithi (VSS) or Joint Forest Management Committees (JFMCs) was recorded across Paderu (T), Araku (T) and Araku FRO-II ranges during establishment and maintenance. However, in Paderu FRO-I range did not involve the Vana Samrakshana Samithi (VSS) in its implementation or maintenance. Consequently, Focus Group Discussion (FGD) activities were not undertaken for this plantation.

Tulabarangi plantation, Paderu (T) range

Jangadivalasa plantation, Araku (T) range

Thotlagondhi plantation, FRO-VI range

Vanthomoru plantation, FRO-II range

2. Monitoring and Evaluation of Maintenance Activities

A total of 43 maintenance activities were carried out in Paderu division during 2018-19, of which 12 activities were selected for monitoring. Among the ranges in Paderu (T) range, 4 activities (1 sampled), in Araku (T) range, (5; 1 sampled), in Pedabayalu (T) range, (8; 2 sampled), in Paderu FRO-I range, (5; 3 sampled), in Araku FRO-II range, (5; 0 sampled), in Paderu FRO-III range, (4; 2 sampled), in Paderu FRO-IV range, (4; 1 sampled), in Pedabayalu FRO-V range, (4; 1 sampled), in Paderu FRO-VI range, (4; 1 sampled).

Table 111 Maintenance activities selected for evaluation in Paderu division

Sl. no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Paderu (T) range			
1	Third year maintenance of 2015-16 over 15 Ha NTSH plantation at Chinthagondi in Vanthala R.F	N 18.005020 E 82.602328	DSO 122 A (2018-19)
Araku (T) range			
2	Third year maintenance of NTSH plantation at B. Baliyaguda	N 18.414388 E 82.886275	DSO 137 (2018-19)
Pedabayalu (T) range			
3	First year maintenance of 2017-18 NTSH plantation over 20 ha at Seekari village of Aradakota beat	N 18.248139 E 82.569893	DSO 108 A (2018-19)
4	Third year maintenance of 2015-16 NTSH plantation over 10 Ha at G. Siragamputtu	N 18.358055 E 82.47287	DSO 135 (2018-19)
Paderu FRO-I range			
5	First year maintenance 20 Ha NTSH Plantation a Vennela	N 18.060265 E 82.537061	DSO 105 A (2018-19)

6	Third year maintenance of 2015-16 NTSH plantation at Marridatu - 10 Ha.	N 18.120541 E 82.537077	DSO 141 (2018-19)
7	Third year maintenance of 2015-16 NTSH plantation at Baridiputtu - 10 Ha.	N 18.126457 E 82.541838	DSO 142 (2018-19)
Paderu FRO-III range			
8	First year maintenance of 2017-18 NTSH plantation over 20.00 Ha at Peddapadu village	N 18.140310 E 82.832872	DSO 74 A 2018-19
9	Second year maintenance of 2016-17 NTSH plantation over 20.00 Ha near Ollubedda village	N 18.222691 E 82.69202	DSO 125 A 2018-19
Paderu FRO-IV range			
10	Third year maintenance of 2015-16 NTSH plantation over 15.00 Ha at Sampangidhatu village	N 18.129709 E 82.539325	DSO 129 2018-19
Pedabayalu FRO-V range			
11	First year maintenance of 2017-18 NTSH plantatio over 20 Ha at Cheekumadula	N 18.066352 E 82.772907	DSO 76 2018-19
Paderu FRO-VI range			
12	First year maintenance of 2017-18 NTSH 20 H plantation at Thotlagondhi village	N 18.069583 E 82.519138	DSO 77 A (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year (first, second and third) of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), formation of saucers, coppice management, pruning of lower branches, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding operations, especially along plantation boundaries, to control Lantana and bushy grasses, minimizing competition and ensuring healthy plant growth.
- Continue maintaining clear and effective fire lines, with regular clearing before dry seasons to enhance visibility and effectiveness in preventing forest fires.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments, and complement contingency records.
- Maintain accurate and updated plantation journals, markers, and records to support ongoing identification, monitoring, and accountability.
- Continue timely and appropriate fertilizer application, with special focus on weaker plants to promote uniform growth and ensure optimal nutrient support.
- Carry out timely replanting with healthy bagged seedlings to maintain uniform density, improve survival rate, and strengthen overall plantation health.
- Implement routine coppice management to reduce competition from secondary shoots.

- Improve the frequency and timing of pruning operations to promote healthy plant structure and better bole formation.

Thotlagondi, Paderu FRO-VI range

B Baliyaguda, Araku (T) range

Jangamputtu, Pedabayalu (T) range

Vennela, Paderu FRO-I range

3. Monitoring and Evaluation of Protection Activities

A total of 2 Protection activities were carried out in Paderu division during 2018-19, of which 1 activity was selected for monitoring. In Paderu (T) range 1 activity (1 sampled), Pedabayalu (T) range 1 activity (0 sampled). No Protection activities were reported from other ranges.

3.1 Creation of fire tracing operation in Korra RF area Marripalem to D.Chinthalavedi

GPS location: 18.148127 E 82.748125 **SO no. and year**: DSO 244 (2018-19)

A fire line was created and maintained in Korra RF of Paderu (T) range under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 1750 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was not clear, moderate grass or weed growth was observed, indicating that periodic maintenance is needed.

Fire line in and around the RF areas of Paderu (T) range

4. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 138 activities were carried out during 2018–19, of which 34 were sampled for verification. Among the ranges, Paderu (T) recorded 35 activities (9 sampled), Araku (T) 26 (4 sampled), Pedabayalu (T) 24 (5 sampled), Paderu FRO-I 12 (4 sampled), Araku FRO-II 10 (4 sampled), Paderu FRO-III 9 (3 sampled), Paderu FRO-IV 10 (2 sampled), Pedabayalu FRO-V 7 (1 sampled), and Paderu FRO-VI 5 (2 sampled). Document verification and cross-checking were carried out in the presence of Division and Range office staff, covering sanction orders, estimation sheets, and work registers. The sanctioned amounts were found consistent with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Utilization of funds was appropriate and in accordance with approved estimates and guidelines. Both internal audit by the Conservator of Forests and external audit by the Accountant General's office were conducted, ensuring transparency and compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- Plantation survival was high across all sampled sites, with *Acrocarpus fraxinifolius* consistently showing strong adaptability.
- Plantation areas exceeded recorded figures in all sampled cases, stressing the need for precise GIS-based measurement.
- Plantations were healthy, with no pest infestations and minimal grazing or human interference.
- Maintenance activities were well implemented but weakened by incomplete signage and delayed journal updates.
- Fire line protection existed but required stricter upkeep to remain effective.
- VSS/JFMC participation was evident in Paderu (T), Araku (T), and Araku FRO-II, contributing to better outcomes, but absent in Paderu FRO-I.

Recommendations

- Reconcile plantation records with GIS mapping to ensure accurate area reporting and eliminate discrepancies between records and field conditions.
- Strengthen fire line maintenance through seasonal clearance to minimize fire risks and protect plantation investments.
- Install and maintain signage and boundary stones for clear demarcation, preventing encroachment and ensuring transparency.
- Update plantation journals regularly with data on survival, growth, and maintenance to improve monitoring and audit reliability.
- Expand weeding and fertilizer practices to enhance plantation vigor, survival, and long-term productivity.
- Promote stronger VSS/JFMC participation to build local ownership and ensure sustainable protection and management.
- Continue financial monitoring with third-party verification to complement audits and enhance transparency and accountability.

22. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN VISAKHAPATNAM DIVISION

Introduction

Visakhapatnam division, spanning 315.25 km², is characterized by a diverse forest landscape primarily composed of Moderately Dense Forest (202.49 km²) and Very Dense Forest (112.76 km²). This region, known for its southern moist mixed deciduous forests and productive plantations, plays a vital ecological role in supporting wildlife, replenishing groundwater sources, and stabilizing slopes. Despite a slight reduction of 6.51 km² in forest area, the division maintains relatively stable forest conditions with minimal scrubland and low fire risk. The forests are integral to the livelihoods of local tribal and rural communities, fostering a strong emphasis on biodiversity conservation and community-driven reforestation efforts.

In Visakhapatnam division during 2018-19, a total of 141 CAMPA activities were carried out, of which 29 activities (around 20 %) were selected for detailed monitoring and evaluation. In Visakhapatnam range, 48 activities were implemented, and 10 were sampled. In Chodavaram range, 40 activities were implemented, and 9 were sampled. In Ananthagiri range, 27 activities were implemented, with 5 sampled. In Yellamanchili range, 26 activities were implemented, and 7 were sampled. Among activity types, other works dominated with 86 activities (17 sampled), followed by maintenance (42; 9 sampled), plantations (10; 3 sampled), Protection 3; 2 sampled), there were no soil and moisture conservation works and construction activities were reported during the 2018-19 in Visakhapatnam division.

1. Monitoring and Evaluation of Plantation Activities

In Visakhapatnam division, a total of 10 plantation activities were carried out under CAMPA, of which 3 activities (about 30 %) were selected for monitoring and evaluation. Among the ranges maximum with 4 plantation projects in Chodavaram range reported with 1 sampled, followed by Visakhapatnam range with (2; 1 sampled), Yellamanchili range with (2; 1 sampled). Ananthagiri range with (2; 0 sampled).

1.1 Chodavaram range

During 2018–19, a total of four plantation activities were carried out under the CAMPA scheme in Chodavaram range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 112 Details of plantation selected in Chodavaram range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha NTSH plantation at K Valabu village.	DSO 80 (2018-19)

The plantation site at K Valabu is characterized by black soil with pebble stones, with plantation rows oriented in a south-to-north direction.

Survival percentage: In K Valabu, moderate suitability was noted for *Pongamia pinnata* (79.61 %), *Terminalia arjuna* (76.38 %), and *Azadirach ta indica* (75.89 %).

Growth: In K Valabu, tree heights ranged from 4.00 to 5.12 metres, with girths between 30.23 and 38.88 cm.

Table 113 Details of plantation enumerated in Chodavaram range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Average growth		
					Survival (%)	Height (m)	GBH (cm)
1	K Valabu 10 Ha NTSH plantation	1	*Pongamia pinnata*	N 18.01156 E 82.904523	81.81	4.45 ±1.21	35.15 ±15.06
		2	*Terminalia arjuna*	N 18.011722 E 82.904741	79.33	5.12 ±1.21	38.88 ±14.44
		3	*Azadirachta indica*	N 18.01227 E 82.904378	74.57	4.33 ±1.00	30.86 ±12.28
			Pongamia pinnata		77.41	4.00 ±1.09	33.79 ±11.51
		4	*Terminalia arjuna*	N 18.0118 E 82.904126	73.43	4.38 ±1.06	32.94 ±10.43
			Azadirachta indica		75.43	4.52 ±0.94	32.70 ±9.04
		5	*Azadirachta indica*	N 18.012133 E 82.903313	77.68	4.50 ±1.18	30.23 ±9.54
Plantation average					**77.09**	**4.47**	**33.50**

1.2 Visakhapatnam range

A total of two plantation projects were implemented under the CAMPA scheme in Visakhapatnam range during 2018–19. For evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 114 Details of plantation enumerated in Visakhapatnam range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha NTSH plantation at Ayyannapalem, Nallakonda beat, Pendurthy section, Visakhapatnam range.	DSO 75 (2018-19)

The 10-hectare site selected for the Nallakonda plantation is characterized by red soil interspersed with surface stones.

Survival Percentage: The 10-hectare plantation site at Nallakonda showed good suitability for *Dalbergia latifolia* (77.33%), *Pterocarpus marsupium* (73.23%), *Azadirachta indica* (80.48%), *Terminalia tomentosa* (73.35%), and *Terminalia arjuna* (63.41%).

Growth: In the Nallakonda plantation, average tree height ranged from 4.00 to 5.12 metres, with girths between 30.23 and 38.88 cm.

Table 115 Details of plantation enumerated in Visakhapatnam range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Height (m)	GBH (cm)
1	Nallakonda 10 Ha NTSH plantation	1	*Dalbergia latifolia*	N 17.845160 E 83.112647	90.00	5.92 ±0.76	44.69 ±11.73
			Pterocarpus marsupium		85.00	5.60 ±0.92	40.65 ±9.97

			Azadirachta indica		78.04	4.89 ±0.47	28.97 ±5.35
		2	*Dalbergia latifolia*	N 17.845063 E 83.711627	82.50	5.94 ±0.89	48.94 ± 14.34
			Terminalia tomentosa		75.00	6.30 ±1.07	44.97 ±11.26
			Azadirachta indica		82.92	4.60 ±1.46	36.56 ±13.01
		3	*Dalbergia latifolia*	N 17.844398 E 83.11.406	72.50	6.24 ±0.39	48.38 ±5.87
			Terminalia arjuna		63.41	6.37 ±0.68	46.00 ±7.26
			Pterocarpus marsupium		67.50	4.78 ±1.62	37.33 ±11.66
		4	*Dalbergia latifolia*	N 17.844104 E 83.108912	66.66	4.85 ±1.09	39.93 ±9.76
			Pterocarpus marsupium		67.21	4.07 ±1.05	34.9 ±8.33
		5	*Dalbergia latifolia*	N 17.845821 E 83.112651	75.00	5.40 ±0.56	33.57 ±6.14
			Terminalia tementosa		72.50	4.57 ±0.97	30.97 ±9.67
			Syzygium cumini		63.41	5.00 ±0.58	31.04 ±6.35
Plantation average					**67.95**	**5.00**	**36.24**

1.3 Yellamanchili range

A total of two plantation projects were implemented under the CAMPA scheme in Yellamanchili range during 2018–19. For evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected.

Table 116 Details of plantation selected in Yellamanchili range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha Teak plantation at Gunupudi of Yellamanchili range.	DSO 38 (2018-19)

The proposed 10-hectare teak plantation site at Gunupudi is characterized by red soil with a red loamy texture, which is suitable for teak growth due to its good drainage holding capacity.

Survival percentage: In the Yellamanchili Range, the teak plantation site at Gunupudi Beat demonstrated good suitability for *Tectona grandis*, with an average survival rate of 83.35%.

Growth: In the Gunupudi Beat teak plantation, the average tree height ranged from 4.84 to 5.81 metres, with girths between 23.47 and 25.24 cm.

Table 117 Details of plantation enumerated in Yellamanchili range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Average growth		
					Survival (%)	Height (m)	GBH (cm)
1		1	*Tectona grandis*	N 17.34918 E 82.635862	82.03	4.84 ±1.83	24.21 ±8.67

	Gunupudi 10 Ha Teak plantation	2	*Tectona grandis*	N 17.348491 E 82.635404	84.37	5.59 ±1.76	25.08 ±8.67
		3	*Tectona grandis*	N 17.347096 E 82.634788	82.81	5.77 ±1.70	23.47 ±8.52
		4	*Tectona grandis*	N 17.349655 E 82.636203	84.76	5.64 ±1.93	25.08 ±9.64
		5	*Tectona grandis*	N 17.350117 E 82.636754	82.81	5.81 ±1.82	25.24 ±9.40
Plantation average					**83.35**	**5.53**	**24.61**

Comparative assessment of plantations in Visakhapatnam division during 2018-19

At K Valabu, survival was moderate (75.89–79.61%) with good growth (4.00–5.12 m height, 30.23–38.88 cm girth). Nallakonda showed good suitability with survival ranging 63.41–80.48% and similar growth to K Valabu. The Gunupudi Beat teak plantation recorded the best survival (83.35%) and higher height growth (4.84–5.81 m), though with lower girth (23.47–25.24 cm). Overall, Gunupudi performed best in survival, while K Valabu and Nallakonda showed balanced survival and better girth development.

The verification of plantation area and boundaries

In Visakhapatnam division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

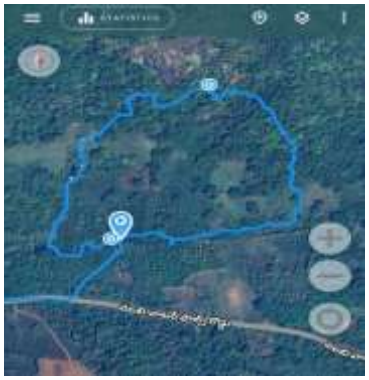
Table 118 Details of plantation area perambulation in Visakhapatnam division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 10 ha. NTSH plantation at K. Valabu village	10 Ha	10.21 Ha
2	Raising of 10 Ha NTSH plantation at Ayyannapalem, Nallakonda beat, Pendurthy section	10 Ha	13.34 Ha
3	Raising of 10 Ha Teak plantation at Gunupudi	10 Ha	9.67 Ha

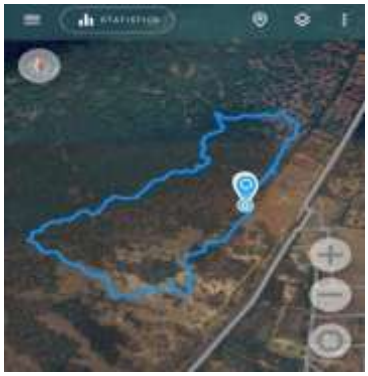
Perambulation of selected NTSH plantations was carried out with the assistance of the local Forest Beat Officer. In all cases, the perambulated area was found to be shortfall and exceed the recorded plantation area due to the presence of rocky terrain, trenches, and barren patches within plantation boundaries. Measurements were therefore taken along the outer boundary or inside the plantation boundary of these natural obstructions rather than the precise plantation limits. Plantation-wise findings

- K Valabu (10 Ha): 10.21 Ha (exceeded by 0.21 Ha)
- Nallakonda (10 Ha): 13.34 Ha (exceeded by 3.34 Ha)
- Gunupudi (10 Ha): 9.67 Ha (lesser by 0.33 Ha)

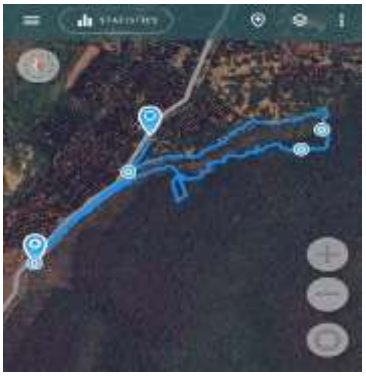
Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.



K Valabu plantation 10.21 Ha



Nallakonda plantation 13.34 Ha



Gunupudi plantation 9.67 Ha

Health Status of Plantations: Field observations across all evaluated plantations indicated no evidence of pest or insect-related damage. The plantations were generally healthy, showing no signs of stress or deterioration.

Protection Measures: Inspection paths and designated watchers were in place and actively maintained to safeguard the plantations against fire and other environmental threats. Fire prevention measures appear to be effective and consistently monitored.

Biotic Pressure on Plantations: The plantations were subjected to minimal biotic pressure. Only occasional instances of grazing and browsing by cattle or other herbivores were observed, and human interference was negligible, indicating low disturbance levels.

Maintenance of Plantation Journal's and Records: Plantation journals were generally well maintained across all sites. Plantation boards were observed at Nallaregupalem, Nallakonda, Gunupudi, and Narendrapuram plantations, while the Sirasavarasa plantation lacked a plantation board. Periodic updating of key plantation parameters in the journals is recommended to ensure accurate monitoring, effective management, and proper documentation of plantation activities.

Vana Samrakshan Samithi (VSS): Among the three plantations evaluated in the Visakhapatnam Division, the involvement of Vana Samrakshana Samithi (VSS) or Joint Forest Management Committees (JFMCs) was recorded in the Chodavaram and Visakhapatnam Ranges during both establishment and maintenance phases. In contrast, the Gunupudi plantation in Yellamanchili Range did not involve VSS in its implementation or maintenance. As a result, Focus Group Discussion (FGD) activities were not conducted at this site.

K Valabu plantation, Chodavaram range

Nallakonda plantation, Visakhapatnam

Gunupudi plantation, Yellamanchili range

2. Monitoring and Evaluation of Maintenance Activities

A total of 42 maintenance activities were carried out in Visakhapatnam division during 2018-19, of which 9 activities were selected for monitoring. Chodavaram accounted for the maximum with 15 activities (3 sampled), followed by Ananthagiri with 14 (3 sampled), Visakhapatnam with 7 (2 sampled), Yellamanchili with 6 (1 sampled).

Table 119 Maintenance activities selected for evaluation in Visakhapatnam division

Sl. no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Chodavaram range			
1	First year maintenance of 10 Ha Teak plantation at M Gadaburu village	N 17.959025 E 82.87508	DSO 61 (2018-19)
2	Second year maintenance of 10 Ha Teak plantation at Pikkalamamidi village	N 18.021404 E 82.937907	DSO 60 (2018-19)
3	Second year maintenance of 10 Ha Bamboo and NTSH plantation at B Kotturu village	N 18.018092 E 82.672304	DSO 55 (2018-19)
Ananthagiri range			
4	Second-year maintenance of 10 Ha NTSH (Miscellaneous) plantation at Antiparthi bit-I & bit-II	N 18.353974 E 83.075555	DSO 169 (2018-19)
5	Second year maintenance of 10 Ha miscellaneous & bamboo plantation at Punyagiri	N 18.110236 E 83.120209	DSO 165 (2018-19)
6	Third year maintenance of 10 Ha NTSH plantation at Dabbagunta	N 18.131822 E 83.101374	DSO 222 (2018-19)
Visakhapatnam range			
7	Second year maintenance of 10 Ha NTSH plantation (Raised during 2016-17), Adduru village, Nallakonda beat, Pendurthy section	N 17.827641 E 83.036710	DSO 37 (2018-19)
8	Third year maintenance of 10 Ha NTSH species Ippalivanipalem plantation in Narava RF in Duvvada beat	N 17.768829 E 83.158379	DSO 198 A (2018-19)
Yellamanchili range			
6	Third year maintenance of 10 Ha NTSH plantation at Janguluru of Yellamanchili range	N 17.515182 E 82.840641	DSO 200 A (2018-19)

As per the approved maintenance plan, the nature of maintenance activities varies according to the year of implementation (first, second, and third) following plantation establishment. These

activities typically include casualty replacement, weeding operations, soil tilling (inter-ploughing), saucer formation, coppice management, pruning of lower branches, fire line maintenance, and other contingency measures. The monitoring visit confirmed that all planned maintenance activities had been carried out across the evaluated plantations. However, in certain sites, plantation boards were either damaged or missing, necessitating replacement to facilitate proper identification and monitoring. Some general recommendations for enhancing plantation growth are as follows:

General recommendations for maintenance activities

- Intensify weeding operations, particularly along plantation boundaries, to control Lantana and bushy grasses, minimize competition, and promote healthy plant growth.
- Continue maintaining and regularly clearing fire lines, especially before the dry season, to enhance their effectiveness in preventing the spread of forest fires.
- Undertake timely replanting with healthy bagged seedlings to ensure adequate stocking density, improve survival rates, and strengthen overall plantation health.
- Increase the frequency and adopt proper timing of pruning operations to encourage healthy growth and promote better bole formation.
- Install and maintain plantation boundary stones and boards to ensure accurate demarcation, facilitate monitoring, prevent encroachments, and support reliable record-keeping.
- Maintain accurate, up-to-date plantation journals, markers, and records to ensure effective monitoring, transparency, and accountability.

Pikkalamamidi, Chodavaram range

M Gadabur, Chodavaram range

Punyagiri plantation, Ananthagiri range

Adduru, Visakhapatnam range

Janguluru, yellamanchili range

3. Monitoring and Evaluation of Protection Activities

A total of 3 Protection activities were carried out in Visakhapatnam division during 2018-19, of which 2 activities were selected for monitoring. In Visakhapatnam range 2 activities (1 sampled), Chodavaram with 1 activity (1 sampled). No Protection activities were reported from Ananthagiri and Yellamanchili ranges.

3.1 Casting of RCC Fence posts and Chain-link Fence fixing in Gandigudam PCA plantation, Mudasarlova beat of Visakhapatnam range.

GPS location: N 17.832102 E 83.262901 **SO no. and year**: RSO 27 (2018-19)

A RCC fence was created and maintained at Gandigudem PCA plantation of Mudasarlova beat in Visakhapatnam range under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of RCC fence are width – 3 m, and length – 261 rmt and Depth with 0.5 below the ground. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fence was clear, as it was established around the PCA plantation. Minor damages were observed, indicating that periodic maintenance is needed.

RCC Fence posts and Chain-link Fence fixing in Mudasarlova beat

3.2 New fire line operation works of Chodavaram range

GPS location: N 17.994935 E 82.814052 **SO no. and year**: DSO 186 (2018-19)

Fire line was created and maintained in Chodavaram range under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of fire line with the width of 3 m, and length – 11000 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was not clear due to

dense growth of grass and weeds, as it was established in the RF of Chodavaram. indicating that periodic maintenance is needed.

Fire tracing operation in Chodavaram range

4 Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 86 activities were carried out during 2018–19, of which 17 were sampled for verification. The highest number of activities was recorded in Visakhapatnam with 37 (6 sampled), followed by Chodavaram with 20 (4 sampled), Yellamanchili with 18 (5 sampled), and Ananthagiri with 11 (2 sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff, covering sanction orders, estimation sheets, and work registers. The sanctioned amounts were found consistent with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was appropriate and aligned with approved estimates and guidelines. Both internal audit by the Conservator of Forests and external audit by the Accountant General's office were conducted, ensuring transparency and adherence to CAMPA financial and administrative protocols. However, in Visakhapatnam range, the work registers for RSO 10 (2018–19) was not made available or presented for verification.

Key Findings

- Plantations were generally healthy and successful, with the Nallakonda site emerging as the most ecologically suitable and Gunupudi affirming teak's adaptability.
- Maintenance activities were widespread but weakened by irregular weeding, insufficient pruning, and missing boards, limiting their full impact.
- Protection measures, though technically correct, were few in number and undermined by weak follow-up, especially in fire line upkeep.
- Documentation and audits were broadly sound, but missing registers and irregular journal updates reduced transparency.
- Community participation was partial, with strong involvement in some ranges and total absence in others.

Recommendations

- Expand plantation efforts in high-performing sites like Nallakonda and Gunupudi, while ensuring rigorous site–species matching in new areas.
- Extend maintenance cycles division-wide, with systematic attention to pruning, replanting, and invasive weed control.

- Scale up protection interventions, particularly fire lines and fencing, and enforce routine clearance and repair schedules.
- Standardize GIS-based verification to resolve persistent mismatches in recorded versus actual plantation extents.
- Mandate structured VSS involvement across all ranges, with FGDs institutionalized as part of plantation monitoring.
- Rebalance the CAMPA portfolio by reducing dependence on “other” works and directing more resources to plantations, maintenance, and protection, which carry direct ecological value.

23. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN VIZIANAGARAM DIVISION

Introduction

Vizianagaram division spans ~376.20 km² of forest cover as per ISFR 2023, all of which falls into Moderately Dense Forest (MDF; ~341.51 km²) and Very Dense Forest (VDF; ~34.69 km²) categories there is no Open Forest in the current assessment. A substantial net gain of +34.71 km² in forest cover has been recorded in this division, marking it among the positive outliers in Andhra Pradesh for conservation and restoration efforts. Despite its relatively good forest status, there remains a significant area 77.29 km² under scrub, indicating zones of degraded or low canopy cover which may be targets for restoration. Ecologically, these woodlands are characteristic of tropical dry deciduous forest types dominated by teak and bamboo species. The division also benefits from less fire-prone conditions compared to many other districts. Along coastal fringes, mangroves and casuarina shelterbelts provide additional buffers and ecosystem services. On the economic and social side, plantations make up a meaningful fraction of the landscape, enhancing economic resilience. Community dependence remains high for fuelwood and Non-Timber Forest Products (NTFPs), driving participatory forest management and sustainable extraction practices. SMC are ongoing priorities, especially in scrub-prone/regenerating areas, to bolster forest health.

In Vizianagaram division during 2018-19, a total of 187 CAMPA activities were carried out, of which 40 activities (around 20 %) were selected for detailed monitoring and evaluation. In Vizianagaram range, 53 activities were implemented, and 12 were sampled. In Parvathi Puram range, 50 activities were implemented, and 10 were sampled. In Saluru range, 51 activities were implemented, with 11 sampled. In Kurupam range, 33 activities were implemented, and 7 were sampled. In Anantagiri range, none of the activities implemented. Among activity types, other works dominated with 120 activities (25 sampled), followed by maintenance (43; 9 sampled), Protection (12; 4 sampled), plantations (5; 1 sampled), soil and moisture conservation works (7; 1 sampled) there were no construction activities were implemented.

1. Monitoring and Evaluation of Plantation Activities

In Vizianagaram division, a total of 5 plantation activities were carried out under CAMPA, of which 1 activity (about 20 %) was selected for monitoring and evaluation. Among the ranges in Parvathi Puram reported with 2 activities (1 sampled), Vizianagaram, Saluru and Kurupam reported with 1 activity in each range (0 sampled), No plantation activities in Anantagiri range.

1.1 Parvathi Puram range

During 2018–19, a total of two plantation activities were carried out under the CAMPA scheme in Vizianagaram range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 120 Details of plantation selected in Parvathi Puram range

Sl. no.	Plantation	SO no. and year
1	Estimate for raising 10 Ha teak plantation at Puligummi	DSO 77 B (2018-19)

The plantation site is situated on gently sloping terrain with sandy loam soil, offering good aeration and moisture retention conducive to plant growth. Also, within a dry deciduous forest biome, the site's seasonal climate supports the growth of drought-tolerant species.

Survival percentage: In Puligummi plantation *Tectona grandis* survival rate – 86.32%, reflecting highly favourable growth conditions.

Growth: The average growth metrics for this plantation indicate tree heights ranging from 1.38 – 8.74 m, with girths ranging from 10.54 – 25.35 cm. These measurements reflect healthy and consistent growth, suggesting that the plantation is thriving under the prevailing environmental conditions.

Table 121 Details of plantation enumerated in Parvathi Puram range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Puligummi 10 Ha Teak plantation	1	*Tectona grandis*	N 18.428143 E 83.418641	85.54	4.16 ±0.76	-	25.35 ±4.00
		2	*Tectona grandis*	N 18.428696 E 83.418713	81.25	1.38 ±0.43	10.54 ±2.98	-
		3	*Tectona grandis*	N 18.427708 E 83.419221	82.03	6.60 ±1.99	20.46 ±4.06	-
		4	*Tectona grandis*	N 18.427642 E 83.419549	80.07	8.74 ±2.40	-	21.68 ±3.01
		5	*Tectona grandis*	N 18.427447 E 83.419804	86.32	7.59 ±2.38	-	20.18 ±3.58
Plantation average					**83.04**	**5.69**	**20.46**	**22.40**

The verification of plantation area and boundaries

In Vizianagaram division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 122 Details of plantation area perambulation in Vizianagaram division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Estimate for raising 10 Ha Teak plantation at Puligummi.	10 Ha	32.93 Ha

Perambulation of selected plantation was carried out with the Forest Beat Officer, using QGIS software and verified with the Geo Tracker app. plantations showed higher perambulated areas than recorded. Because of rocky terrain, trenches, and barren patches, measurements followed the outer boundary instead of the exact plantation line. This resulted in the perambulated areas being larger than the recorded areas.

- Puligummi: Recorded 10.00 Ha → Perambulated 32.93 Ha (+22.93 Ha)

Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.

Geo tracker of Puligummi plantation 32.93 Ha

Health Status of Plantation: Field inspections revealed no incidence of insect or pest damage affecting plantation species at either site. All plants appeared healthy, showing no visible signs of infestation, stress, or pest-related deterioration.

Protection Measures: Fire lines and inspection paths were maintained. Fire watchers were deployed to safeguard plantations from fire hazards and other environmental risks.

Biotic Pressure on Plantation: No evidence of grazing or browsing pressure from cattle or human interference was observed at either plantation site.

Maintenance of Plantation Journal and Records: The plantation journals were not shown during field visit, recommended to keep proper documentation and the periodic updating of key plantation parameters requires. A plantation board marks the initial point of the boundary. Plantation is inspected by concerned forest official and entered the observations.

Vana Samrakshan Samithi (VSS): Vizianagaram Division during 2018-19, the involvement of Vana Samrakshana Samithi (VSS) as recorded in Parvathi Puram range during establishment

Puligummi plantation, Parvathi Puram range

2. Monitoring and Evaluation of Maintenance Activities

A total of 43 maintenance activities were carried out in Vizianagaram division during 2018-19, of which 9 activities were selected for monitoring. Saluru range accounted for the maximum with 14 activities (3 sampled), followed by Parvathi Puram with 12 (2 sampled), Vizianagaram with 11 (2 sampled), Kurupam with 6 (2 sampled), none of the activities were reported in Anantagiri range.

Table 123 Maintenance activities selected for evaluation in Vizianagaram division

Sl. no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Saluru range			
1	Estimate for silvicultural operations of 1983 old Teak plantation at Kankanapalli beat of Saluru Section	N 18.526333 E 83.123387	RSO 9 (2018-19)
2	Second year maintenance of 10 Ha NTSH plantation at Velagavalasa.	N 18.618163 E 83.126634	DSO 146 (2018-19)
3	Third year maintenance of 5.00 Ha Teak plantation Lovarakandi	N 18.720346 E 83.282143	DSO 185 (2018-19)
Parvathi Puram range			
3	First year maintenance 10 Ha NTSH plantation at Kondakenguva.	N 18.470605 E 83.262093	DSO 70 A (2018-19)
4	Estimate for silvicultural operations 10 Ha in Kappalada Sal patch (Shorea robusta) of Masimanda beat of Komarada section of Parvathipuram range (bit-1).	N 18.998129 E 83.381619	RSO 18 (2018-19)
Vizianagaram range			
5	First year maintenance of 10 Ha. Teak plantation at Kumbivalasa.	N 18.351968 E 83.182453	DSO 62 (2018-19)
6	Estimate for 10 ha bamboo decongestion works at Chippapalli (Bheemavaram beat)	N 18.338366 E 83.118107	DSO 235 (2018-19)
Kurupam range			
7	Third year maintenance of 10 Ha Teak plantation at Biyyalavalasa of Kurupam Section of Kurupam range.	N 18.880347 E 83.559627	DSO 259 (2018-19)
8	Silvicultural operations in Karivalasa Teak plantation of G. L. Puram section of Kurupam range.	N 19.010075 E 83.614064	RSO 2 (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year (Silvicultural operations and Decongestion of Bamboo works, first, second and third) of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), coppice management, pruning of lower branches, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. However, in some sites, plantation boards were found to be damaged or missing, requiring replacement to ensure proper identification and monitoring. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Weeding: Intensify weeding operations, particularly along plantation boundaries, to control Lantana and bushy grasses, reduce competition, and promote healthy plant growth.
- Fire Protection: Continue maintaining clear fire lines, ensuring they are regularly cleared before the dry season to improve effectiveness in preventing forest fires.
- Replanting: Undertake timely replanting with healthy bagged seedlings to maintain proper stocking density, enhance survival rates, and strengthen plantation health.
- Pruning: Increase the frequency and ensure proper timing of pruning operations to encourage healthy growth and better bole formation.

- Boundary Demarcation: Install and maintain plantation boundary stones and boards for accurate demarcation, better monitoring, prevention of encroachments, and reliable record-keeping.
- Records Management: Maintain accurate and regularly updated plantation journals, markers, and records to support effective monitoring and accountability.

Masimanda beat, Parvathi Puram range

Velagavalasa beat, Saluru range

Bheemavaram beat, Vizianagaram range

Sangamguddi, Anantagiri range

3. Monitoring and Evaluation of Protection Activities

A total of 12 Protection activities were carried out in Vizianagaram division during 2018-19, of which 4 activity was selected for monitoring. Vizianagaram range accounted for the maximum with 4 activities (1 sampled), followed by Saluru with 3 (1 sampled), Kurupam with 3 (1 sampled), Parvathi Puram with 2 (1 sampled), no protection activities were reported in Anantagiri range.

3.1 Creation of fire lines at Andra RF in Andra beat and section of Vizianagaram range

GPS location: N 18.353456 E 83.182382 **SO no. and year**: RSO 25 (2018-19)

A fire line was created and maintained in Andra RF of Vizianagaram range under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 1100 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was not clear, as it was established along the inspection path. moderate grass or weed growth was observed, indicating periodic maintenance is needed.

3.2 Estimate for creation of new fire lines in Gunnikonda RF block, Thonam beat in Mamidipalli section of Saluru range.

GPS location: N 18.621746 E 83.235756 **SO no. and year:** RSO 18 (2018-19)

A fire line was created and maintained in Gunnukonda RF of Saluru range under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 1000 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was not clear, dense grass or weed growth was observed, indicating rework is needed.

3.3 Creation of new forest fire line in Peddakonda RF of Kurupam section in Kurupam range

GPS location: N 18.880525 E 83.559715 **SO no. and year:** RSO 14 (2018-19)

A fire line was created and maintained in Peddakonda RF of Kurupam range under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 2300 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was not clear, moderate grass or weed growth was observed, indicating periodic maintenance is needed.

3.4 Estimate for creation of new file lines in Vanakabadi RF Ulipirivalasa village of Masimanda beat in Komarada section of Parvathipuam range.

GPS location: N 18.935633 E 83.436016 **SO no. and year:** RSO 23 (2018-19)

A fire line was created and maintained in old teak plantations at Masimanda beat of Parvathi Puram range under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of new fire line are width – 3 m, and length – 3000 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was reduced, moderate grass or weed growth was observed, indicating periodic maintenance is needed.

Andra beat, Vizianagaram range

Masimnda beat, Parvathi Puram range

4. Monitoring and Evaluation of Soil and Moisture Conservation (SMC) Activities

A total of 7 SMC activities were carried out during 2018-19, of which 1 was sampled. All these were taken up in the Saluru range**.** No SMC activities were recorded in other ranges of Vizianagaram division.

4.1 Digging of percolation tanks at Madavalasa area, Pachipenta section of Saluru range

GPS location: N 18.433415 E 83.088570 **SO no. and year**: RSO 138 (2018-19)

Total six percolation tanks were constructed across Madavalasa in Pachipenta beat of Saluru range was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the mini percolation tanks; length – 10 m, width – 10 m, and depth – 1 m for four percolation tanks and the other two tanks with the dimensions of length – 15 m, width – 15 m, and depth – 1 m The field measurements matched those in the measurement book, indicating no deviations. The tank structure is well maintained, and its measurements align with the recorded specifications. However, regular de-siltation is recommended to enhance its storage capacity, improve water infiltration, and maintain soil moisture levels effectively.


Percolation tank in Pachipenta beat, Saluru range

5. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 120 activities were carried out during 2018–19, of which 25 were sampled for verification. The highest number of activities was recorded in Vizianagaram with 37 (9 sampled), followed by Parvathi Puram with 34 (6 sampled), Saluru with 26 (6 sampled), and Kurupam with 23 (4 sampled). No other activities were reported in Anantagiri Range. Document verification and cross-checking were conducted in the presence of Division and Range office staff, covering sanction orders, estimation sheets, and work registers. The sanctioned amounts were found consistent with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was appropriate and aligned with approved estimates and guidelines. Both internal audit by the Conservator of Forests and external audit by the Accountant General's office were conducted, ensuring transparency and adherence to financial and administrative protocols under the CAMPA scheme.

Key Findings

- Overall plantation survival was high at 86%, reflecting effective species selection, site preparation, and routine maintenance.
- A significant overestimation of 22.9 ha was noted at Puligummi, indicating the need to reconcile records with GIS mapping for accurate reporting.
- Weeding, pruning, and fertilization were satisfactory, but effectiveness was reduced by missing boards, poor signage, and irregular journal updates.
- Fire lines and SMC structures were functional, though routine upkeep and timely inspections are needed to maintain their protective role.

Recommendations

- Discrepancies between recorded and actual plantation areas should be reconciled using GIS mapping to ensure accurate reporting, accountability, and monitoring of plantation extents.
- Plantation journals must be consistently updated with survival, growth, and maintenance data. Officers should verify and produce these records during field visits to improve monitoring and audit reliability.
- Plantation boards and boundary markers should be installed and regularly maintained to ensure clear demarcation, prevent encroachment, and facilitate verification of plantations during inspections.
- Routine upkeep of fire lines and Soil & Moisture Conservation structures is essential to prevent erosion, enhance water retention, and reduce fire risks. Scheduled clearance and de-siltation should be institutionalized.
- Strengthening the involvement of Vana Samrakshana Samithis (VSS) and Joint Forest Management Committees (JFMC) will enhance local ownership, protection, and long-term sustainability of plantations through active community participation.

24. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN SRIKAKULAM DIVISION

Introduction

Srikakulam division encompasses 585.22 km² of forest area, of which 81.16 km² is Very Dense Forest (VDF) and 504.06 km² is Moderately Dense Forest (MDF), with no Open Forest (OF) remaining the division registered a net gain of 6.81 km² in forest cover in the latest assessment, even as about 318.41 km² is classified as scrub forming a mixed mosaic of dry deciduous scrub and moderately dense vegetation. Dominant tree species include Teak, *Terminalia, Anogeissus,* and bamboo; in coastal zones, mangrove shelterbelts and casuarina and teak plantations add to ecological diversity and services. Srikakulam is categorized as less fire-prone in terms of forest fire risk under ISFR-2023. Local communities depend heavily on these forests for fuelwood, fodder, grazing, gums, honey, and medicinal plants; mangroves additionally play a crucial role in cyclone protection and supporting fisheries. Management priorities in the division include soil conservation, enrichment plantations, and promotion of participatory governance, especially through Vana Samrakshana Samithis (VSS).

In Srikakulam division during 2018-19, a total of 163 CAMPA activities were carried out, of which 33 activities (around 20 %) were selected for detailed monitoring and evaluation. In Srikakulam range, 29 activities were implemented, and 6 were sampled. In Kasibugga range, 30 activities were implemented, and 6 were sampled. In Palakonda range, 47 activities were implemented, with 9 sampled. In Pathapatnam range, 44 activities were implemented, and 9 were sampled. In Tekkali range, 13 activities were implemented, and 3 were sampled. Among activity types, other works dominated with 133 activities (27 sampled), followed by maintenance (22; 4 sampled), plantation (8; 2 sampled), there were no protection, construction and soil and moisture conservation activities were implemented.

1. Monitoring and Evaluation of Plantation Activities

In Srikakulam division, a total of 8 plantation activities were carried out under CAMPA, of which 2 activities (about 20 %) were selected for monitoring and evaluation. Among the ranges in Kasibugga range reported with 4 activities (1 sampled), Pathapatnam range with 3 activities (1 sampled) and Palakonda range with 1 activity (0 sampled). No plantation activities were reported from Srikakulam, and Tekkali ranges.

1.1 Kasibugga range

During 2017–18, a total of four plantation activities were carried out under the CAMPA scheme in Kasibugga range. In this monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 124 Details of plantation selected in Kasibugga range

Sl. no.	Plantation	SO no. and year
1	Raising of 5 Ha Teak plantation in Koradabadi, Mandasa beat	DSO 171 (2018-19)

In Koradabadi plantation 5 Ha site has black soil with a sandy-loam texture. The flat terrain shows little erosion, and the granite-based soil provides moderate stability and drainage.

Survival percentage: In Koradabadi plantation survival rate was lower at 65.85%, suggesting only moderate success and the need for improved maintenance or site-specific measures.

Growth: In Koradabadi plantation tree height ranged 3.03–4.81 m with girths of 21.05–29.83 cm, indicating moderate growth.

Table 125 Details of plantation enumerated in Kasibugga range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average	
						Height (m)	GBH (cm)
1	Koradabadi 5 Ha Teak plantation	1	*Tectona grandis*	N 18.909496 E 84.463204	64.84	4.81 ±1.32	29.83 ±6.64
		2	*Tectona grandis*	N 18.909018 E 84.46317	68.75	3.15 ±0.54	21.05 ±3.49
		3	*Tectona grandis*	N 18.908688 E 84.463246	62.89	3.03 ±0.42	21.82 ±2.07
		4	*Tectona grandis*	N 18.908342 E 84.463044	66.4	3.16 ±0.67	21.55 ±2.91
		5	*Tectona grandis*	N 18.909411 E 84.463158	66.4	3.81 ±0.62	28.82 ±7.79
Plantation average					**65.85**	**3.59**	**24.61**

1.2 Pathapatnam range

A total of three plantation projects were implemented under the CAMPA scheme in Pathapatnam range during 2016–17. For evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 126 Details of plantation selected in Pathapatnam range

Sl. no.	Plantation	SO no. and year
1	Raising of 5 Ha Teak plantation at Pathuru village limits of Pathapatnam section	DSO 100 (2018-19)

In Pathuru 5 Ha plantation consists of alluvial soil with good drainage, making it highly suitable for teak cultivation and capable of supporting healthy growth.

Survival percentage: In Pathuru *Tectona grandis* with 78.74%, showing healthy plantation establishment and favorable site conditions.

Growth: In Pathuru tree height ranged between 5.06–5.70 m, with girth measurements of 27.38–32.88 cm, reflecting moderate growth.

Table 127 Details of plantation enumerated in Pathapatnam range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average	
						Height (m)	GBH (cm)
1	Pathuru 5 Ha Teak plantation	1	*Tectona grandis*	N 18.737703 E 84.100548	89.06	5.06 ±0.66	27.38 ±4.03
		2	*Tectona grandis*	N 18.737877 E 84.100288	84.76	5.70 ±0.64	32.88 ±5.82

		3	*Tectona grandis*	N 18.73864 E 84.099961	57.42	5.24 ±072	28.48 ±4.97
		4	*Tectona grandis*	N 18.738998 E 84.099641	79.68	5.68 ±0.47	31.75 ±4.77
		5	*Tectona grandis*	N 18.738838 E 84.100175	82.81	5.09 ±075	31.08 ±5.70
Plantation average					**78.74**	**5.35**	**30.31**

Comparative assessment of plantations in Srikakulam division during 2018-19

The survival and growth of Tectona grandis varied between the two plantations. In Koradabadi, the survival rate was lower at 65.85%, indicating moderate establishment and highlighting the need for improved maintenance or site-specific interventions. Trees in this plantation attained average height of 3.03–4.81 m and girths of 21.05–29.83 cm, reflecting moderate growth. In contrast, Pathuru plantation showed better performance with a survival rate of 78.74%, indicating healthy establishment under favourable site conditions. Trees here exhibited with average height of 5.06–5.70 m and girths of 27.38–32.88 cm, demonstrating moderate but consistent growth.

The verification of plantation area and boundaries In Srikalulam division during 2018-19 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 128 Details of plantation area perambulation in Srikakulam division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 5 Ha Teak plantation in Koradabadi, Mandasa beat & section of Kasibugga range.	05 Ha	8.88 Ha
2	Raising of 5 Ha Teak plantation at Pathuru village limits of Pathapatnam section of Pathapatnam range.	05 Ha	5.95 Ha

Perambulation was carried out with the assistance of local Forest Beat Officers and verified using QGIS software and the Geo Tracker application with geotagged/ documentation. In Koradabadi (5 Ha Plantation) the perambulated area measured 8.88 Ha, which is 3.88 Ha more than the official record. The variation arose because the outer boundary included rocky patches and trenches within the plantation limits. In Pathuru (5 Ha Teak Plantation): The perambulated area was 5.95 Ha, i.e., 0.95 Ha more than the official record. This difference was due to dense jungle growth and trenches around the site, which made it difficult to trace the exact boundary.

Koradabadi plantation 8.88 Ha

Pathuru plantation 5.95 Ha

Health Status of Plantations: Field visits indicated that the plantations were in good health, with no incidences of insect or pest damage observed. The species exhibited healthy growth, reflecting favourable site conditions and effective management.

Protection Measures: Adequate protection measures were in place through the creation and maintenance of fire lines, inspection paths, and the deployment of fire watchers. These measures provided effective safeguards against fire and other environmental threats, ensuring the long-term sustainability of the plantations.

Biotic Pressure on plantations: Biotic interference was minimal. Only a few instances of grazing and browsing were recorded, indicating negligible impact from livestock or wild herbivores on plantation development.

Maintenance of Plantation Journals and Records: Plantation journals and records were generally well maintained and satisfactory. However, periodic updating of plantation parameters such as survival, growth, and maintenance activities is necessary for accurate monitoring. It was also noted that plantation boards were not displayed at the Kopradabadi and Pathuru plantations, which should be addressed to improve transparency and site identification. Plantation is inspected by concerned forest official and entered the observations.

Vana Samrakshan Samithi (VSS): Among the two plantations evaluated in the Srikakulam Division, the involvement of Vana Samrakshana Samithi (VSS) or Joint Forest Management Committees (JFMCs) was observed in the Kasibugga and Pathapatnam ranges during plantation establishment and maintenance. Their active participation facilitated smooth implementation, strengthened community ownership, enhanced protection measures, and supported local livelihoods through collective decision-making and participatory monitoring.

Koradabadi plantation, Kasibugga range

Pathuru plantation, Pathapatnam

2. Monitoring and Evaluation of Maintenance Activities

A total of 22 maintenance activities were carried out in Srikakulam division during 2018-19, of which 4 activities were selected for monitoring. Pathapatnam accounted for the maximum with 8 activities (2 sampled), Kasibugga followed by with 6 (1 sampled), Palakonda with 6 (1 sampled), Tekkali with 2 (0 sampled), there were no maintenance activity recorded in Srikakulam range.

Table 129 Maintenance activities selected for evaluation in Srikakulam division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Pathapatnam range			
1	Second year maintenance of 5 Ha miscellaneous plantation at Savarabontu village limits Saravakota section	N 18.659798 E 84.010120	DSO 104 (2018-19)
2	Third year maintenance of 10.00 Ha Teak plantation at Dasaradha Puram village	N 18.746918 E 84.112344	DSO 107 (2018-19)
Kasibugga range			
3	First year maintenance of 10 Ha Teak plantation in Hunnali Mandasa beat, Mandasa section of Kasibugga range.	N 18.889835 E 84.479500	DSO 174 (2018-19)
Palakonda range			
4	First year maintenance of 5 Ha NTSH plantation 3×3 espacement at Burna Seethampeta limits, Burna central beat, Veeraghattam section of Palakonda range.	N 18.683294 E 83.697275	DSO 88A (2018-19)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year (first, second and third) of implementation following plantation establishment. These activities include casualty replacement, weeding operations, soil tilling (inter-ploughing), formation of saucers, coppice management, pruning of lower branches, fire line management, and other contingency measures. During the monitoring visit, it was observed that all planned maintenance activities had been executed across the evaluated plantations. plantation boards were found and good in condition. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Implement regular weed control with targeted removal of Lantana and bushy grasses.
- Clear and maintain fire lines and inspection paths regularly to enhance accessibility and fire prevention.
- Carry out systematic pruning of side branches to promote healthy growth and clear bole formation.
- Install plantation boards and boundary markers to improve visibility and site identification.
- Records Management: Maintain accurate and regularly updated plantation journals, markers, and records to support effective monitoring and accountability.

Savarabontu, Pathapatnam range

Burna beat, Palakonda range

3. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 133 activities were carried out during 2018–19, of which 27 were sampled for verification. The highest number of activities was recorded in Palakonda with 40 (8 sampled), followed by Pathapatnam with 33 (6 sampled), Srikakulam with 29 (6 sampled), Kasibugga with 20 (4 sampled), and Tekkali with 11 (3 sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff, covering sanction orders, estimation sheets, and work registers. The sanctioned amounts were found to be in alignment with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was appropriate and consistent with approved estimates and guidelines. Both internal audit by the Conservator of Forests and external audit by the Accountant General's office were conducted, ensuring transparency and adherence to financial and administrative protocols under the CAMPA scheme.

Key Findings

- The survival of plantations across the sampled sites ranged from moderate to satisfactory, with recorded rates between 66% and 79%. While most species showed good adaptability to local conditions, some areas reflected moderate survival, indicating a need for targeted care and follow-up maintenance interventions to improve overall establishment.
- Field verification revealed that all sampled plantations exhibited an area excess relative to the recorded measurements. This discrepancy suggests either overestimation during plantation reporting or expansion beyond the sanctioned boundary. Accurate reconciliation of plantation records with field surveys or GIS mapping is recommended to ensure consistency and accountability.
- The plantations were generally healthy, with minimal evidence of pest infestations or grazing pressure. The absence of significant biotic stress indicates that current protection measures, including fencing, patrolling, and community participation, are largely effective in safeguarding plantation health.
- Routine maintenance activities such as weeding, soil and moisture conservation, and fertilization were effectively carried out, contributing to the overall vigor of the plantations.
- This highlights the need to strengthen documentation practices and ensure timely maintenance of protective infrastructure to sustain long-term plantation productivity.

Recommendations

- Correct plantation area mismatches using GIS-based monitoring: Use GIS mapping to reconcile recorded and actual plantation areas, ensuring accuracy and accountability.
- Intensify weeding and pruning operations: Regular weeding and pruning will improve plantation vigor, reduce competition, and enhance survival rates.
- Ensure plantation boards and markers are installed at all sites: Clear signage and boundary markers will prevent encroachment and support effective monitoring.
- Regularly update plantation journals and parameters: Timely recording of survival, growth, and maintenance activities will improve monitoring and audit reliability.
- Expand community participation via VSS/JFMCs: Strengthen local ownership and protection of plantations through active involvement and incentivized responsibilities.

V. ASSESSMENT OF VANA SAMRAKSHANA SAMITI INVOLVEMENT

The evaluation of CAMPA-funded activities during 2018–19 was undertaken to assess the social, environmental, and economic impacts achieved through plantation and allied works. The purpose was not only to measure the effectiveness of plantations in achieving ecological regeneration and livelihood support but also to identify undesirable impacts that were successfully avoided. The evaluation placed emphasis on the role of community institutions, particularly Vana Samrakshana Samitis (VSS), in shaping sustainable outcomes.

Specifically, the evaluation focused on four dimensions

1. Social Impacts – Assessing community participation, employment generation, and inclusion of vulnerable groups.
2. Environmental Impacts – Improvement in forest cover, biodiversity conservation, soil and moisture protection, and fire prevention.
3. Economic Impacts – Wage employment, income opportunities through forest-based activities, and benefit-sharing mechanisms.
4. Institutional Strengthening – The role of VSS/JFMCs in planning, execution, monitoring, and sustaining plantation and protection works.

Role and Responsibilities of VSS

The Vana Samrakshana Samiti (VSS), functioning under the Joint Forest Management framework, serves as a bridge between the Forest Department and the local communities. Its primary role is to safeguard forests from threats such as illegal felling, grazing, encroachment, and fire, while simultaneously engaging in regeneration efforts. The VSS does not merely execute instructions but actively participates in scheme implementation, including CAMPA, watershed management, and soil conservation programs.

Through collective decision-making processes involving Gram Sabhas, the VSS encourages participation from women, Below Poverty Line families, and fringe villagers. This participatory approach ensures that local knowledge is integrated into planning and that the benefits of forestry activities are equitably distributed. Wage employment opportunities are created through tasks like pitting, planting, weeding, pruning, and fire line creation. Simultaneously, the VSS promotes livelihood support through the collection of non-timber forest produce (NTFP) and other income-generating activities.

Beyond immediate employment, the VSS fosters long-term community ownership by sharing benefits from plantations and ensuring that conservation efforts are seen as shared responsibilities. Awareness campaigns and capacity-building initiatives conducted by VSS further strengthen community understanding of climate change, sustainable practices, and forest laws.

Significance of VSS

The significance of VSS lies in its ability to blend ecological priorities with socio-economic development. By providing communities with tangible benefits while protecting natural resources, the VSS model ensures that conservation is not an imposed activity but a mutually beneficial partnership. This approach contributes to the socio-economic development of

stakeholders particularly the vulnerable and underprivileged while simultaneously drawing upon local wisdom to rejuvenate forests in an inclusive and sustainable manner.

By actively involving marginalized groups, VSS strengthens social inclusion and reduces inequities in resource management. Moreover, through vigilant monitoring and responsible use of forest resources, VSS helps mitigate man-animal conflicts and prevents further degradation of fragile ecosystems. The model thus represents a holistic approach, where ecological integrity and human welfare advance together.

Division-wise Assessment of VSS Involvement

A review of division-wise participation reveals varying degrees of VSS involvement across Andhra Pradesh. Among the 24 forest divisions assessed, 18 divisions (≈75%) recorded active VSS participation in plantation establishment and management, indicating generally strong yet spatially uneven community engagement. High levels of involvement were observed in Kakinada, Nellore, Proddatur, and Eluru divisions, where VSS contributed across multiple ranges covering four or more plantations per division demonstrating strong institutional coordination, effective local mobilization, and shared ownership. Moderate participation was noted in Chittoor West, Narsipatnam, Guntur, and Srikakulam, where VSS involvement was confined to select ranges, while Ananthapuramu, Chittoor-East, Krishna, and Vizianagaram exhibited limited or no participation. Weaker engagement in dry and interior divisions such as Ananthapuramu and Chittoor was often associated with site inaccessibility, lower productivity, and reduced community dependence on forest resources. In contrast, coastal and forest-rich divisions like Kakinada, Vizianagaram, and Srikakulam benefited from the established Joint Forest Management framework, which strengthened institutional support and improved plantation maintenance and protection.

Overall, VSS involvement was confirmed in approximately 50 plantation sites statewide, underscoring that community participation remains a critical determinant of plantation sustainability. Divisions with strong VSS engagement achieved better integration between departmental efforts and local needs, reflecting higher levels of awareness, institutional capacity, and willingness to participate in forest regeneration. Conversely, divisions with minimal VSS presence reflected weak community participation and limited ownership, underscoring the need for targeted awareness programs, capacity building, and participatory planning to enhance long-term sustainability. Where VSS involvement was weak or absent, plantations risked being perceived as externally driven projects rather than community-owned initiatives, reducing prospects for durable ecological and social outcomes.

General Observations

The implementation of CAMPA activities across various divisions demonstrated strong community participation and effective collaboration between the Forest Department and local institutions such as the Joint Forest Management Committees (JFMCs) and Vana Samrakshana Samithis (VSS).

The VSS played an active role in project planning, implementation, and monitoring of plantation, maintenance, soil and moisture conservation (SMC), protection, and construction activities. Fringe villagers were well-informed about CAMPA objectives and operational

processes through special meetings conducted by the *Grama Sabha* and VSS, ensuring transparency and local awareness.

Species selection was carried out jointly by the Forest Department and local communities through the VSS, reflecting both ecological suitability and community preferences. The plantation activities provided multiple socio-economic benefits, particularly through employment generation. Local villagers were engaged in activities such as pitting, planting, weeding, pruning, and creating fire lines each contributing not only to plantation establishment and protection but also to livelihood enhancement.

The Focus Group Discussions (FGDs) revealed that community members were aware of the project budgets, records, and technical supervision processes. Both the Forest Department and VSS jointly oversaw the progress and quality of works, and FGD participants expressed overall satisfaction with the implementation and outcomes of CAMPA interventions.

The tangible benefits to local communities were evident in the form of consistent employment opportunities and skill development. Activities such as pitting, planting, and pruning provided income to local labourers, while the creation of fire lines supported forest protection and offered additional seasonal work. This participatory approach not only strengthened the ecological success of plantations but also promoted socio-economic development and fostered a sense of shared ownership and responsibility toward forest resources.

Furthermore, this inclusive model draws upon local wisdom and participation, contributing to the dual goals of ecological restoration and community empowerment. It has been particularly beneficial for vulnerable and underprivileged groups residing in forest fringes.

Local stakeholders also expressed interest in expanding the scope of future plantations to include Non-Timber Forest Product (NTFP) species, enabling sustained livelihood opportunities through the collection and sale of forest produce. To further enhance the effectiveness and inclusiveness of CAMPA activities, there is a recognized need for structured awareness and capacity-building programs to educate the local population about CAMPA objectives, benefits, and long-term ecological importance.

Conclusions

The evaluation underscores that active VSS participation is central to the long-term success of CAMPA-funded plantations. Where VSS was effectively engaged, plantations not only contributed to ecological regeneration but also delivered socio-economic benefits to forest-dependent communities. However, divisions with weak or absent VSS reveal gaps in community engagement that require urgent attention. Strengthening awareness campaigns, expanding inclusion of NTFP species, and enhancing institutional capacity of VSS will ensure that CAMPA objectives are fully realized. Ultimately, community-driven forest management remains the cornerstone of sustainable afforestation and ecological security in Andhra Pradesh.

VSS in Gooty range, Anantapuramu division

VSS in V.R Puram, Chintur division

VSS in Kurnool range, Kurnool division

VSS in Kavali range, Nellore division

VSS in Araku (T) range Paderu division

VSS in Araku (FRO II) range, Paderu

VSS in Pathapatnam range, Srikakulam

VSS in Visakhapatanam range

VI. DIVISION WISE SUMMARY OF CAMPA ACTIVITIES

1. Chittoor East Division

In 2018–19, Chittoor East Forest Division implemented 232 CAMPA-funded activities, out of which 54 activities (23.3 %) were sampled for evaluation. These activities spanned six categories: plantations (8), maintenance (58), protection (40), soil and moisture conservation (SMC) works (11), construction (9), and others (106), with the majority of the budget and effort concentrated on routine maintenance and miscellaneous works, while plantations and SMC, though smaller in number, were considered ecologically significant.

Plantation performance varied notably across sites. The Pathagunta plantation in the Chittoor East range was the division's best-performing site, showing a 71 % average survival rate across species such as *Pterocarpus santalinus*, *Syzygium cumini*, *Hardwickia binata*, and *Terminalia arjuna*, with growth reaching 2.4–4.0 meters in height and up to 32 cm in girth. In contrast, the Ambakam site in the Sathyavedu range had a moderate survival rate of 63%, with reduced growth due to shallow, rocky soils. The Nandanam site in the Puttur range showed the poorest performance, with survival rates falling below 30 %, despite some girth growth, highlighting the critical need for better site species compatibility. Plantation journals were generally well-maintained, although a few gaps were noted most notably, the journal for the Ambakam plantation was missing. Furthermore, GPS-based ground verification revealed discrepancies in recorded plantation areas, with actual field extents exceeding documented figures in some cases, such as at Nandanam, where the area was 6.79 hectares more than recorded. These mismatches were partly due to tracing of natural rather than administrative boundaries, underscoring the need for more precise GIS-based demarcation across the division.

Maintenance constituted the largest activity type with 58 works, of which 13 were sampled. These included casualty replacement, circular weeding, coppice management, pruning, fertilizer application, and fire line maintenance. Most maintenance activities were implemented as per sanction and helped improve plant survival and bole formation. However, several issues were observed, such as non-uniform fertilizer application, inadequate clearing of fire lines in some areas, and missing plantation boards. Evaluators emphasized the need to extend maintenance cycles, especially for young plantations, to ensure proper establishment and growth.

Protection activities involved 40 works, primarily the creation and upkeep of fire lines, of which 8 were sampled. Performance was mixed while beats in Puttur and parts of Sathyavedu had clean, effective fire lines, other areas like Mungilipattu (Tirupati range) and Kollagunta (Karvetinagar range) had poorly maintained lines with significant weed regrowth, which reduced their effectiveness. This inconsistency in upkeep suggests that while infrastructure was created properly, regular clearance and monitoring were lacking in certain areas.

A total of 11 SMC works were implemented and 5 were sampled, including saucer pits, continuous contour trenches (CCTs), and rock-filled dams (RFDs). The saucer pits in Chittoor East and Piler ranges were technically sound but already showed signs of silting and surface wear, requiring desilting and minor repairs. The CCTs and RFDs in Karvetinagar were well-executed and aided in biomass regeneration, though lower trenches also experienced early

siltation. Evaluators concluded that while the design and implementation of SMC works were satisfactory, their long-term effectiveness depended heavily on timely upkeep and desilting.

In the construction category, 9 RCC boundary pillar works were implemented and 4 sampled across Sathyavedu, Piler, Puttur, and Srikalahasti. All pillars met the required specifications (1.20 m × 0.30 m × 0.45 m), were intact, and successfully marked forest boundaries, thereby helping to prevent encroachments and improve clarity regarding reserve forest limits.

Financial management in the division was found to be strong and transparent, with all sanction orders, estimates, and expenditure registers aligning accurately. Both internal and external audits confirmed compliance with CAMPA guidelines.

2. Chittoor West Division

In 2018–19, Chittoor West Division implemented 233 CAMPA activities, of which 54 (23.1%) were sampled for evaluation. The activity portfolio comprised plantations (12), maintenance (80), protection (19), Soil and Moisture Conservation (21), construction (2), and others (99), with a clear emphasis on routine maintenance and "other" works, while plantation, SMC, and protection activities made up a smaller proportion of the total.

Of the 12 plantation works, three were sampled, showing clear contrasts in performance across sites. In Kuppam, a 15-hectare plantation with *Azadirachta indica* and *Sterculia urens* achieved a survival rate of 70–75 %, but the growth was poor, with trees averaging only 1–1.6 metres in height. Conversely, the Valligatla site in Punganur performed significantly better; here, *Pterocarpus santalinus* had a 95% survival rate, while *A. indica* and *Hardwickia binata* survived at 82–84%, with tree heights between 1.9–4.0 metres and girths of 21–30 cm. These outcomes demonstrated that species–site compatibility was key to successful plantation outcomes, as Valligatla's sandy loam soils provided favorable conditions, whereas Kuppam's soil was less suitable. Plantation journals were generally well-maintained, plantation boards were present at most sites, and GPS verification was conducted. However, area mismatches were noted Kuppam's plantation exceeded the recorded extent by 0.02 ha, while Valligatla's actual area was 15.73 ha versus 10 ha recorded, highlighting the ongoing need for accurate GIS-based mapping.

Maintenance was the dominant activity, with 80 works executed and 16 sampled. These involved standard tasks such as casualty replacement, circular weeding, coppice management, pruning, fertilizer application, and fire line maintenance. Most works were implemented as planned, improving plantation survival and bole formation. Nonetheless, evaluators noted gaps in execution, including uneven fertilizer application, incomplete fire line clearance, and damaged or missing plantation boards. The evaluation strongly recommended extending maintenance cycles by at least two more years, especially in young plantations, to secure establishment and maximize survival.

Protection works totalled 19, with four sampled, including chain-link mesh fencing and fire line creation. The fencing at Irala was of high quality, built to specification, and effectively protected plantations from grazing. Fire lines in Kuppam, Punganur, and Madanapalle were constructed as sanctioned and were in good condition, although grass regrowth was observed in some places. Despite the availability of basic protection infrastructure, evaluators

emphasized the continued risk from fire and grazing, calling for more frequent clearance and stronger vigilance systems.

The division implemented 21 Soil and Moisture Conservation (SMC) works, with six sampled, including cement check dams, percolation tanks, and artificial ponds. These structures were technically sound and built to specification, but many were already experiencing silt deposition, especially at Tayamma Vanka and Balappagaripalli Vanka, which was reducing their effectiveness. While the SMC component had expanded compared to previous years, its success depended on regular desilting and maintenance, without which the structures' support to plantations would decline rapidly.

Of the two construction works, one was sampled a watchtower at Tekumanda in Palamaner Range. The structure was built as per design, strategically located near a water body, and in good condition. It was effectively used for monitoring elephant movement and fire surveillance. However, weed growth around the tower needed to be cleared to maintain visibility and accessibility.

On the financial and administrative side, records were meticulously maintained, with sanction orders, estimates, and expenditure registers matching accurately. Both internal and external audits confirmed compliance with CAMPA guidelines. Technical documentation and record-keeping showed clear improvement over previous years, although GPS-based area verification continued to highlight inconsistencies between recorded and actual plantation extents.

3. Rajampet Division

In 2018–19, Rajampet division implemented 80 CAMPA activities, of which 16 (25 %) were selected for monitoring and evaluation. These included plantation, maintenance, soil and moisture conservation (SMC), construction, and other ancillary works. As in previous years, the division showed positive results in favorable ecological zones, while continuing to face challenges in semi-arid and degraded areas.

The division undertook eight plantation activities, with two sites evaluated. At Annasamudram (Rajampet Range), plantations involving *Hardwickia binata*, *Azadirachta indica*, *Holoptelea integrifolia*, and *Syzygium cumini* had low to moderate survival rates (45–51 %), with poor growth seedlings averaged 0.79–0.99 meters in height and 4.39–8.00 cm girth due to gravelly soils and limited water retention. In contrast, the Rajukunta site (Chitvel Range) showed higher survival (45–56 %) and significantly better growth, with heights between 2.43–2.58 meters and girths of 9.73–14.86 cm, owing to more favorable site conditions. GPS-based area verification revealed discrepancies in recorded versus actual extents at both sites Annasamudram: 44.99 ha vs. 30 ha and Rajukunta: 102.22 ha vs. 98 ha which were mainly due to the inclusion of rocky or degraded patches during field perambulation.

The division carried out 24 maintenance works, with five sampled. Activities included weeding, pruning, coppice management, fire line maintenance, and casualty replacement. Most operations were executed as planned, contributing to basic plantation survival. However, issues such as missing plantation boards, uneven fertilizer application, and incomplete fire line clearance were noted. Evaluators recommended consistent weeding, timely fertilizer application, replanting with healthy seedlings, and more regular coppice regulation to improve plantation outcomes.

In terms of soil and moisture conservation (SMC), 15 works were undertaken, and three were sampled, including check dams and percolation tanks in Chitvel and Sanipaya ranges. The structures were technically sound and built to specification, but their effectiveness was declining due to silt accumulation and water seepage. The report emphasized the urgent need for desilting and minor structural repairs to ensure continued support for plantations, especially under semi-arid conditions.

The division also carried out one construction activity, which involved erecting permanent cairns at Rajukunta (Chitvel Range) to demarcate the boundary between reserve forest and revenue land. The cairns were intact and effective in preventing encroachment, although some had base portions submerged in soil, slightly affecting visibility.

Under the "Others" category, 32 activities were carried out, with seven sampled. Document verification showed that financial records, sanction orders, and work registers were properly maintained, and expenditures matched sanctioned amounts. Both internal and external audits confirmed compliance, though some ranges failed to produce cost estimates for certain works, pointing to minor administrative lapses.

4. Tirupati division

In 2018–19, Tirupati division implemented a total of 144 CAMPA activities, of which 31 (21%) were sampled for evaluation. No plantation activities were undertaken during the year, reflecting a shift in focus toward maintenance, protection, soil and moisture conservation (SMC), construction, and other ancillary works.

The division carried out 11 maintenance works, of which two were sampled in Krishnapuram (Tirupati Range) and Chamala (Talakona South Range). These works were generally executed satisfactorily, involving routine activities aimed at supporting existing plantations. However, both sites suffered from the absence of plantation boards, which affected visibility and monitoring.

Under protection activities, the division implemented 10 works, with three sampled. In T.N. Palem beat (Tirupati Range), a 10 m × 4000 m fire line was found to be well maintained. In Chamala Range, the Eathagunta base camp fencing was intact and effective in preventing external interference. Similarly, in Balapalli Range, a 10 m × 5000 m fire line at Gunjana South was found to be clear of major weed growth, enhancing fire protection capacity.

The division executed six SMC activities, with one sampled at Varisettivanikunta (Chamala Range), where percolation tanks were constructed. These structures met the technical specifications, but desilting was required to restore their full storage and infiltration capacity, particularly important in the region's seasonal climate.

Of the four construction works taken up, one was sampled a gravel road in Balapalli Range. The road was functional and served its purpose, but evaluators noted the need for seasonal maintenance, especially during monsoons, when surface damage could affect accessibility.

A total of 113 activities were carried out under the "Other" category, with 23 sampled across the division. Financial and administrative records generally matched sanctioned details, confirming procedural compliance. However, minor discrepancies were observed in Balapalli, Chamala, and Tirupati ranges, indicating a need for improved documentation consistency.

5. Nellore Division

In 2018–19, Nellore division implemented a total of 414 CAMPA activities, with 89 activities (22 %) selected for detailed evaluation. The highest number of activities was recorded in Nellore range (98 implemented, 20 sampled), followed by Udayagiri (76 implemented, 17 sampled), Kavali (64 implemented, 14 sampled), Atmakur (64 implemented, 14 sampled), Venkatagiri (67 implemented, 14 sampled), and Rapur (45 implemented, 10 sampled). By activity type, "Other works" dominated (282 implemented, 58 sampled), while the remaining activities included maintenance (87 implemented, 19 sampled), plantations (19 implemented, 4 sampled), SMC works (11 implemented, 3 sampled), protection (9 implemented, 4 sampled), and construction (6 implemented, 1 sampled).

The division undertook 19 plantations, with four sites evaluated. In the Nellore range, the Vinduru plantation (20 ha) showed high survival for *Azadirachta indica* (92.6 %) and *Terminalia arjuna* (82.6 %), with moderate performance for *Syzygium cumini* (66.1–70.2 %) and *Sterculia urens* (76.0 %). The Madamanuru plantation (20 ha) also performed strongly, with survival rates of *Syzygium cumini* (93.4 %), *Dalbergia latifolia* (85.1 %), *Hardwickia binata* (90.1 %), and *Azadirachta indica* (81 %).

In contrast, the Maddurupadu plantation (Kavali range) recorded poor survival, with *Hardwickia binata* at 15.3 %, *Azadirachta indica* at 11.6 %, and *Pterocarpus santalinus* at 36 %, with growth stunted (under 0.5 m). The Dakkanuru plantation (Udayagiri range) showed good results for *Sterculia urens* (83.1 %) and moderate performance for *Hardwickia binata* (69.4 %), though some patches were affected by cattle grazing. Across all sampled plantations, area verification revealed that actual extents exceeded the recorded areas e.g., Vinduru (+6.93 ha), Madamanuru (+8.65 ha), Maddurupadu (+3.48 ha), and Dakkanuru (+2.49 ha). VSS participation was active, and plantations were generally healthy and pest-free, though plantation boards were missing or damaged at Vinduru and Madamanuru.

The division implemented 87 maintenance activities, with 19 sampled across all ranges. Kavali had the highest number (24 implemented, 5 sampled), followed by Atmakur (18 implemented, 4 sampled), Venkatagiri (17 implemented, 3 sampled), Nellore (12 implemented, 3 sampled), Udayagiri (11 implemented, 3 sampled), and Rapur (5 implemented, 1 sampled). Maintenance activities included casualty replacement, soil working, coppice management, pruning, and fire line upkeep. These were mostly completed as per sanction, with good documentation, but signage was often missing. Evaluators recommended more intensive weeding, timely pruning, and regular replanting of casualties for better long-term results.

Protection activities numbered nine, with four sampled. These included chain-link fencing at Kesavaram RF (530 rmt, Nellore range), which was intact and effective, and fire lines at Sangam (Atmakur – 5 km), Venkatagiri (2.5 km), and Veligonda RF (Rapur – 2 km). While all fire lines were constructed to specification, weed and grass growth at some locations reduced visibility and effectiveness, requiring routine clearance.

The division carried out 11 soil and moisture conservation (SMC) works, with three sampled. These included a check dam at Yerragunta Vagu (Mittatmakur RF, Nellore), a rock-fill dam at Bhiaravanikonda (Udayagiri), and saucer pits at Kandaleru dam (Rapur). All structures matched technical specifications, but were compromised by siltation, overflow damage, or weed

infestation, highlighting the need for periodic desilting and minor repairs to maintain storage capacity and effectiveness.

Construction works totalled six, all located in the Nellore range, with one site sampled. This involved RCC cairns erected in Marupuru RF (120 installed). The cairns matched the recorded specifications, but plastering had deteriorated and bases were partially covered with soil, affecting their visibility and requiring routine maintenance.

Under the "Other" category, 282 works were carried out, with 58 sampled. Document verification confirmed that sanctions and expenditures were in alignment, and internal/external audits validated compliance. However, minor discrepancies were noted, such as missing work registers for DSO 395 and DSO 625 (2018–19, Nellore range) and an unavailable estimate for DSO 508 (Venkatagiri range), indicating the need for better record management at the divisional level.

6. Kadapa Division

In 2018–19, Kadapa division implemented 116 CAMPA activities, of which 23 (20%) were sampled for monitoring and evaluation. Among the ranges, Vempalli reported the highest number of activities (33, with 6 sampled), followed by Kadapa and Sidhout (28 each, with 6 and 5 sampled respectively), and Vontimitta (27 implemented, 6 sampled). By type, the majority of activities were categorized as "Other works" (96 implemented, 19 sampled), followed by maintenance (13 implemented, 3 sampled), protection (4 implemented, 1 sampled), and construction (3 implemented, 1 sampled). No plantation or soil and moisture conservation (SMC) works were taken up during the year.

The division reported 13 maintenance activities, with three sampled. Field inspections confirmed that casualty replacement, soil working, weeding, and fire line maintenance were carried out as sanctioned. Plantation boards were present, and journals were properly maintained. Evaluators recommended intensified weeding, particularly to manage Lantana and invasive grasses, timely fire line upkeep before the dry season, and regular updates to plantation records to ensure continuity and monitoring.

Of the four protection works implemented, one was sampled in Vontimitta range. At Chintarajupalli section, a 2,000 rmt × 3 m wide fire line was established. Field verification confirmed the fire line was weed-free, clearly aligned, and accurately matched measurement book records, offering effective protection to adjacent natural forests. The work was deemed to be well-maintained and functional.

The division undertook three construction activities, of which one was sampled in the Vontimitta range. At the PN Wildlife Sanctuary, 25 RCC cairns were erected at 100-meter intervals to demarcate forest boundaries. Field verification confirmed the cairns matched the specified dimensions (1.2 m × 0.3 m × 1.2 m) and were structurally intact. However, some cairns showed weathering and partial soil coverage, indicating a need for periodic maintenance to preserve visibility and effectiveness.

A total of 96 "Other" activities were carried out, of which 20 were sampled. Document verification confirmed that sanction orders, estimates, and work registers were in proper alignment with financial approvals. Records were well maintained and authenticated by both

divisional and range-level officials. Furthermore, internal audits by the Conservator of Forests and external audits by the Accountant General verified compliance, reflecting transparent and accountable financial management across the division.

7. Proddatur Division

In 2018–19, Proddatur division implemented a total of 162 CAMPA activities, of which 37 (22 %) were sampled for monitoring and evaluation. Range-wise, the highest number of activities was recorded in Porumamilla (50 implemented, 9 sampled), followed by Onipenta (37 implemented, 8 sampled), Badvel (32 implemented, 7 sampled), Muddanur (27 implemented, 7 sampled), and Proddatur (16 implemented, 6 sampled). By activity type, "Other works" dominated the portfolio with 90 activities (19 sampled), followed by maintenance (38 implemented, 10 sampled), plantations (22 implemented, 4 sampled), protection (5 implemented, 1 sampled), soil and moisture conservation (5 implemented, 1 sampled), and construction (2 implemented, 1 sampled).

The division undertook 22 plantation activities, of which four were evaluated. In Porumamilla range, two plantations were located at Itukulapadu (15 ha and 5 ha), both consisting of *Azadirachta indica*. The 15 ha block demonstrated strong survival (89.08%), with average tree heights of 4.69–5.69 meters and girths of 32–34 cm. The 5 ha block had slightly lower survival (83.30%) and shorter heights (3.02–4.66 m), but overall growth was satisfactory, with the larger block performing better due to site suitability. In Muddanur range, both plantations at Gandlur bit I and IV (20 ha each) failed entirely as they were submerged by Gandikota reservoir backwaters, leaving no surviving seedlings. Though records and journals were maintained, there was no participation from Vana Samrakshana Samithi (VSS).

Area verification through KML and QGIS tools revealed that actual plantation extents consistently exceeded recorded areas: Itukulapadu 15 ha exceeded by +3.96 ha, Itukulapadu 5 ha by +0.58 ha, Gandlur bit I by +0.16 ha, and Gandlur bit IV by a significant +13.98 ha. These discrepancies highlighted the need for accurate GIS-based mapping and boundary demarcation.

A total of 38 maintenance activities were implemented across the division, with 10 sampled. Sites included Settivaripalli, Mallela, Gangayapalli, Mudireddipalli, Jangamarajupalli, Ganugapenta, and Itukulapadu. Field inspections confirmed that casualty replacement, soil working, pruning, fire line upkeep, and contingency measures were executed as sanctioned. However, plantation boards were missing or damaged in several locations. Despite this, plantation journals were available and up to date, indicating acceptable administrative diligence.

Of the five protection works, one was sampled in Ganjikunta beat (Onipenta range), where a 500 rmt × 3 m fire line was created. While it met dimensional specifications, visibility was reduced due to grass and weed regrowth, underscoring the need for regular clearance to maintain its effectiveness.

In soil and moisture conservation (SMC), all five works were executed in the Badvel range, with one sampled at Balayapalli beat, where three saucer pits were constructed. The structures matched the measurement book and were functional, but desilting and re-plastering were advised to preserve capacity and functionality.

Among two construction works, one was sampled in Balayapalli beat (Badvel range), involving the installation of 16 RCC cairns to demarcate forest boundaries. Field verification confirmed accurate dimensions and that all cairns were intact and functional, though some showed soil coverage and plaster deterioration, necessitating routine upkeep.

The division also implemented 90 "Other" works, of which 19 were sampled. Document verification confirmed that sanction orders matched expenditures, records were complete, and audits were conducted. However, typographical errors were found in records from Proddatur (RSO 1 and DSO 34) and Onipenta (DSO 19). These errors were acknowledged by range officials and attributed to clerical mistakes, though they indicate a need for greater scrutiny in documentation and data entry.

8. Ananthapuramu Division

In 2018–19, Ananthapuramu division executed a total of 216 CAMPA activities, of which 55 (25.5 %) were sampled for evaluation. The activity portfolio included plantations (12), maintenance (115), protection (12), Soil and Moisture Conservation (24), construction (5), and "other works" (48). Maintenance constituted the bulk of the work, while plantations and SMC interventions were noted for their ecological relevance.

Among plantations, the Kalyandurga range (Beluguppa RF) yielded the best results, with survival rates above 88% for *Azadirachta indica*, *Hardwickia binata*, and *Ficus species*. Trees displayed vigorous growth, reaching heights of 2.7–3.5 m and girths of 25–36 cm. In Gooty (Mutchukota RF), *Sterculia urens* and *Pongamia pinnata* showed promising results with survival close to 85 % and heights up to 3 m. In contrast, Penukonda (Gollapalli RF) and Kadiri (Kokkanti beat) showed good survival (73–90 %) but poor growth (0.7–1.7 m) due to limiting factors like gravelly soils, poor rainfall, and lack of irrigation. This comparative analysis positioned Beluguppa as the most successful site, followed by Mutchukota, while Gollapalli and Kokkanti were hindered by site-related constraints despite adequate establishment.

Maintenance activities were implemented extensively, with Kadiri recording the highest (41 works), followed by Anantapuramu and Kalyandurga (22 each), and Bukkapatnam (17). Field verification confirmed that casualty replacement, weeding, coppice management, pruning, fertilizer application, and fire line maintenance were largely carried out as per guidelines. These interventions improved bole formation and reduced weed competition. However, deficiencies such as uneven fertilizer application, inadequate fire line clearance, and missing plantation boards were observed. Evaluators recommended longer maintenance cycles and stricter adherence to standards for better plantation consolidation.

Under protection works, fire lines were constructed to specification in Kadiri and Bukkapatnam (10 m × 1,000–2,000 m) and in Kalyandurga (6 m × 3,000 m). These lines were clearly visible, well aligned with inspection paths, and free of weed regrowth, indicating high maintenance quality, though overall coverage was insufficient relative to the division's scale.

In Soil and Moisture Conservation (SMC), the division executed 24 activities, including rock-fill dams (Anantapuramu), percolation tanks (Penukonda and Bukkapatnam), Continuous Contour Trenches (Gooty), and cement check dams (Kadiri). Field inspections confirmed that all structures were constructed to specification and functioning effectively, but early signs of siltation and seepage highlighted the need for regular desilting and repair to sustain their utility.

All five construction works involved the erection of boundary demarcation pillars. These were built to standard dimensions (1.2 m height, 0.3 m top width, 0.45 m bottom width), were intact, and effectively marked forest and revenue boundaries.

Financial documentation was well maintained across the division. Sanction orders, estimates, and expenditure statements were consistent and validated through both internal audits (Conservator of Forests) and external audits (Accountant General). Plantation journals were generally in place, although more frequent updating of survival and growth data was advised.

GIS-based verification revealed area mismatches in plantation records. For example, Gollapalli was under-recorded by 2.62 ha, while Kokkanti (+3.42 ha), Mutchukota (+0.63 ha), and Beluguppa (+1.03 ha) showed excess area compared to records. These deviations were attributed to perambulation along natural outer boundaries, reinforcing the need for accurate and updated GIS-based demarcation.

9. Giddalur Division

In 2018–19, Giddalur division implemented a total of 79 CAMPA activities, of which 16 (20 %) were sampled for monitoring and evaluation.

Only two plantations were undertaken during the year, with one site sampled in Giddalur range. At Uyyalawada, a 15-hectare Assisted Natural Regeneration (ANR) plantation of *Hardwickia binata* showed high survival rates ranging from 73% to 100%, though growth was limited, with tree heights between 2.95 and 3.10 meters and girths of 22–24 cm. Interestingly, naturally regenerated species performed better than the planted stock in terms of overall health and vigour. Area verification using field perambulation revealed an excess area of 2.57 hectares (17.57 ha perambulated vs. 15 ha recorded), attributed to inclusion of naturally vegetated areas.

In the protection category, eight works were implemented, with one fire line work sampled. At Iskagundam (Gundlakamma range), a fire line of 10.4 km length and 3 m width was well maintained, clear of vegetation, and aligned with protection objectives, ensuring effective safeguarding against fire risks.

The division executed seven Soil and Moisture Conservation (SMC) works, with two sampled. These included saucer pits in Gundlakamma and Turimella, which matched the design specifications (diameter of 2–6 meters, depth of 0.5 meters). However, the structures required urgent desilting and re-plastering to retain water effectively and prolong their functional life.

The “Other works” category accounted for 62 activities, with 12 sampled. Document verification confirmed that sanction orders, expenditure records, and work registers were complete, accurate, and aligned with approved plans. These records were authenticated by divisional officials, ensuring financial compliance and transparency.

10. Kurnool Division

In 2018–19, Kurnool division implemented 65 CAMPA activities, with 16 (24 %) selected for monitoring and evaluation. The division undertook seven plantations, with two sampled: at Adoni (Tungabhadra RF, 6.6 ha), *Pongamia pinnata* recorded the highest survival at 87 %, followed by *Sterculia urens* and *Dolichandrone crispa* at 82 %, with satisfactory growth reaching 2.0–3.1 meters in height and 24–27 cm in girth. At Ramallakota (Kurnool Range), a 1-hectare linear plantation near a mining area showed 77 % survival but stunted growth,

averaging 1.1 meters in height and 10 cm in girth. Area verification at both sites was consistent with official records. Overall, plantation survival was satisfactory, although linear plantations near mining zones faced growth limitations due to site-specific stress.

Eighteen maintenance activities were carried out, with five sampled in Dhone and Adoni ranges. Scheduled works such as weeding, pruning, and fire line upkeep were executed, but plantation signage was poor and journals inadequately updated, revealing documentation gaps.

Forty "Other works" activities were implemented, with nine sampled. Verification confirmed that sanction orders matched expenditures, and internal audits ensured financial compliance and transparency in fund utilization.

11. Nandyal Division

In 2018–19, only two CAMPA activities were implemented in the Panyam range, both being plantation works, with no maintenance, protection, soil and moisture conservation (SMC), or construction activities undertaken during the year. One plantation (50 %) was sampled for monitoring and evaluation.

The sampled site was a 25-hectare mixed plantation at Bandlakanuma locality in Panyam RF (Konidedu beat), established under the CAMPA scheme through active community participation via the Sugalimetta Vana Samrakshana Samithi (VSS). The plantation was located on gravelly terrain, presenting moderate site challenges. Survival rates were satisfactory across species: *Azadirachta indica* (77 %), *Holoptelea integrifolia* (74–79 %), *Tecoma stans* (67–76 %), *Pongamia pinnata* (67–70 %). Growth performance was modest, with tree heights ranging from 1.26 to 2.19 meters, and girths between 15.22 and 19.50 cm, consistent with the site's poor soil quality. Area verification using KML mapping revealed a discrepancy, as the field-verified extent was 26.15 hectares, slightly exceeding the sanctioned 25 hectares. This was attributed to the inclusion of degraded or rocky patches within plantation boundaries.

12. Atmakur Division

In 2018–19, Atmakur division, covering the ranges of Atmakur, Velgode, Nagaluty, Bairluty, and Srisailam, implemented 175 CAMPA activities, of which 38 (22%) were sampled for monitoring and evaluation. The portfolio was dominated by "other works" (148 activities), while no new plantations were undertaken, reflecting a strategic focus on maintenance, protection, boundary demarcation, and resource conservation.

A total of 10 maintenance activities were carried out, with three evaluated, including bamboo plantations in Bairluty and ANR plantations on Deccan Cement CA lands (Nagaluty Range). While standard operations like weeding, soil working, and fire line upkeep were completed, outcomes were mixed: bamboo plantations faced threats from Lantana camara invasion and grazing, and ANR plantations needed better fire protection and systematic weeding. Plantation boards were often missing, hampering effective monitoring.

In protection efforts, the division deployed a patrol boat and five watchers along the Krishna River (Atmakur Range) to curb threats such as fire, poaching, and illegal logging in the sensitive Andhra–Telangana border. While the patrol boat was functional and regular patrolling was observed, ongoing maintenance was recommended to ensure its operational longevity.

Of seven protection activities, two were sampled in Srisailam Range: a fire line (3 m × 1,035 rmt) in Pecheruvu East beat, and a view line (10 m × 4,142 rmt) in Sundipenta Biopark. Both matched specifications, but weed regrowth and grass accumulation reduced effectiveness, necessitating annual clearance to mitigate wildfire risk and maintain visibility for surveillance.

Among six SMC works, two were evaluated: a mini percolation tank (Nagaluty) and a basement-cum-water pit (Velgode). Both structures were technically sound and well-aligned with records. However, early siltation and vegetation growth were already diminishing their storage capacity, emphasizing the need for regular desilting and upkeep to support plantations and wildlife in this semi-arid landscape.

One of four construction works was sampled, involving RCC boundary pillar installation in Indireswaram West (Nagaluty Range). Though the pillars matched specifications and effectively demarcated boundaries, partial soil coverage of their bases threatened their visibility and usefulness, indicating a need for periodic soil clearance to prevent encroachment risks.

The bulk of the division's efforts lay in "other" activities (148 works, 30 sampled). Most records sanction orders, estimates, and work registers were found to be in order, and financial audits (internal and external) confirmed compliance with CAMPA norms. However, gaps in documentation were noted across all ranges, including missing estimates and unverified work registers in Atmakur (e.g., DSO 47, 147, 219A) and Velgode (RSO 59, 74, 113), undermining transparency and oversight, despite overall adherence to budget utilization.

13. Markapur Division

In 2018–19, Markapur division implemented a total of 117 CAMPA activities, of which 30 activities (25 %) were sampled for monitoring and evaluation. The Dornala Range accounted for the largest number of activities (54 implemented, with 15 sampled), followed by Markapur (23 implemented, 5 sampled), GV Palli (21 implemented, 5 sampled), Y Palem (16 implemented, 4 sampled), and V.P. South (3 implemented, 1 sampled). Among activity categories, "other works" dominated (83 activities, 20 sampled), while the remaining activities included maintenance (14 implemented, 3 sampled), construction (7 implemented, 2 sampled), protection (6 implemented, 2 sampled), soil and moisture conservation (6 implemented, 2 sampled), and only one plantation activity, which was also sampled.

The only plantation activity was a 3-hectare gap plantation at Chilakacherla Beat in Dornala Range, which completely failed. No plants were observed during field verification, and the failure was attributed to unsuitable rocky and red gravelly soil, the absence of plantation boards, and lack of Vana Samrakshana Samithi (VSS) involvement. Area verification using GPS and QGIS showed a slight increase in actual plantation area (3.27 ha vs. 3.00 ha recorded), due to terrain conditions affecting measurement accuracy. This marked the third consecutive year of failed plantation outcomes in the division.

Out of the 14 maintenance works taken up during the year, three were sampled (two in Markapur, one in Y Palem). Activities such as weeding, inter-ploughing, and pruning were found to be implemented, but plantation boards were missing at all sites, and weed growth and lantana invasion were prevalent. Evaluators recommended improved soil management, consistent pruning, and installation of boundary markers for better visibility and monitoring.

Six protection works were carried out during the year, with two sampled in Dornala Range. These involved peripheral trenches around Inamukkala CA land (Bits II and IV). While the trenches met the sanctioned length and breadth specifications, they were found to be shallower than prescribed (2.5 m vs. 3 m) due to siltation. Additionally, grass and weed overgrowth were noted, diminishing their effectiveness. Regular desilting and maintenance were recommended.

Two soil and moisture conservation (SMC) structures were evaluated in Dornala Range—a rock-fill dam and mini trenches. Both were consistent with specifications in the measurement books, but signs of seepage, siltation, and dry stone erosion were found, particularly in the trenches. Field teams recommended repairs and periodic desilting to maintain their utility.

Under the construction category, two works were sampled. A 400-meter-long protection wall in Dornala Range was found to be structurally sound, though weed growth along the base was noted. Additionally, 60 boundary pillars installed in Markapur Range were verified as effective and well-built, though plastering work was incomplete, suggesting the need for periodic maintenance to preserve their durability.

The "Other works" category accounted for the majority of the division's CAMPA activities, with 83 works undertaken and 20 sampled. Document verification confirmed that sanction orders matched expenditure records, and that work registers were properly maintained and authenticated. Internal and external audits were completed, confirming overall compliance with CAMPA financial norms and indicating a strong record of administrative transparency.

14. Guntur Division

In 2018–19, Guntur division implemented a total of 188 CAMPA activities, of which 42 (22 %) were sampled for monitoring and evaluation. Range-wise, the highest number of activities were undertaken in Guntur Range (84 implemented, 18 sampled), followed by Vinukonda (68 implemented, 16 sampled), Repalli (18 implemented, 4 sampled), and Macherla (18 implemented, 4 sampled). By type, "other works" dominated (139 implemented, 30 sampled), with fewer interventions in maintenance (30 implemented, 6 sampled), plantation (10 implemented, 2 sampled), protection (4 implemented, 3 sampled), and construction (5 implemented, 1 sampled). No soil and moisture conservation works were taken up in this period.

Two plantation activities were sampled. At Tummalapalli VSS, a 10-hectare shelterbelt plantation of *Casuarina equisetifolia* recorded a survival rate of 51.95 %, with healthy average growth (3.70 m height, 19.97 cm girth). At Adavuladeevi bit-I, a 12-hectare mangrove plantation of *Avicennia officinalis* suffered survival below 50 % due to prolonged submergence, which also disturbed planting geometry and prevented growth measurements. However, natural regeneration of mangroves was observed in this site.

Area verification using KML and QGIS revealed discrepancies: Tummalapalli showed only 5.80 hectares against the sanctioned 10 ha, while Adavuladeevi exceeded the recorded area slightly (12.19 ha vs. 12 ha). Both plantations were free of pest infestations, but lacked plantation boards and had no recorded involvement of the Vana Samrakshana Samithi (VSS). Plantation journals were maintained at both sites.

Of the 30-maintenance works, six were sampled. Activities such as casualty replacement, soil working, circular weeding, coppice management, pruning, fertilizer application, and fire line upkeep were carried out across the sites. Field inspections confirmed their execution; however, plantation boards were either missing or damaged, affecting monitoring and visibility. Evaluators recommended extending the maintenance period by at least two more years to improve plantation establishment and resilience.

Three fire line works were sampled—constructed in Bollapalli (3,000 rmt), Ravulapuram (4,000 rmt), and Atchempet (5,000 rmt). All fire lines matched the prescribed dimensions, and visibility was clear during verification. However, coppice regrowth during the monsoon was noted as a recurring problem. Moreover, some plantations lacked fire line coverage, indicating incomplete protection across sites.

One construction work a CC pathway (2.5 m × 15 m) built at Kotappakonda was sampled. The pathway, linking the aquarium and painted stork area, complied with design specifications and was found to be structurally sound and functional. Minor routine upkeep was recommended to ensure its durability.

Among the 139 "other works", 30 were sampled. Document checks confirmed that sanction orders aligned with expenditures, and financial records were duly maintained and verified by internal and external audits. However, there were some lapses in record presentation—particularly for DSO 438 and DSO 424, for which estimates and registers were missing, and DSO 387, for which expenditure details were incomplete. Additionally, audit payments to A.M. Reddy and D.R. Reddy were not linked to any corresponding RSO/DSO numbers, indicating gaps in documentation and financial traceability.

15. Krishna Division

In 2018–19, Krishna division implemented 142 CAMPA activities, with 31 (22%) sampled for monitoring and evaluation. Among these, four plantations were undertaken, with two sampled in the Nuzvid and Mylavaram ranges. At Katrenipadu (20 ha, Nuzvid), the plantation recorded high survival rates: *Albizia odoratissima* and *Syzygium cumini* at 84%, *Terminalia arjuna* at 78%, and *Azadirachta indica* at 79%, accompanied by robust growth ranging from 4 to 7.6 meters in height and 30 to 43 cm in girth. Area verification indicated a significant excess in plantation area, with 24.41 ha perambulated against the recorded 20 ha (+4.4 ha).

A total of 32 maintenance works were carried out across the ranges, with six sampled. While execution was satisfactory, plantation boards were missing, and plantation journals were inconsistently updated, which hampered monitoring efforts.

Three fire line works were undertaken, two sampled. These fire lines generally met prescribed specifications, but weed growth along the lines reduced visibility, thereby limiting their effectiveness for fire control.

The division executed 57 soil and moisture conservation (SMC) activities, with 12 sampled. Percolation tanks located in Mylavaram and Vijayawada matched their sanctioned measurements, but were found to be heavily silted, and stone packing had been damaged due to monsoon overflows, indicating the need for regular maintenance and desilting.

Only one construction work was reported a set of boundary pillars in Kondapalli (Vijayawada) which were intact and effectively demarcated forest boundaries, helping to prevent encroachment.

Additionally, 45 "other" activities were implemented, with eight sampled. Verification of financial and administrative records showed that expenditures aligned with sanctioned amounts, and audits confirmed the transparency and compliance of these activities.

16. Eluru Division

In 2018–19, Eluru division undertook 228 CAMPA activities, with 50 (21%) sampled for monitoring and evaluation. Range-wise, the activities were distributed across Eluru (35 implemented, 8 sampled), J.R. Gudem (46 implemented, 10 sampled), Kannapuram (44 implemented, 10 sampled), Kukunoor (33 implemented, 8 sampled), Polavaram (37 implemented, 6 sampled), and Amaravaram (33 implemented, 8 sampled). The activity portfolio was dominated by "other works" (115 implemented, 24 sampled), followed by soil and moisture conservation (SMC) activities (79 implemented, 19 sampled), and maintenance (34 implemented, 7 sampled). No plantation, protection, or construction works were recorded or sampled during this period.

Among the 34 maintenance activities implemented, seven were sampled across various sites including Bhogole, Adamilli, and Recherla in Eluru range; P. Rajavaram and Bandarlagudem in J.R. Gudem; Karakapadu in Kannapuram; and Goparajugudem in Kukunoor. These maintenance operations encompassed casualty replacement, soil tilling, coppice management, pruning, fire line upkeep, and fertilizer application. Field inspections confirmed that prescribed activities were largely implemented, although plantation boards were frequently missing or damaged, and journals required more consistent updating. Recommendations highlighted the need for intensified weeding to control Lantana invasion, timely upkeep of fire lines before dry seasons, replanting of casualties, stricter coppice regulation, and better maintenance of signage and records.

A total of 79 SMC works were carried out, with 19 sampled across Polavaram, Kannapuram, J.R. Gudem, Amaravaram, and Kukunoor ranges. These primarily involved the construction of check dams at locations such as Gullapudi, Doramamidi, Sridhara, Kothuru, Vinjaram, LND Peta, and others. While most structures conformed to measurement book specifications, widespread issues such as siltation, weed infestation, apron wall damage, erosion of sidewalls, plastering deterioration, and in some cases complete structural failure (notably at Cheelika-1 and Jinnekoyya Kalava) were observed. Although some dams remained intact and functional, the majority required desilting, minor repairs, and restoration to regain full storage capacity and effectiveness.

The division also executed 115 "other works", with 24 sampled. Verification of sanction orders, estimates, and registers confirmed that sanctioned amounts matched actual expenditures, with records authenticated and audits conducted both internally and externally to ensure transparency. However, documentation gaps were identified in several locations, including Amaravaram, Eluru, J.R. Gudem, Kannapuram, and Kukunoor, where estimates or work registers were missing for multiple sanction orders, undermining full verification.

17. Eluru WLM Division

In 2018–19, Eluru WLM division implemented 84 CAMPA activities, with 17 (20 %) sampled for monitoring and evaluation. The portfolio was overwhelmingly dominated by "other works" (82 implemented, 16 sampled), while only two maintenance activities were undertaken, one of which was sampled. No plantation, protection, soil and moisture conservation (SMC), or construction works were reported during this period.

Among the maintenance works, one activity evaluated was at the Environmental Education Centre (EEC) in Atapaka, Kaikaluru range. Field inspection confirmed that the EEC was well maintained, with intact and clean infrastructure including statues and display structures. Informative display boards detailing local species were installed, enhancing visitor awareness, alongside a prominently displayed site map guiding visitors through the sanctuary. The premises were found to be clean, organized, and reflective of proper execution of approved plans, contributing positively to environmental education and conservation objectives of the Kolleru Wildlife Sanctuary.

Among the 82 "other works", 16 were sampled. Document verification confirmed that sanction orders, estimates, and work registers matched actual expenditures. Records were authenticated by responsible officials, and both internal audits by the Conservator of Forests and external audits by the Accountant General were conducted, ensuring transparency and compliance with financial and administrative protocols. However, minor lapses were noted as work registers for RSO 7, RSO 5, and RSO 9 were not presented during verification, indicating incomplete record submission.

18. Chintur Division

In 2018–19, Chintur division implemented 140 CAMPA activities, with 33 (23 %) sampled for detailed monitoring and evaluation. Among these, twelve plantations were undertaken across Chintur, Lakkavaram, V.R. Puram, and Nellipaka ranges, with four plantations sampled, all of which performed poorly. Bamboo plantation at Tellavarigudem (Chintur, 10 ha) showed very low survival of 12.96 % and stunted growth. NTSHW plantation at Dabbagudem (Lakkavaram, 5 ha) recorded survival below 10 %, while bamboo at Mattapally (V.R. Puram, 20 ha) failed completely. Bamboo at Palamadagu (Nellipaka, 15 ha) had survival of only 6.94 %. Area verification revealed significant excesses in recorded plantation sizes, such as Mattapally with 31.16 ha versus the recorded 20 ha, and Palamadagu with 22.41 ha versus the recorded 15 ha.

The division carried out ten maintenance works, with three sampled. Teak at Kalleru (Chintur) exhibited poor growth, bamboo at Maredupudi (V.R. Puram) had average growth, and teak at Palamadagu (Nellipaka) failed to thrive. Plantation boards were missing at all sampled maintenance sites.

Among the three protection works, one was sampled at Chintur, where fire lines measuring 3 m × 2,500 m existed but were poorly maintained and obscured by weeds, limiting their effectiveness.

A total of ninety-four soil and moisture conservation (SMC) works were implemented, with nineteen sampled. Structures such as percolation tanks, check dams, and trenches were intact

but heavily silted and in need of immediate de-siltation. Minor structural repairs were also recommended to restore full functionality.

The division undertook twenty-one "other" works, with six sampled. Records and expenditures generally aligned with sanctions; however, the work register for DSO 188 (Chintur) was missing during verification, indicating a minor lapse in documentation.

19. Kakinada Division

In 2018–19, Kakinada division implemented 94 CAMPA activities, with 25 (26 %) sampled for monitoring and evaluation. Range-wise, Rampachodavaram led with 31 implemented (7 sampled), followed by Rajavommangi (18 implemented, 3 sampled), Gokavaram (14 implemented, 4 sampled), Addatheegala (8 implemented, 4 sampled), Kakinada (8 implemented, 2 sampled), Yeleswaram (10 implemented, 3 sampled), and Sudikonda (5 implemented, 2 sampled). Activity-wise, maintenance dominated with 33 activities (8 sampled), followed by soil and moisture conservation (SMC) with 24 implemented activities (5 sampled), plantations with 17 implemented activities (5 sampled), and "other works" with 20 implemented activities (6 sampled). No protection or construction works were undertaken.

In the Kakinada range, the Atchutapuram teak plantation (1 ha) recorded poor survival of 35.15% for *Tectona grandis*, with low average growth (0.92 m height, 11.32 cm girth), reflecting the rocky red soil's unsuitability. The Vathangi teak plantation (2 ha) in Yeleswaram performed better with 66.6% survival and moderate growth (2.86–3.81 m height, 22.8–25.3 cm girth), indicating improved site conditions and management. In Rampachodavaram, a 10 ha teak plantation at Daragedda failed due to encroachment and grazing, with only stunted growth observed. An 8 ha mixed NTHW plantation at the same site was untraceable in the field, reportedly encroached. A 4 ha NTHW plantation in Rajavommangi showed partial establishment, with survival between 49–52% for species such as *Hymenodictyon orixense*, *Terminalia elliptica*, *Adina cordifolia*, and *Terminalia arjuna*, and height and girth ranging from 2.72 to 6.40 m and 18.3 to 24.5 cm, respectively.

Perambulation using KML/QGIS revealed discrepancies between recorded and actual plantation areas: Atchutapuram was slightly less by 0.11 ha, Vathangi was larger by 0.40 ha, Daragedda exceeded records by 3.19 ha, and Rajavommangi was larger by 0.22 ha. While plantations were generally healthy, pest damage was noted at Atchutapuram and Vathangi. Plantation boards were missing at all sampled sites, though Vana Samrakshana Samithi (VSS) involvement was observed at Atchutapuram, Vathangi, and Rajavommangi.

The division carried out 33 maintenance activities, with eight sampled across teak and bamboo plantations in various ranges. Maintenance operations included casualty replacement, soil tilling, pruning, coppice control, fertilizer application, and fire line upkeep. Field inspections confirmed these were carried out, but many sites lacked or had damaged plantation boards. Record-keeping was maintained but survival and growth data needed better updating.

Among the 24 SMC activities, five were sampled in Rampachodavaram and Gokavaram. Staggered trenches at Pindukuruvalasa, Kutrawada, Kakuru, and Dandangi generally matched specifications (10 m × 0.5 m × 0.3 m), but deviations in depth and heavy siltation reduced effectiveness. Most structures were visible but filled with silt and plant debris, necessitating regular desilting.

Twenty "other works" were implemented, with six sampled. Sanction orders aligned with expenditures, and records were maintained with internal and external audits ensuring transparency. However, some registers and estimates were not presented during verification for works in Rampachodavaram (SDSO 32, DSO 199, RSO 23), Gokavaram (RSO 1), and Sudikonda (SDSO 8), indicating minor documentation gaps.

20. Narsipatnam Division

Narsipatnam division, rich in dry deciduous forests dominated by teak and mixed hardwoods with teak and red sanders plantations, plays a vital role in soil conservation, water recharge, biodiversity support, and sustaining local livelihoods, with strong community participation through JFMCs and VSS. In 2018–19, the division undertook 84 CAMPA activities, with 19 (21%) sampled for monitoring. Range-wise activity distribution included Narsipatnam (25 implemented; 4 sampled), KD Peta (14 implemented; 4 sampled), Chintapalli (19 implemented; 6 sampled), Lothugedda (6 implemented; 1 sampled), Sileru (20 implemented; 4 sampled), while RV Nagar and Marripakala had none. Activity types were led by "other works" (39 implemented; 8 sampled), followed by maintenance (30 implemented; 5 sampled), plantations (10 implemented; 3 sampled), and protection (5 implemented; 3 sampled), with no soil and moisture conservation or construction works reported.

Among the three sampled plantations, Kondasantha (Narsipatnam, 10 ha NTSH) showed poor survival rates for *Terminalia arjuna* (33%), *Pterocarpus marsupium* (26 %), and *Syzygium cumini* (24%), with moderate growth (2.5–5.2 m height, 26–42 cm girth). Chintapalli's Jajulapalem plantation (10 ha) demonstrated good survival *Syzygium cumini* (80 %), *Dalbergia latifolia* (81%), *Terminalia arjuna* (77 %), and *Pterocarpus marsupium* (63 %) with fair growth (1.3–2.9 m height, 12–23 cm girth). KD Peta's B. Kothuru teak plantation (10 ha) excelled with 92% survival of *Tectona grandis* and strong growth (8.5–10.5 m height, 37–45 cm girth). Area verification revealed minor mismatches between official and field measurements: Kondasantha (+0.11 ha), Jajulapalem (+1.56 ha), and B. Kothuru (–1.92 ha).

Plantation health was generally good with no pest infestations and minimal grazing; fire lines and watchers were active. Journals were maintained but updated irregularly, and plantation boards were missing at some sites. VSS participation was noted across multiple ranges, complemented by focused group discussions.

Maintenance works numbered 30 (5 sampled), covering key sites like teak plantations at M.K. Patnam (Narsipatnam), Nimmagedda (KD Peta), Goppulapalem and Damanapalli (Chintapalli), and Pentalagedda (Sileru). Activities including weeding, casualty replacement, coppice cutting, pruning, and fire line upkeep were carried out satisfactorily, though plantation boards were often damaged or absent and journals needed more frequent updating.

Five fire line works (3 sampled) were implemented with varied conditions: Narsipatnam's 1,000 rmt fire line was clear and well maintained; KD Peta's 1,000 rmt line suffered poor visibility due to grass regrowth; and Lothugedda's 2,000 rmt line was overgrown with weeds, requiring urgent maintenance. This indicated uneven effectiveness in fire protection measures.

Financial verification of 39 works (8 sampled) confirmed alignment of expenditures with sanctioned amounts, authenticated and audited both internally and by the Accountant General.

However, documentation gaps were observed in some cases, particularly in Chintapalli and KD Peta, where estimates and work registers were not available for review.

21. Paderu Division

In 2018–19, the Paderu division implemented 203 CAMPA activities, with 51 (25 %) sampled for detailed monitoring and evaluation. Plantation efforts saw an expansion compared to previous years, with 20 plantations undertaken and 4 sampled across the Paderu (T), Araku (T), Paderu FRO-I, and Araku FRO-II ranges. Key species planted included *Acrocarpus fraxinifolius*, *Grevillea robusta*, and *Syzygium cumini*. Survival rates were generally strong, notably *Acrocarpus fraxinifolius* with survival between 83.47 % and 87.5 % at various sites like Tulabarangi, Jangadivalasa, Munthamamidi, and Vanthomoru. Grevillea robusta survival ranged consistently from 79% to 82%. Growth performance was robust, with tree heights ranging from 7 to 12 meters and girths between 30 and 42 centimeters. Area verification revealed consistent discrepancies, with all sampled plantations exceeding their recorded extents, for example, Jangadivalasa (20 ha recorded vs. 25.76 ha verified) and Munthamamidi (20 ha vs. 24.78 ha). These overestimations point to the need for systematic GIS-based validation for accurate area reporting. Overall plantation health was good, with no pest or disease issues observed, and minimal biotic pressures such as grazing or human interference.

Maintenance works numbered 43 implemented, with 12 sampled across the division. These activities included weeding, soil working, pruning, coppice control, fire line upkeep, fertilizer application, and casualty replacement. Execution was generally satisfactory and contributed to improving survival and growth. However, some sites had damaged or missing plantation boards, and journals, though maintained, required more frequent updating. Recommendations focused on intensified weeding (especially targeting invasive species), consistent fertilizer application, timely casualty replanting, and installation of plantation boundary markers to aid monitoring and protection.

Two protection works were undertaken, with one sampled a fire line (3 m × 1750 m) in Korra RF under the CAMPA–NPV scheme in the Paderu (T) range. While the fire line met dimensional specifications, moderate weed growth diminished its effectiveness, highlighting the need for regular maintenance.

The “Others” category constituted the largest share of activities, totalling 138, with 34 sampled. Verification of sanction orders and records confirmed expenditures aligned with sanctioned amounts. Records were properly maintained and authenticated by officials. Both internal (Conservator of Forests) and external (Accountant General) audits were completed, ensuring financial accountability and transparency.

22. Visakhapatnam Division

In 2018–19, Visakhapatnam division covered 315.25 km² of dense and moderately dense forests and implemented 141 CAMPA activities, of which 29 (20 %) were sampled for monitoring and evaluation. The majority of implemented activities (86) fell under the “other works” category, while ecological interventions included 10 plantations, 42 maintenance works, and only 3 protection activities. No Soil and Moisture Conservation (SMC) or construction works were reported during this period, continuing a trend where administrative tasks overshadow ecological priorities.

Three plantation sites were closely examined. At K. Valabu in Chodavaram, the NTSH plantation recorded survival rates between 74% and 81% across *Pongamia pinnata*, *Terminalia arjuna*, and *Azadirachta indica*, with tree heights of 4 to 5 meters and girths ranging from 30 to 39 cm. These results reflect moderate soil suitability with some limitations due to rocky, infertile conditions. The Nallakonda plantation in Visakhapatnam range exhibited stronger survival rates of 63% to 90% across diverse species, with growth reaching up to 6.3 meters in height and girths exceeding 40 cm, demonstrating high compatibility with the red loamy soils. In Gunupudi, Yellamanchili range, teak showed 83 % survival with heights between 4.8 and 5.8 meters, confirming the species' adaptability, although growth was slightly lower than at Nallakonda.

Area verification revealed discrepancies between sanctioned and actual plantation extents: Nallakonda exceeded its area by 3.34 ha, K. Valabu by 0.21 ha, and Gunupudi showed a deficit of 0.33 ha. These inconsistencies, consistent with previous years, are attributed to boundary perambulation issues. Field inspections confirmed plantations were generally healthy, free of pests, and under minimal biotic pressure, with only occasional grazing.

Maintenance was the most significant ecological activity with 42 interventions, including casualty replacement, soil tilling, coppice control, pruning, saucer formation, and fire line upkeep. These efforts visibly improved plantation density and bole formation, moving stands toward stability. However, deficiencies were observed in inconsistent weeding, especially at plantation edges where invasive species like Lantana persisted. Pruning operations were irregular, impacting bole quality, and plantation boards were frequently missing or damaged, hindering effective site identification and monitoring. It was recommended to extend maintenance cycles, enforce stricter supervision of pruning and replanting, and implement systematic boundary marking using durable materials.

Protection efforts were minimal, with only three activities recorded. At Gandigudam, Visakhapatnam range, an RCC fence with chain-link met specifications but showed minor damage needing repair. At Chodavaram, an 11 km long fire line was established but became overgrown with grasses and weeds, reducing its effectiveness and highlighting the need for more frequent maintenance. The scale of protection works was inadequate relative to the division's fire and grazing pressures, leaving forests vulnerable to environmental risks.

Financial accountability was strong, with sanction orders and expenditures matching, supported by internal and external audits. Plantation journals were available for most sites, although updates of survival and growth data were irregular. Plantation boards were inconsistently present, and work registers were missing for Visakhapatnam (RSO 10), indicating documentation lapses that could weaken long-term monitoring.

23. Vizianagaram Division

In 2018–19, Vizianagaram division implemented 187 CAMPA activities, with 39 (20 %) sampled for monitoring and evaluation. Five plantations were undertaken, with one sampled at Parvathi Puram. At Puligummi, the teak (*Tectona grandis*) plantation showed a strong survival rate of 86.32 %, with tree heights ranging from 1.3 to 8.7 meters and girths between 10 and 25 cm. Area verification revealed a significant discrepancy, with the recorded plantation size at 10 hectares, while perambulation measured 32.93 hectares, indicating over-reporting of plantation

extent. Plantation health was good, with no pest or disease incidences and minimal biotic pressure, but plantation journals were not produced during the visit, highlighting a need for improved documentation.

The division carried out 43 maintenance activities, with eight sampled across all ranges except Anantagiri. These included various silvicultural practices such as teak and bamboo maintenance and coppice control, which were generally well executed. However, missing or damaged plantation boards were observed at several sites, affecting monitoring and visibility.

Twelve protection works were conducted, with four sampled in Vizianagaram, Saluru, Kurupam, and Parvathi Puram ranges. Fire lines, measuring 3 meters in width and between 1000 and 3000 meters in length, were functional but showed reduced visibility due to moderate weed growth, indicating the need for more frequent clearance.

Seven Soil and Moisture Conservation (SMC) activities were undertaken, with one sampled at Saluru. Percolation tanks were found intact and consistent with records, although periodic de-silting was recommended to maintain effectiveness. No construction activities were reported during the year.

The "Other" category constituted the largest share, with 120 activities implemented and 25 sampled. Financial records and expenditures were properly maintained and subjected to both internal and external audits, ensuring accountability and transparency.

24. Srikakulam Division

In 2018–19, Srikakulam division implemented 163 CAMPA activities, with 32 (20 %) sampled for detailed monitoring and evaluation. Eight plantations were undertaken, with two sampled at Kasibugga and Pathapatnam. Teak (*Tectona grandis*) survival was moderate, recording 65.85 % at Koradabadi (Kasibugga) and 78.74 % at Pathuru (Pathapatnam), with average tree heights between 3 and 5.7 meters and girths ranging from 21 to 33 cm. Area verification revealed discrepancies, with Koradabadi's plantation recorded as 5 hectares but perambulated at 8.88 hectares, and Pathuru recorded at 5 hectares but measured at 5.95 hectares. The plantations were healthy, showing no pest incidences and minimal grazing pressure.

Twenty-two maintenance activities were carried out, with four sampled, including weeding, pruning, and fire line upkeep, which were satisfactorily executed. However, some sites had missing plantation boards, and record updating was inconsistent, indicating gaps in documentation. No protection, soil and moisture conservation (SMC), or construction activities were reported during the year.

A large majority of activities (133, with 26 sampled) were categorized as "Others." Verification confirmed full compliance with procedures, with records authenticated and audited, ensuring accountability and transparency.

VII. SUMMARY OF FINDINGS

The monitoring and evaluation of CAMPA activities during 2018–19 revealed that success in plantation forestry cannot be measured merely by the number of saplings planted or funds spent. Instead, outcomes were shaped by a delicate balance of ecological suitability, technical management, and social involvement. In some divisions, where species were carefully matched to site conditions, maintenance was timely, and communities were actively engaged, plantations showed excellent survival and growth.

These findings underline that plantations are not mechanical projects but living systems that respond to soil, water, climate, and people. The lessons learnt highlight the recurring strengths and weaknesses across divisions, offering insights into what sustains ecological investments and what undermines them. Together, they form a roadmap for improving the effectiveness, sustainability, and long-term impact of CAMPA interventions.

Activity Wise Observations

Plantation performance across divisions during 2018–19 unfolded as a mixed story, shaped largely by how well species were matched with site conditions. At Beluguppa, Valligatla, Paderu, Nallakonda, and in certain parts of Nellore, plantations stood out with excellent survival and growth, showcasing the potential of sound planning and site selection. Yet in places like Nandanam, Gandlur, Chintur, and in coastal or submergence-prone zones, performance was weak. *Pterocarpus santalinus* in Nellore succumbed almost entirely to stress. Bamboo plantations at Atmakur managed only moderate survival, constantly under threat from grazing animals and invasive weeds. In general, survival percentages were often better than actual growth rates, plantations remained largely free of pests, but limitations such as poor soils and unchecked grazing held back their progress. Adding to this, field verification repeatedly revealed mismatches, with actual areas often exceeding the recorded plantation extents.

Maintenance, though widespread, told a story of uneven quality. In many places, plantations were weakened by missing signage, irregular pruning and weeding, uneven fertilizer application, incomplete journal entries, and fire lines left overgrown. Where maintenance was carefully followed such as in Paderu and Visakhapatnam plantations displayed stronger growth and resilience. But in divisions where these activities faltered, the ecological promise of plantations diminished.

Protection measures, too, depended on regular follow-up. Fire lines, fences, and patrols were generally effective where maintained, but in many places their purpose was undermined by overgrowth, partial coverage, and grazing pressures. Tirupati, Atmakur, and Nandyal demonstrated stronger fire line upkeep, while divisions like Krishna and Chintur revealed vulnerabilities in their protection works.

Soil and moisture conservation works such as trenches, saucer pits, and check dams were constructed widely, and many were functional in their initial years. Yet without routine desilting and upkeep, their benefits declined rapidly. In Chittoor East and West, Rajampet, Nellore, and Proddatur, SMC structures began losing their effectiveness as silt accumulated. In Kadapa and Guntur, where few or no SMC works were undertaken, the ecological impact was limited from the outset.

Construction activities provided more durable contributions. RCC cairns, boundary walls, and CC pathways helped demarcate forests and strengthen ecological infrastructure. In divisions like Rajampet, Proddatur, and Atmakur, these structures were robust, requiring only minor maintenance. In coastal divisions, however, weathering and soil coverage reduced their visibility and durability, leaving their impact lessened.

On the **financial** side, management and auditing were strong across almost all divisions. Works were carried out with fiscal discipline and accountability, but technical and administrative weaknesses persisted in field-level documentation. Discrepancies between recorded and actual plantation areas were widespread, and incomplete registers, missing estimates, and irregular journal entries were commonly noted in divisions such as Chittoor, Guntur, Eluru, and Markapur.

The role of people was the most uneven of all. **Community** engagement through VSS and JFMC varied dramatically from one division to another. In Nandyal, Paderu, and parts of Visakhapatnam, positive participation strengthened plantations, providing oversight and continuity. Elsewhere especially in Chittoor East, Chintur, and several other divisions—social ownership was absent or minimal, weakening both the monitoring and the long-term sustainability of interventions.

Division Wise Insight

Chittoor East and West Divisions: Plantation outcomes were highly variable. In Chittoor East, Pathagunta showed excellent growth, Ambakam moderate performance, and Nandanam poor results, linked to inconsistent fertilizer use, irregular fire line maintenance, and missing signage. SMC structures silted quickly, protection works were maintained, and community participation was lacking. In Chittoor West, Valligatla succeeded while Kuppam struggled; maintenance was systematic but weakened by gaps in fertilizer application, signage, and fire line upkeep. Protection measures were sound but grazing and fire risks persisted, and GPS verification revealed area mismatches. Community involvement was partial and inconsistent.

Rajampet and Tirupati Divisions: In Rajampet, plantations performed moderately, neem fared better, and Rajukunta outperformed Annasamudram. Maintenance existed but poor record-keeping and missing signage reduced effectiveness. SMC structures silted and needed desilting, though cairns and financial compliance were robust. Tirupati focused solely on maintenance and protection; fire lines and fencing were effective, yet SMC structures were heavily silted and documentation mismatches persisted.

Nellore and Kadapa Divisions: Nellore showed mixed success, with species like Syzygium, Azadirachta, Terminalia, Dalbergia, and Sterculia thriving, but Pterocarpus santalinus failed. Maintenance was affected by poor signage and grazing, while SMC overflowed or silted. Cairns needed plastering, though finances were compliant. Kadapa had no new plantations or SMC works; existing areas were well-maintained, fire lines effective, boundaries clearly demarcated, and financial compliance ensured.

Proddatur and Ananthapuramu Divisions: Proddatur showed contrasts: neem thrived at Itukulapadu while Gandlur collapsed under waterlogging. Maintenance existed but signage was lacking, fire lines overgrown, and SMC needed desilting. RCC cairns and finances were sound. In Ananthapuramu, Beluguppa and Mutchukota grew well, Gollapalli and Kokkanti poorly;

maintenance was generally effective but inconsistent, SMC lost effectiveness due to siltation, cairns were well executed, finances transparent, and community participation partial.

Giddalur, Kurnool and Nandyal Divisions: Giddalur plantations survived but grew poorly; fire lines functioned and SMC structures required upkeep, though area verification revealed mismatches. Kurnool showed high survival but weak growth in stressed soils; protection and SMC were lacking, and documentation poor. Nandyal had limited interventions; plantations survived moderately, pests absent, protection adequate, VSS participation strong, though journals were irregularly updated.

Atmakur, Markapur and Guntur Divisions: Atmakur had no new plantations; bamboo survival was moderate, vulnerable to grazing and weeds, but fire lines and SMC were effective with maintenance needed. RCC boundaries were reliable, finances intact. Markapur saw negligible, unsuccessful plantations; maintenance poor, signage missing, and SMC silted. Guntur had mixed outcomes: Casuarina survived moderately, Avicennia failed, maintenance weakened by missing signage, fire lines needed upkeep, SMC absent, but CC pathway construction succeeded and finances remained strong.

Krishna, Eluru and Eluru WLM Divisions: Krishna plantations had >75% survival; SMC ineffective without desilting, boundaries well-marked, community involvement weak. Eluru focused little on plantations; maintenance limited due to missing signage and silted SMC, no protection or construction, finances strong. Eluru WLM had no plantation/protection activity, but the Environmental Education Centre at Atapaka was well maintained; financial compliance intact.

Chintur, Kakinada and Narsipatnam Divisions: Chintur plantations repeatedly failed due to poor site selection, grazing, and weak maintenance; SMC silted, area verification discrepancies were large, and community participation minimal. Kakinada had mixed results, with success at Vathangi and Rajavommangi but failures elsewhere; area discrepancies noted, SMC silted, no protection/construction works. Narsipatnam ranged from poor to excellent; maintenance generally good but signage missing, fire line protection inconsistent, finances transparent, VSS participation positive.

Paderu, Visakhapatnam and Vizianagaram Divisions: Paderu recorded high survival, especially Acrocarpus fraxinifolius; plantations healthy, maintenance good though signage/journal updates irregular, fire lines needed attention, community engagement varied. Visakhapatnam plantations were generally healthy; maintenance weakened by irregular weeding/pruning and missing signage, protection limited, records mostly sound, community participation partial. Vizianagaram survival was high (86%), Puligummi overestimated; maintenance satisfactory, signage weak, journals irregular, fire lines and SMC functional but needed upkeep.

Srikakulam Division: Plantation survival ranged 66–79%; areas exceeded records, plantations healthy, minimal pest/grazing threats, maintenance effective but weakened by missing signage and irregular record-keeping.

VIII. RECOMMENDATIONS

The review of CAMPA implementation during 2018–19 across Andhra Pradesh revealed that while financial utilization and administrative compliance were generally strong, the ecological outcomes varied considerably across divisions. Success often depended on factors such as appropriate species–site selection, effective maintenance, functional soil and moisture conservation (SMC) measures, and active community participation through Vana Samrakshana Samithis (VSS). However, several systemic issues were observed imbalanced activity portfolios dominated by "other works," inconsistencies between mapped and verified plantation areas, weak documentation, and limited upkeep of protective and SMC structures. These challenges indicate a need to move beyond financial efficiency toward ecological effectiveness, transparency, and sustained community engagement. The following recommendations and way forward outline the key strategic actions required to enhance the technical quality, ecological integrity, and social inclusiveness of CAMPA interventions. They aim to strengthen future planning, execution, and monitoring frameworks to ensure that restoration efforts translate into long-term forest resilience and tangible ecosystem benefits.

1. **Improve Site–Species Matching and Ecological Planning:** Undertake scientific site assessments before plantation establishment, emphasizing soil type, moisture regime, and rainfall suitability. Develop and adopt a standardized species–site matching protocol using soil health data, hydrological maps, and local climate parameters. Prioritize native, mixed, and resilient species suited to specific ecological zones, avoiding monocultures and unsuitable or encroached areas.
2. **Rebalance Activity Portfolios for Ecological Impact:** Increase the proportion of ecologically substantive works plantations, soil and moisture conservation (SMC), and protection while reducing overdependence on "other works." Establish minimum thresholds for these core activities in each division's annual plan, ensuring that budget allocations translate directly into on-ground ecological outcomes.
3. **Extend Maintenance and Protection Cycles:** Provide a minimum of 3–5 years of maintenance support, particularly in semi-arid, degraded, or drought-prone regions. Institutionalize a maintenance calendar covering weeding, pruning, fertilizer application, fire line clearance, coppice regulation, and pest control. Strengthen boundary demarcation and regular inspection of fencing, gates, and cairns to prevent grazing and encroachment.
4. **Sustain and Expand Soil and Moisture Conservation Works:** Make SMC structures such as ponds, trenches, percolation tanks, and contour bunds a mandatory and integral component of plantation projects. Institutionalize annual de-silting, repair, and functional monitoring of SMC structures to sustain water availability and soil stability. Prioritize these works in water-scarce, erosion-prone, and high-runoff divisions.
5. **Strengthen Documentation, Transparency, and Geospatial Accountability:** Enforce regular updating of plantation journals, registers, and expenditure records to ensure audit readiness and data consistency. Mandate GPS/GIS-based area verification before and after plantation to reconcile discrepancies between maps and field reality. Introduce digital record-keeping systems and display boards with QR codes linking to online plantation data for transparency and public awareness.

6. **Promote and Institutionalize Community Participation:** Empower Vana Samrakshana Samithis (VSS) and Joint Forest Management Committees (JFMCs) to take active roles in plantation protection, maintenance, and monitoring. Conduct structured focus group discussions (FGDs) and awareness programs to enhance local stewardship. Link community engagement with livelihood and eco-development initiatives (e.g., eco-tourism, NTFP collection) to build long-term ownership and accountability.
7. **Institutionalize Ecological and Technical Audits:** Continue periodic financial and technical audits but integrate ecological performance audits assessing survival, growth, biodiversity, and ecosystem services. Develop division-level ecological scorecards combining field verification, GIS data, and community feedback to guide adaptive management.
8. **Leverage Technology and Build Capacity:** Deploy a centralized GIS-enabled monitoring platform for real-time tracking of plantation performance, SMC functionality, and budget utilization. Provide capacity-building programs for frontline staff and local communities on silviculture techniques, invasive species management, and digital data entry. Utilize drones, remote sensing, and mobile apps for verification and performance evaluation.
9. **Reintroduce and Restore Ecologically Suitable Areas:** Revisit degraded or failed plantation sites to implement restoration through mixed-species replanting and native species enrichment. Control invasive species and encourage natural regeneration in appropriate areas to strengthen ecological resilience.
10. **Foster Continuous Monitoring and Adaptive Management:** Establish a state-level monitoring cell to track plantation health, pest incidence, and survival trends through periodic field assessments. Integrate ecological feedback into future planning cycles, ensuring that lessons from past performance inform adaptive restoration strategies.
11. **Overcome Implementation Challenges:** Procedural bottlenecks and administrative delays in the release and utilization of CAMPA funds may be address to ensure timely implementation. Approval processes, strengthen fund flow mechanisms, and improve coordination between field and administrative units may be streamlined to prevent disruptions in plantation scheduling, maintenance, and synchronization of SMC activities.