Third Party Monitoring and Evaluation of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) Activities of Andhra Pradesh Forest Department (APFD) During 2017-18

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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 2017–18. 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 during 2017-18, including plantations, maintenance, protection, construction, and soil and moisture conservation (SMC) work across all forest circles and divisions. To assess the quality, effectiveness, and field-level outcomes of these interventions, third-party monitoring, and evaluation for the year 2017–18 was entrusted to the Institute of Wood Science and Technology (ICFRE–IWST), Bengaluru. During 2017–18, a total of 3,101 activities were implemented across all divisions of Andhra Pradesh under CAMPA, with 729 of these sampled for monitoring and evaluation. Plantation activities accounted for 191 implementations, with 57 sampled, while maintenance activities were the most numerous, with 841 implemented and 196 sampled. Protection activities totalled 111 implemented and 42 sampled, and soil and moisture conservation (SMC) works included 203 implementations with 54 sampled. Construction activities numbered 73, with 24 sampled, and other activities were the most extensive, with 1,682 implemented and 356 sampled. Afforestation activities were reviewed after a gap of eight years to evaluate survival rates, growth performance, and site sustainability outcomes based on all the interventions. The evaluation of CAMPA activities during 2017–18 revealed a recurring pattern of critical interventions across divisions, including plantations, maintenance, protection measures, and soil and moisture conservation (SMC) work. While financial management was generally sound and adhered to audit requirements, the ecological outcomes showed a mixed picture, indicating variability in the effectiveness and impact of the interventions.

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;

Plantations were established in most forest divisions, but their performance varied significantly based on site-specific factors such as soil quality, rainfall, and the level of protection provided. High survival rates and vigorous growth were observed in several locations, including Thimmasamudram in Chittoor East; Keenatampalli and Santhapeta in Chittoor West; S.R. Palem in Rajampet; Ponugodu and Yeturu in Nellore; Mallela and Itukulapadu in Proddatur; Beluguppa in Ananthapuramu; Marupuru in Nellore; Gandrai in Krishna; Velagalapalli and Karakapadu in Eluru; teak plantations in Srikakulam and Visakhapatnam; and Kumbivalasa and Narlavalasa in Vizianagaram. In these areas, survival rates often exceeded 80 to 90 percent, reflecting favorable ecological conditions and effective

plantation practices. In contrast, plantations performed poorly in degraded, rocky, or drought-prone sites. Notable examples include Rayalacheruvu and Nendragunta in Chittoor East, Shikaripalem in Rajampet, Chowdavaram in Nellore, Kanumalopalli in Kadapa, Mattapally and Palamadagu in Chintur, and Damsarai in Visakhapatnam. In these locations, survival rates fell below 30 percent, highlighting the challenges of establishing plantations in ecologically unsuitable areas. Several divisions also reported discrepancies between the sanctioned plantation areas and those verified through GPS and GIS-based perambulation, indicating potential issues in planning, documentation, or field execution.

Although plantations were often considered the most visible symbol of afforestation efforts, their success varied widely. Some species, such as *Pterocarpus santalinus*, *Terminalia arjuna*, *Hardwickia binata*, *Sterculia urens*, and *Azadirachta indica*, showed strong growth where soils were deep and environmental conditions were favorable. In such areas, saplings exhibited robust and healthy development. However, when these species were planted on unsuitable sites such as rocky terrain, waterlogged zones, or areas prone to drought—their growth was stunted, and survival was often poor. Red Sanders (*Pterocarpus santalinus*) and bamboo were especially vulnerable under adverse conditions, underscoring the critical importance of matching species to site characteristics.

Maintenance works constituted the largest ecological intervention across divisions, encompassing activities such as weeding, soil working, pruning, coppice control, casualty replacement, fertilizer application, and fire line clearance. These operations played a critical role in sustaining plantation survival and enhancing bole formation, particularly in divisions like Nellore, Ananthapuramu, Chittoor East, and Chittoor West. However, several shortcomings were frequently observed. These included incomplete fire line clearance, inadequate removal of invasive species such as *Lantana camara*, damaged or missing plantation name boards, irregular or poorly maintained plantation journals, and inconsistent application of fertilizers. Such gaps undermined the intended impact of maintenance efforts. Evaluators consistently recommended that maintenance support be extended by at least two additional years, particularly in semi-arid zones, to ensure successful plantation establishment and growth. While maintenance activities were implemented in most areas, their consistency and quality often fell short. In many instances, plantation boards meant to identify and validate sites were either damaged or missing. Cleared patches were quickly overtaken again by weeds due to lack of follow-up. Protective fencing, where provided, deteriorated in the absence of regular upkeep. Similarly, although maintenance records were often maintained in ledgers, they were not always reflected in actual field conditions.

Protection works were primarily limited to fire line formation and fencing. Well-maintained fire lines were observed in locations such as Toderu in Nellore; Kovvada and LND Peta in Eluru; Ganjikunta and Bayanapalli in Proddatur; and Marutla in Ananthapuramu. In these areas, the fire lines were clearly visible and contributed effectively to fire preparedness. In contrast, in several other sites including Kasipenta in Chittoor East, RV Nagar and Marripakala in Narsipatnam, and Tadda in Paderu fire lines were found to be overgrown with weeds and grasses, significantly reducing their effectiveness as protective barriers. Fencing was relatively rare across the divisions but proved useful where implemented. For instance,

the Jangamarajupalli nursery in Proddatur benefitted from physical fencing, while solar fencing installed in Palamaner of Chittoor West was rendered non-functional due to damage caused by heavy surface runoff. Although fire lines were often initially drawn with care, they were frequently left unattended and eventually became overgrown, deflation their intended purpose as a protection measure.

Soil and Moisture Conservation (SMC) works were unevenly distributed across divisions and often underrepresented, despite their critical ecological significance. In areas where they were implemented such as check dams and percolation tanks in Rajampet and Nellore, continuous contour trenches in Krishna, check dams and rock-fill dams in Eluru, and percolation tanks and trenches in Chintur and Kakinada the structures were generally constructed to specification and were initially functional. However, within a year, many of these structures had become silted, infested with weeds, or had developed issues such as seepage and structural damage to walls or aprons. These conditions significantly reduced their long-term effectiveness and ecological utility. Entire divisions such as Kadapa, Guntur, Srikakulam, Paderu, and Chittoor West reported negligible or no SMC interventions, representing a substantial ecological gap and missed opportunity to support plantation health and landscape stability. Although SMC structures, where present, played a quiet but crucial role in retaining moisture and stabilizing soils thus strengthening plantations their potential often went unrealized due to a lack of maintenance. Without regular desilting and repair, many structures degraded quickly, undermining the initial investment and long-term sustainability of plantation efforts.

Construction activities were relatively limited in number but included important infrastructure such as RCC boundary pillars, cairns, watchtowers, approach roads, sheds, gates, and eco-tourism facilities. These structures were generally well-built, structurally sound, and functional, serving their intended purposes of demarcation, protection, or visitor support. Divisions such as Chittoor East, Kadapa, Proddatur, Ananthapuramu, Kakinada, Guntur, Srikakulam, and Eluru (Wildlife Management) reported such works, which were found to be largely intact and operational. Minor issues were observed in some locations, including plaster damage, weed growth around the bases of structures, and the need for routine maintenance. However, these did not significantly impact the overall utility or functionality of the assets. Overall, construction activities such as gates, pillars, animal orphanage sheds, and eco-tourism infrastructure were considered solid investments that provided tangible support to field operations and visitor management.

Other works constituted the largest share of activities in nearly every division, with particularly high volumes recorded in Tirupati, Nellore, Kadapa, Proddatur, Eluru, Eluru Wildlife Management, Chittoor East, Chittoor West, and Paderu. These activities were primarily administrative and facilitative, contributing less directly to ecological outcomes. Financial records related to these works were generally consistent with sanctioned budgets, and both internal and external audits confirmed compliance. However, widespread issues such as missing registers, absent estimates, incomplete documentation, and typographical errors were observed. These shortcomings weakened technical accountability, despite otherwise sound financial management practices. While "other works" were financially compliant and often visible on paper, they sometimes resulted in limited ecological impact. Financially, most divisions presented a positive narrative, with clean audits and well-tracked expenditures. Yet, plantations often covered areas larger or smaller than official records indicated, reflecting persistent mismatches between mapped boundaries and actual ground conditions. Without proper GIS verification and timely updates to plantation journals, these gaps continued to undermine effective monitoring and accountability.

The evaluation underscores that active participation of **Vana Samrakshana Samiti** (VSS) is central to the long-term success of CAMPA-funded plantations. In divisions where VSS engagement was strong, plantations not only contributed significantly to ecological regeneration but also provided important socio-economic benefits to forest-dependent communities. Conversely, divisions with weak/absent VSS involvement exhibited clear gaps in community engagement that need urgent attention. To fully realize CAMPA's objectives, it is essential to strengthen awareness campaigns, expand the inclusion of Non-Timber Forest Produce (NTFP) species, and enhance the institutional capacity of VSS. Ultimately, community-driven forest management remains the cornerstone of sustainable afforestation and ecological security in Andhra Pradesh. The critical role of local communities, through VSS and Joint Forest Management Committees (JFMC), was particularly evident. Where these groups were active, forests thrived saplings were protected from cattle grazing, weeds were regularly cleared, and plantation boundaries were respected. In contrast, where community involvement was lacking, plantations suffered from grazing, encroachment, and neglect.

II. 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 the Institute of Wood Science and Technology (ICFRE–IWST), Bengaluru for the year 2017–18.

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 2017–2018, 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 vigor, 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.

5. Methodology for Evaluation of 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 2017–18. 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:

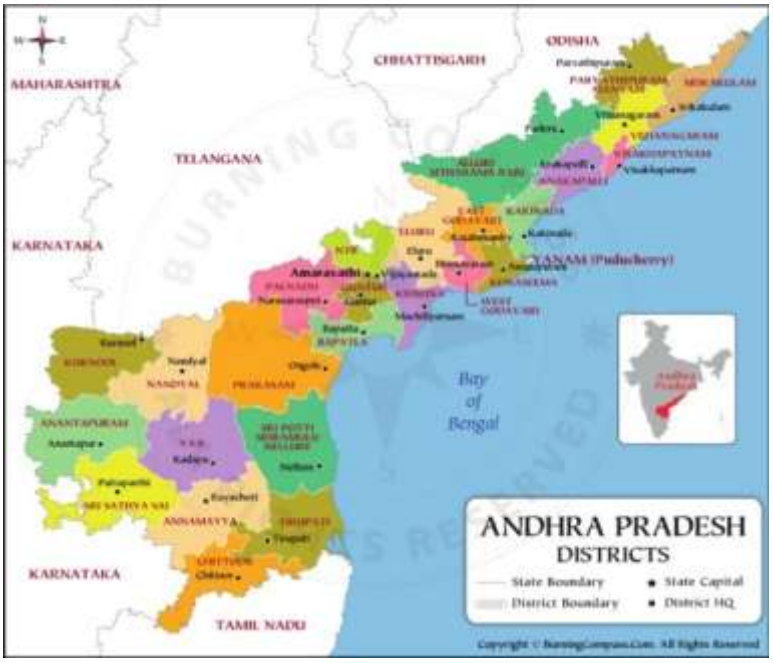
1. Sampling constraint: Only about 20–25 % of activities were sampled for field verification, which may not fully capture the diversity and variability of outcomes across the entire division.
2. Temporal limitation: Evaluations were conducted in a single season, meaning survival and growth data reflect 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 eight 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 2017-18

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	10	4	58	12	21	5	1	1	10	3	85	19	185	44
2	Chittoor West	19	4	64	14	3	1	1	1	2	1	120	27	209	48
3	Rajampet	4	2	30	6	0	0	11	4	2	2	27	5	74	19
4	Tirupati	0	0	5	2	9	2	6	2	0	0	82	18	102	24
5	Nellore	22	6	85	17	5	1	8	2	0	0	119	24	239	50
6	Kadapa	4	1	19	4	2	2	0	0	2	1	83	17	110	25
7	Proddatur	20	5	27	7	8	5	8	2	6	2	127	26	196	47
8	Ananthapuram	6	1	116	29	4	2	4	2	11	3	34	7	175	44
9	Giddalur	0	0	0	0	2	1	0	0	0	0	43	9	45	10
10	Kurnool	4	1	26	5	1	1	0	0	0	0	18	4	49	11
11	Nandyal	0	0	6	2	0	0	0	0	0	0	0	0	6	2
12	Atmakur	0	0	19	4	2	2	1	1	1	1	110	23	133	31
13	Markapur	1	1	29	7	1	1	3	1	2	1	88	18	124	29
14	Guntur	7	3	25	7	7	2	0	0	3	1	47	10	89	23
15	Krishna	9	3	40	10	6	2	22	5	0	0	10	2	87	22
16	Eluru	8	3	35	7	5	3	30	7	0	0	76	16	154	36
17	Eluru WLM	0	0	1	1	0	0	0	0	2	2	82	17	85	20
18	Chintur	9	2	11	3	6	2	22	5	0	0	20	4	68	16
19	Kakinada	23	6	48	11	9	2	76	18	7	1	58	12	221	50
20	Narsipatnam	10	3	31	7	7	4	0	0	0	0	55	13	103	27
21	Paderu	10	3	76	20	3	1	0	0	0	0	123	25	212	49
22	Visakhapatnam	10	4	40	9	3	1	3	1	1	1	90	20	147	36
23	Vizianagaram	9	3	33	8	7	2	7	2	0	0	98	20	154	35
24	Srikakulam	6	2	17	4	0	0	0	0	24	5	87	20	134	31
	Grand Total	**191**	**57**	**841**	**196**	**111**	**42**	**203**	**54**	**73**	**24**	**1682**	**356**	**3101**	**729**

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. Divisions, formed the core units covered under the monitoring and evaluation of CAMPA activities across Andhra Pradesh are arranged/presented in 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.

Across all seven ranges, a total of 185 activities were implemented during 2017-18, covering Plantation, Maintenance, Protection, SMC, Construction, and Other activities. Out of these, 44 activities were sampled, resulting in an overall sampling coverage of approximately 24 %. In Chittoor East range, 19 activities were implemented, including Plantation (2), Maintenance (11), Protection (1), and Others (5). During sampling, 3 activities were assessed: Maintenance (2) and others (1), while Plantation and Protection were not sampled. In Karvetinagar range, 14 activities were implemented: Plantation (1), Maintenance (4), Protection (1), Construction (2), and Others (6). 4 activities were sampled: Plantation (1), Maintenance (1), Construction (1), and Others (1), while Protection was not sampled. In Piler range, 20 activities were implemented, comprising Maintenance (3), Protection (2), Construction (5), and Others (10). 6 activities were sampled: Maintenance (1), Protection (1), Construction (1), and Others (3). Plantation was not implemented in this range. In Tirupati range, 32 activities were implemented: Plantation (1), Maintenance (6), Protection (5), and Others (20). Sampling

included 7 activities: Plantation (1), Maintenance (1), Protection (1), and Others (4), while SMC and Construction were not sampled. In Puttur range, 21 activities were implemented, including Maintenance (6), Protection (4), and Others (11). 5 activities were sampled: Maintenance (1), Protection (1), and Others (3). Plantation and Construction were not implemented here. In Sathyavedu range, 42 activities were implemented: Plantation (3), Maintenance (13), Protection (4), SMC (1), Construction (3), and Others (18). Sampling covered 8 activities: Plantation (1), Maintenance (2), Protection (1), SMC (1), Construction (1), and Others (2). In Srikalahasti range, 37 activities were implemented, comprising Plantation (3), Maintenance (15), Protection (4), and Others (15). 11 activities were sampled: Plantation (1), Maintenance (4), Protection (1), and Others (5). Construction and SMC were not implemented or sampled in this range.

1. Monitoring and Evaluation of Plantation Activities

A total of 10 Plantation activities were implemented across all ranges. Sampling covered 4 activities (40 %). Specifically, Karvetinagar range implemented 1, 1 sampled; Tirupati range implemented 1, 1 sampled; Sathyavedu range implemented 3, 1 sampled; and Srikalahasti range implemented 3, 1 sampled, Chittoor East range implemented 2, none sampled, Piler and Puttur range had none implemented during 2017-18.

1.1 Karvetinagar range

One plantation activity implemented under the CAMPA scheme in the Karvetinagar Range during 2017–18 was identified. Accordingly, one plantation activity (constituting 100 %) was chosen for monitoring and evaluation pirpose.

Table 3 Details of plantation selected in Karvetinagr range

Sl. no.	Plantation	SO no. and year
1	Raising of 61 Ha CA Plantation (SKVBR Eco-Tourism Project) in Sy. No. 427/4, Sanjeevarayapuram village, Ramachandrapuram Mandal adjacenet to Compt. No. 354, Rayalacheruvu Beat of Karvetinagar Range	DSO 119 (2017-18)

GPS location: N 13.520753 E 79.387427 **SO no. and year:** DSO 119 (2017-18)

The CA plantation has largely been unsuccessful. The main constraint is the rocky terrain, which dominates the site, limiting soil depth and hindering plant establishment. Gap planting was attempted in small patches with slightly better soil, but the area is now predominantly covered by hardy boda grass. Tree survival is extremely poor, with only a few scattered individuals of *Azadirachta indica*, *Hardwickia binata*, and *Mangifera indica*, collectively accounting for less than 1 % of the planted seedlings. This indicates very low survival and establishment of the plantation.

1.2 Tirupati range

One plantation activity implemented under the CAMPA scheme in the Tirupati Range during the period 2017–18 was identified. Accordingly, one plantation activity (constituting 100 %) was chosen for monitoring and evaluation purpose.

Table 4 Details of plantation selected in Tirupati range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha RS Plantation in Nendragunta Beat of Tirupati Range during 2017-18	DSO 9 (2017-18)

GPS location: N 13.50412 E 79.164274 **SO no. and year:** DSO 9 (2017-18)

This plantation has been unsuccessful due to heavy browsing by domestic cattle and wild herbivores, particularly spotted deer. The continuous biotic pressure hindered the survival and growth of *Pterocarpus santalinus* seedlings, resulting in stunted growth, poor survival, and high mortality. However, *Hardwickia binata* plants showed relatively better establishment in certain patches. These observations were recorded in the plantation journal by DCF and CF during field inspections.

1.3 Sathyavedu range

Three plantation activity implemented under the CAMPA scheme in the Sathyavedu range during 2017–18 was identified. Accordingly, one plantation activity (constituting 33 %) was chosen for monitoring and evaluation.

Table 5 Details of plantation selected in Sathyavedu range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha RS Plantation in Banglabatagutta locality of Ambakam beat of Sathyavedu Range during 2017-18	DSO 84 (2017-18)

The 20-hectare red sanders plantation site selected at Ambakam is characterized by red earth interspersed with large boulders and rocky stones, indicating a rugged terrain with limited soil depth and moderate challenges for root penetration and water retention.

Survival percentage: The Ambakam beat plantation site shows good suitability for Pterocarpus santalinus with an average survival rate of 69.08 %.

Growth: In the Ambakam plantation, the average tree height ranges from 1.04 to 4.32 meters, with a girth range from 13.49 to 28.37 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)	Collar Girth (cm)	GBH (cm)
1	Ambakam	1	*Pterocarpus santalinus*	N 13.393281 E 79.922977	81.81	4.32 ±0.65	-	24.98 ±3.00
		2	*Pterocarpus santalinus*	N 13.393553 E 79.922439	74.38	3.12 ±0.64	-	25.27 ±5.41
		3	*Pterocarpus santalinus*	N 13.393641 E 79.921938	60.33	1.70 ±0.36	-	13.49 ±2.22
		4	*Pterocarpus santalinus*	N 13.393716 E 79.921536	65.28	3.85 ±1.38	-	28.37 ±8.88
		5	*Pterocarpus santalinus*	N 13.394101 E 79.920618	63.63	1.04 ±0.37	19.56 ±4.19	-
Plantation average					**69.09**	**2.81**	**19.56**	**23.03**

1.4 Srikalahasti range

Three plantation activity implemented under the CAMPA scheme in the Sri Kalahasti range during 2017–18 was identified. Accordingly, one plantation activity (constituting 33 %) was chosen for monitoring and evaluation purpose.

Table 7 Details of plantation selected in Sri Kalahasti range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha RS plantation at Moolakona locality of Thimmasamudram beat of Srikalahasthi range during 2017-18	DSO 19 (2017-18)

The Thimmasamudram site has red soil interspersed with heavy rock formations. While the red soil provides good aeration, the rocks restrict root penetration and reduce planting space, requiring additional site preparation such as rock removal or planting in rock-free pockets.

Survival percentage: At Thimmasamudram, the site is also suitable for *Pterocarpus santalinus*, showing an average survival rate of 96.02 %.

Growth: In Thimmasamudram, average tree height ranges from 5.49 to 6.30 m and girth ranges from 22.75 to 31.11 cm.

Table 8 Details of plantation enumerated in Sri Kalahasti range

Sl. no.	Plantation /Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Thimmasa mudram	1	*Pterocarpus santalinus*	N 13.623885 E 79.71814	99.17	5.82 ±1.11	30.78 ±8.46
		2	*Pterocarpus santalinus*	N 13.630845 E 79.720175	95.86	6.30 ±1.14	31.11 ±6.33
		3	*Pterocarpus santalinus*	N 13.62382 E 79.71817	95.04	5.49 ±1.02	22.75 ±7.02
		4	*Pterocarpus santalinus*	N 13.627627 E 79.718318	95.86	5.80 ±1.21	24.86 ±6.97
		5	*Pterocarpus santalinus*	N 13.628645 E 79.716065	94.21	6.01 ±1.17	29.55 ±8.26
Plantation average					**96.03**	**5.88**	**27.81**

Comparative assessment of plantations in Chittoor east division during 2017-18

The Ambakam beat plantation shows good suitability for *Pterocarpus santalinus*, with an average survival rate of 69.08 %. Trees at this site have an average height ranging from 1.04 to 4.32 meters and a girth of 13.49 to 28.37 cm, although additional site preparation, such as rock removal or planting in rock-free pockets, is required. In contrast, the Thimmasamudram plantation demonstrates high suitability for *Pterocarpus santalinus*, with an average survival rate of 96.02 %. Trees here are taller, with heights ranging from 5.49 to 6.30 meters and girth between 22.75 and 31.11 cm, and no special site preparation is needed.

Verification of plantation area and boundaries: The plantation boundaries and extents were verified using KML files specific to each location. These geospatial references were processed using GIS tools to generate accurate maps and compute the actual area covered under each plantation.

Table 9 Details of plantation area perambulation in Chittoor east division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 61 Ha CA Plantation in Sy. No. 427/4, Sanjeevarayapuram village, Rayalacheruvu Beat	61	60.96
2	Raising of 20 Ha RS Plantation in Nendragunta Beat of Tirupati Range during 2017-18	20	21.74
3	Raising of 20 Ha RS Plantation in Banglabatagutta locality of Ambakam beat of Sathyavedu Range during 2017-18	20	24.94
4	Raising of 20 Ha RS plantation at Moolakona locality of Thimmasamudram beat of Srikalahasthi range during 2017-18	20	20.85

Perambulation of plantation areas revealed that the physically verified extents were generally larger than the officially recorded areas. In the Rayalacheruvu beat, however, the perambulated area was 0.04 hectares less than the documented extent, a discrepancy likely attributable to the hilly terrain. In contrast, the perambulated area exceeded the official records by 1.74 hectares in the Nendragunta beat and by 0.85 hectares in the RS plantation at Thimmasamudram. At the Ambakam plantation, the perambulated area was greater by 4.94 hectares, largely due to the inclusion of patches within the demarcated plantation boundaries that consisted of waste, degraded, or rocky land. These discrepancies mainly arose from natural obstructions such as dense jungle growth and protective trenches, which made it difficult to trace the exact plantation boundaries, leading the perambulation to follow outer perimeters instead. The verification process was conducted using the Geo Tracker mobile application with the support of local forest beat officers, and spatial analysis in QGIS software confirmed the observed discrepancies. Photographic evidence and GIS mapping outputs were also generated to substantiate the findings.

60.96 Ha Rayalacheruvu

21.74 Ha Nendragunta

24.94 Ha Ambakam

20.85 Ha Thimmasamudram

Health Status of Plantations: Across all plantation sites visited, the overall health status of the plantations was found to be satisfactory, with no evidence of pest or insect damage recorded.

Protection of Plantations: Fire lines, inspection paths, and fire watchers were established and maintained at all sites, ensuring adequate protection against fire and other environmental threats.

Biotic (Human/Cattle) Pressure: Biotic pressure from grazing and browsing was generally low; only limited incidences were observed at Rayalacheruvu, very few at Kasaram, Thimmasamudram, Ambakam, while comparatively higher grazing and browsing pressure was noted at Nendragunta.

Plantation Journals and Records Maintenance: With respect to record-keeping, the Rayalacheruvu plantation lacked both journals and plantation boards, while the Nendragunta plantation journals maintained properly, although plantation boards were found only at this site. At Thimmasamudram, journals were maintained, but plantation boards were missing, periodic updating of plantation parameters was required. Similarly, Ambakam plantations, journals were generally maintained and plantation boards were absent in plantation, highlighting the need for regular updates and proper display of records. Plantations are inspected by the concerned forest officials, and their observations are duly recorded.

Vana Samrakshana Samithi (VSS): In terms of community participation, none of the plantations involved the Vana Samrakshana Samithi (VSS) in the implementation or maintenance of activities. Consequently, Focus Group Discussions (FGDs) were not conducted at Rayalacheruvu, Nendragunta, Thimmasamudram, Ambakam plantations, indicating a gap in participatory forest management across all observed ranges.

Ambakam in Sathyavedu range

Thimmasamudram in Sri Kalahasti range

Rayalacheruvu in Karvetinagr range

Nendragunta in Tirupati range

2. Monitoring and Evaluation of Maintenance Activities

The largest category, with 58 activities implemented, of which 12 (≈21%) were sampled. Range-wise, Chittoor East implemented 11, 2 sampled; Karvetinagar 4 implemented, 1 sampled; Piler 3 implemented, 1 sampled; Tirupati 6 implemented, 1 sampled; Puttur 6

implemented, 1 sampled; Sathyavedu 13 implemented, 2 sampled; and Srikalahasti 15, 4 sampled during 2017-18.

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 year maintenance of 5 Ha CA plantation in Pathagunta beat	N 13.444772 E 79.228206	DSO 110 (2017-18)
2	First year maintenance of 5 Ha CA plantation in Basavapalli Village of B Samudram beat	N 13.102642 E 79.144536	DSO 111 (2017-18)
Karvetinagar range			
3	Third year maintenance of 25 Ha CA plantation in Rayalacheruvu beat	N 13.518241 E 79.383802	DSO 240 (2017-18)
Piler range			
4	First year maintenance of 5.05 Ha in Marella beat of Piler range	N 13.798352 E 78.942838	DSO 103 (2017-18)
Tirupati range			
5	First year maintenance of 20 Ha NTSHS plantation in Nendragunta beat	N 13.508052 E 79.167488	DSO 11 (2017-18)
Puttur range			
6	Second year maintenance of 10 Ha Red Sanders plantation in Nagalapuram beat of Puttur range	N 13.407001 E 79.791419	DSO 76 (2017-18)
Sathyavedu range			
7	First year maintenance of 30 Ha RS plantation in Kadur beat of Sathyavedu range	N 13.645339 E 79.961352	DSO 78 (2017-18)
8	First year maintenance of 7 Ha miscellaneous plantation in Pandur beat of Kambakam section of Sathyavedu range	N 13.562879 E 79.910327	DSO 104 (2017-18)
Srikalahasti range			
9	First year maintenance of 20 Ha RS plantation in Gajupoyyalu locality of Kasaram beat	N 13.62314 E 79.717938	DSO 46 (2017-18)
10	Second year maintenance of 10 Ha Red Sanders plantation in Billipodalu locality of Kukkambakam beat	N 13.861386 E 79.707714	DSO 69 A (2017-18)
11	Second year maintenance of 10 Ha Red Sanders plantation in Nemalitippalu locality of Katur beat	N 13.703008 E 79.829263	DSO 67 A (2017-18)
12	Second year maintenance of 20 Ha Red Sanders plantation in Yerrachenumitta locality of Thimmasamudram beat	N 13.62314 E 79.717938	DSO 47 (2017-18)

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 of the plantation are as follows;

General recommendations for maintenance activities

- Install or restore plantation boards and stones for clear site identification, monitoring, and documentation.
- Ensure timely replacement of dead seedlings and adhere to proper fertilizer application methods to improve plantation outcomes.
- Maintain regular circular weeding, particularly along plantation boundaries, and extend weeding and inter-ploughing operations for an additional two years to minimize competition and promote healthy growth.
- Continue effective fire line management, ensuring regular clearance and visibility to reduce fire risks.
- Remove coppice growth completely and manage cut material properly to prevent regrowth.
- Maintain accurate plantation records and ensure periodic updating for effective monitoring.

5 Ha CA in Pathagunta beat

5 Ha CA in B Samudram beat

25 Ha CA in Rayalacheruvu beat

5.05 Ha in Marella beat

20 Ha NTSHS in Nendragunta beat

10 Ha Red Sanders in Nagalapuram beat

30 Ha RS in Kadur beat

20 Ha RS in Gajupoyyalu of Kasaram beat

3. Monitoring and Evaluation of Protection Activities

During 2017-18 a total of 21 Protection activities were implemented in Chittoor east division, with 5 sampled (≈24%). In detail, Piler range 2 implemented, 1 sampled; Tirupati range 5 implemented, 1 sampled; Puttur range 4 implemented, 1 sampled; Sathyavedu range 4 implemented, 1 sampled; Srikalahasti range 4 implemented, 1 sampled, Chittoor East and Karvetinagar range had 1 implemented, none sampled during 2017-18.

3.1 Formation of the new fire lines in Talapula beat, Piler section of Piler range

GPS location: N 13.738116 E 78.968123 **SO no. and year:** RSO 20 (2017-18)

3.2 Creation of new fire lines in Kasipenta beat, Panapakam section of Tirupati range

GPS location: N 13.529502 E 79.2331 **SO no. and year:** RSO 12 (2017-18)

The newly created fire lines in Talapula beat, Piler section of Piler range, and Kasipenta beat, Panapakam section of Tirupati range were monitored and evaluated against the specifications recorded in the measurement book and actual field conditions. At both locations, the fire lines were constructed with a uniform width of 6 meters, while the lengths varied 2,000 meters in Talapula beat and 1,000 meters in Kasipenta beat. In Talapula beat, the fire line was created and maintained across the natural forest, aligned with the inspection path, and remained clearly visible with no dense grass or weed growth, reflecting good maintenance. In contrast, in Kasipenta beat, the fire line's visibility was compromised due to dense weed and grass growth, indicating poor maintenance and lack of clear demarcation.

Fire lines in Diguvaputtur beat

Fire lines in Kasipenta beat

3.3 Creation of new fire lines in Vagathur beat of Puttur range

GPS location: N 13.488422 E 79.749633 **SO no. and year:** RSO 26 (2017-18)

3.4 Creation of new fire lines in Rajugunta RF of Ambakam beat of Sathyavedu range

GPS location: N 13.392484 E 79.923228 **SO no. and year:** RSO 26 (2017-18)

New fire lines in Vagathur beat of Puttur range and Ambakam beat of Sathyavedu range were monitored and evaluated against the specifications recorded in the measurement book and actual field conditions. At both locations, the fire lines were constructed with a uniform width of 6 meters, while the lengths varied—2,000 meters in Vagathur beat and 2,500 meters in Ambakam beat. In Vagathur beat, the fire line was visible, though moderate grass and weed growth was observed, indicating that the line was maintained but required additional clearing. In Ambakam beat, the fire line was clearly visible along the inspection path with no dense grass or weed growth, reflecting good maintenance throughout the natural forest area.

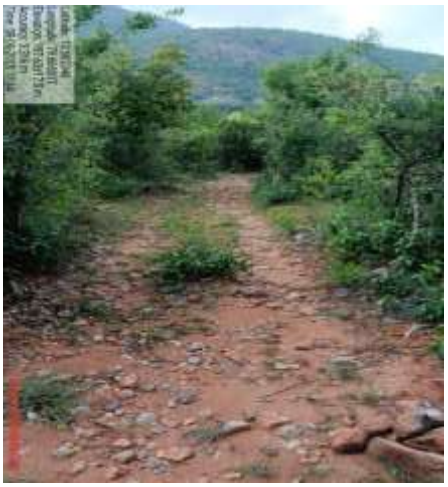
Fire lines in Vagathur beat

Fire lines in Ambakam beat

3.5 Formation of the new fire lines in natural forest at Anjur beat of Sri Kalahasti range

GPS location: N 13.582046 E 79.668017 **SO no. and year:** RSO 36 (2017-18)

A fire line created and maintained across the natural forest of Anjur beat in Sri Kalahasti range was monitored and evaluated against the specifications recorded in the measurement book and actual field conditions. The fire line measured 6 meters in width and 2,000 running meters in length, with no deviations observed. The fire line was clearly visible along the inspection path, though moderate weed growth was noted, indicating that it has been maintained across the natural forest area. However, regular maintenance is required to ensure continued effectiveness.



Creation of fire lines in Anjur beat

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

Only one activity was implemented and fully sampled in Sathyavedu during 2017-18.

4.1 Digging of continuous contour trenches/ stragered trenches in Kambakam RF of Kambakam beat and section of Sathyvedu range

GPS location: N 13.602431 E 79.899054 **SO no. and year:** DSO 234 (2017-18)

A total of 347 Continuous Contour Trenches (CCTs) excavated in Kambakam RF of Kambakam beat and section of Sathyvedu range 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: 867.5 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.

CCTs Kambakam beat of Sathyvedu range

5. Monitoring and Evaluation of Construction Activities

During 2017-18 ten activities were implemented, with 3 sampled (30 %). Specifically, Karvetinagar implemented 2, 1 sampled; Piler implemented 5, 1 sampled; Sathyavedu implemented 3, 1 sampled; other ranges did not implement Construction activities.

5.1 Construction of RCC boundary pillars in Kadur & Pandur beat of Sathyavedu range

GPS Location: N 13.560374 E 79.996600 **SO no. and year:** DSO 311 (2017-18)

5.2 Construction of RCC boundary pillars in Karvetinagar section and range

GPS Location: N 13.671987 E 79.841113 **SO no. and year:** DSO 186 (2017-18)

A total of 55 RCC boundary pillars were monitored and evaluated in Sathyavedu and Karvetinagar ranges.

Sathyavedu Range (Kadur & Pandur beats, Kambakam section): 15 pillars were constructed with dimensions of 1.20 m height, 0.50 m top width, and 1.20 m bottom width. Field measurements were consistent with records, though the bottom width was slightly higher. The pillars were intact and in good condition, with minor plastering wear observed.

Karvetinagar Range (Rayalacheruvu, RKM Puram, Bathikandriga beats): 40 pillars were constructed with dimensions of 1.20 m height, 0.45 m top width, and 0.50 m bottom width. Field measurements matched the specifications without deviations. All pillars were in good condition and effectively served their purpose of boundary demarcation.

The boundary pillars were structurally sound and well-maintained, providing clear demarcation of reserve forests from adjoining revenue lands, with only minor maintenance needs noted.

RCC pillars in Kadur & Pandur beat

RCC pillars in Karvetinagar section

5.3 Construction of RCC boundary pillars in Talapula beat, Piler section and range

GPS Location: N 13.740707 E 78.979611 **SO no. and year:** DSO 189 (2017-18)

Constructed 48 boundary pillars in Talapula beat of Piler section and range were 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 were: height – 1.22 m, top width – 0.33 m, and bottom width – 0.45 m. The field measurements were consistent with the records in the measurement book, with no major deviations observed. Boundary pillars are intact and covering the boundary, demarcating the boundary of reserve forest and revenue land in Talapula beat and were in good condition.

RCC boundary pillars in Talapula beat

6. Monitoring and Evaluation of Other activities

The "Others" category formed the largest set of CAMPA activities in Chittoor East Division during 2017–18, with 85 works implemented across the seven ranges. Of these, 19 activities about 22 percent were selected for verification. Range-wise, Chittoor East range recorded 5 activities with 1 sampled, Karvetinagar implemented 6 with 1 sampled, Piler had 10 with 3 sampled, Tirupati recorded 20 with 4 sampled, Puttur carried out 11 with 3 sampled, Sathyavedu undertook 18 with 2 sampled, and Srikalahasti implemented 15 activities with 5 sampled.

Document verification and cross-checking were conducted in the presence of Division and Range staff. The verification process focused on sanction orders, estimation sheets, and work registers. In most cases, sanctioned amounts were found to be consistent with actual expenditures, and financial records were duly maintained and authenticated by the Divisional Forest Officer (DFO), Sub-Divisional Officer (SDO), and Forest Range Officer (FRO). Utilization of funds was in line with sanctioned estimates and CAMPA guidelines. Both internal audits conducted by the Conservator of Forests and external audits by the Accountant General's

office confirmed adherence to financial and administrative protocols, ensuring transparency and accountability.

However, gaps were noted in record availability in some ranges. In Karvetinagar, estimates and work registers relating to RSO 25 (2017–18) were not presented for verification. In Puttur, estimates corresponding to DSO 75, DSO 101, and RSO 1 (2017–18) were missing. Tirupati range had multiple lapses, as estimates for DSO 55, DSO 15, and DSO 13 (2017–18) were not available, and the work register for DSO 16 (2017–18) was also not produced. These omissions limited the scope of verification in the affected ranges, though most other records were complete and consistent. From a range-wise perspective, Tirupati recorded the highest number of activities (20) but also exhibited the largest gaps in documentation, underscoring the need for stronger record-keeping. Sathyavedu and Srikalahasti ranges contributed significantly to the total, and their sampled works showed proper documentation and compliance. Smaller ranges such as Chittoor East, Karvetinagar, and Piler implemented fewer activities but maintained relatively better alignment between sanctioned and actual expenditures, aside from the missing records noted.

Key Findings

1. Plantation outcomes were polarized: Rayalacheruvu collapsed almost entirely, while Thimmasamudram achieved exemplary survival and growth of *Pterocarpus santalinus*.
2. Maintenance works were widespread but inconsistently executed, with gaps in weed control, fertilizer application, and record-keeping.
3. Fire line creation was adequate in coverage but weak in upkeep, with several lines obscured by weeds.
4. Soil and Moisture Conservation was negligible, with only one trenching work carried out in the entire division.
5. Financial records were strong, but technical documentation and GIS verification revealed persistent mismatches in plantation area.
6. Community participation was entirely absent, undermining the long-term sustainability of plantations.

Recommendations

1. Concentrate future plantations on proven ecological sites, particularly for *P. santalinus*, and avoid rocky or heavily grazed terrain.
2. Expand SMC interventions such as contour trenches, percolation tanks, and check dams to reduce erosion and enhance moisture retention.
3. Extend maintenance cycles by at least two years, with greater emphasis on systematic weed removal, uniform fertilizer application, and upkeep of plantation journals and boards.
4. Institutionalize seasonal clearance of fire lines before the onset of summer.
5. Mandate GPS/GIS-based verification to reconcile discrepancies between records and actual plantation areas.
6. Require active VSS participation in all plantations, linking incentives to measurable survival and protection outcomes.
7. Rebalance the CAMPA portfolio by reducing reliance on “Others” and increasing the share of ecological interventions.

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 Forest Division.

A total of 209 afforestation-related activities were implemented in Chittoor West during 2017–18, out of which 48 activities were sampled, representing approximately 22.9 % of the total activities. In Chittoor west range, a total of 52 activities were implemented in 2017–18, of which 9 were sampled. Among this, Plantation: 11 activities implemented, 2 sampled, Maintenance: 9 activities implemented, 2 sampled, Protection: 1 activity implemented, none sampled, SMC: No activities, Construction: No activities, others: 31 activities implemented, 5 sampled. In Palamaner range, 44 activities were implemented, with 14 sampled, which is the highest sampling rate among all ranges. Details include Plantation: 2 activities implemented, 1 sampled, Maintenance: 13 activities implemented, 3 sampled, Protection: 1 activity implemented, 1 sampled, SMC: No activities, Construction: 2 activities implemented, 1 sampled, others: 26 activities implemented, 8 sampled. Kuppam range had the highest number of actual activities (51), 10 were sampled. Among them, Plantation: No activities, Maintenance: 17 activities implemented, 3 sampled, Protection: No activities, SMC: No activities, Construction: No activities, others: 34 activities implemented, 7 sampled. In Punganur range, 19 activities were implemented, with 3 sampled. Details are, Plantation: 3 activities implemented, none sampled, Maintenance: 7 activities implemented, 1 sampled, Protection: No activities, SMC: No activities, Construction: No activities, others: 9 activities implemented, 2 sampled. Madanapalle range implemented 43 activities, with 12 sampled. Among them, Plantation: 3 activities implemented, 1 sampled, Maintenance: 18 activities implemented, 5 sampled, Protection: 1 activity implemented, 1 sampled, SMC: 1 activity implemented, 1 sampled, Construction: No activities, others: 20 activities implemented, 5 sampled.

1. Monitoring and Evaluation of Plantation Activities

A total of 19 plantation activities were implemented across the division, of which 4 were sampled during 2017-18. Chittoor west: 11 activities implemented (2 sampled), Palamaner: 2 activities implemented (1 sampled), Kuppam: No plantation activities, Punganur: 3 activities implemented (none sampled), Madanapalle: 3 activities implemented (1 sampled).

1.1 Chittoor west range

A total of eleven plantation activities were carried out under the CAMPA scheme in the Chittoor west range. As part of the monitoring and evaluation process, 20 % of these activities equivalent to two plantation sites were selected for detailed assessment.

Table 11 Details of plantations selected in Chittoor West range

Sl. no.	Plantations	SO no. and year
1	Raising of 6.20 Ha (2017) ACA road side plot in Keenatampalli RF & beat, for M/s Gulshan Granites	DSO 111 (2017-18)
2	Advance cum raising of 1.51 Ha (2017) CA area plantation adjacent to Vavilthota reserve forest, Santhapeta beat, M/s Kaligiri Konda Sri Venkateswara swamy temple	DSO 155 (2017-18)

The selected site for the 6.20-hectare plantation at Keenatampalli is characterized by red soil, known for its moderate fertility and good drainage. The site is well-suited for the selected species, supporting healthy establishment and growth.

Survival percentage: At Keenatampalli plantation of Chittoor West range, *Hardwickia binata* and *Pterocarpus santalinus* exhibited good adaptability, with survival rates of 88.97 % and 84.29 % respectively, indicating favorable species-site compatibility. At the Santhapeta plantation of Chittoor West range, *Pterocarpus santalinus* showed a survival rate of 85.54 %, indicating effective establishment and compatibility with the site's red soil conditions.

Growth: At Keenatampalli plantation of Chittoor West range, average tree height ranged from 4.03 to 5.15 meters, and girth between 25.28 and 31.46 cm, influenced by similar environmental variations. At Santhapeta plantation of Chittoor West range, tree height ranged from 2.62 to 3.58 meters, and girth from 17.96 to 21.66 cm, with growth variation due to differences in soil and site-specific conditions.

Table 12 Details of plantations enumerated in Chittoor west range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Keenatampalli	1	*Hardwickia binata*	N 13.1137 E 79.047983	95.86	4.34 ±0.66	-	26.26 ±4.80
		2	*Pterocarpus santalinus*	N 13.13681 E 79.047927	92.56	5.15 ±0.80	-	31.46 ±8.60
		3	*Pterocarpus santalinus*	N 13.113738 E 79.047889	76.03	4.90 ±1.63	-	31.12 ±9.21
		4	*Hardwickia binata*	N 13.113729 E 79.048153	81.81	4.08 ±1.27	26.59 ±5.88	-

		5	*Hardwickia binata*	N 13.11373 E 79.048125	89.25	4.03 ±1.01	25.28 ±6.89	-
Plantation average					**87.10**	**4.50**	**25.94**	**29.61**
2	Santhapeta	1	*Pterocarpus santalinus*	N 13.335417 E 79.084267	82.81	3.58 ±1.59	-	21.66 ±4.50
		2	*Pterocarpus santalinus*	N 13.335417 E 79.084050	95.31	3.13 ±1.38	18.67 ±3.72	-
		3	*Pterocarpus santalinus*	N 13.335383 E 79.083867	82.81	2.62 ±1.11	17.96 ±4.11	-
		4	*Pterocarpus santalinus*	N 13.335267 E 79.083983	81.25	3.45 ±1.29	21.02 ±4.57	-
		5	*Pterocarpus santalinus*	N 13.335245 E 79.083967	85.34	3.19 ± 1.05	19.22 ± 4.25	-
Plantation average					**85.50**	**3.20**	**19.22**	**21.66**

1.2 Palamaner range

A total of two plantation activities were undertaken under the CAMPA scheme in the Palamaner Range. As part of the monitoring and evaluation process, 50 % of the activities equivalent to one plantation activity was selected for assessment.

Table 13 Details of plantation selected in Palamaner range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSH (SMM) plantation in Allapalle RF, compartment no. 244 of Thotakanuma beat	DSO 91 (2017-18)

The Thotakanuma 20 Ha plantation site also features sandy loamy soil, offering optimal conditions for plant establishment. The site is highly suitable for the chosen species, ensuring high potential for healthy growth and survival.

Survival Percentage: In the Thotakanuma plantation of Palamaner range, the following survival rates were recorded: *Phyllanthus emblica* – 81.63 %, *Terminalia arjuna* – 87.75 %, *Azadirachta indica* – 79.68 %, *Pterocarpus marsupium* – 67.34 %, *Pterocarpus santalinus* – 73.51 %. The site proved especially favorable for *Terminalia arjuna*, while *Pterocarpus marsupium* exhibited relatively lower survival, suggesting moderate suitability.

Growth: At Thotakanuma plantation of Palamaner range, tree heights ranged from 2.42 to 5.33 meters, and girths from 22.09 to 28.98 cm, indicating healthy and consistent growth across the plantation.

Table 14 Details of plantations enumerated in Palamaner range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Thotakanuma	1	*Phyllanthus emblica*	N 13.130500 E 78.579567	81.63	5.33± 0.79	24.90± 4.27	-
		2	*Terminalia arjuna*	N 13.130883 E 78.579117	87.75	4.94± 0.31	22.88± 2.83	-
		3	*Azadirachta indica*	N 13.130933 E 78.582900	79.68	4.88± 0.45	-	28.98 ±5.94

		4	*Pterocarpus marsupium*	N 13.129817 E 78.578367	67.34	2.42± 0.61	22.09± 3.21	-
		5	*Pterocarpus santalinus*	N 13.131833 E 78.581800	79.68	4.37± 1.57		26.47 ±6.16
Plantation average					**79.22**	**4.39**	**23.29**	**27.73**

1.3 Madanapalle range

This report presents the findings from the monitoring and evaluation of activities implemented under the CAMPA in the Madanapalle Forest Range during 2017–18.

Table 15 Details of plantation selected in Madanapalle range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSH (LIM) plantation in compartment no. 19 Horsley hills extension RF of Thettu beat of Horsley hills section in Madanapalle	DSO 81 (2017-18)

Thettu plantation is well-suited for *Terminalia arjuna* and *Hardwickia binata*, as these species show good survival and moderate growth on the site. However, *Pterocarpus santalinus* exhibits moderate survival and a slower growth rate, suggesting that the environmental conditions are not as favorable for this species compared to the others.

Survival percentage: In Madanapalle range, Thettu plantation shows good suitability for *Terminalia arjuna* and *Hardwickia binata*, with survival rates of 86.78 % and 90.62 %, respectively. However, Pterocarpus santalinus shows moderate growth and a lower survival rate of 57.81 %, indicating that the conditions are less favorable for this species compared to the others.

Growth: In Thettu plantation of Madanapalle range, the average tree height ranges from 1.85 to 3.61 m, and the average girth ranges from 16.37 to 29.59 cm. The variation in tree growth in the Thettu plantation is likely due to differences in soil quality, sunlight, water availability, species genetics, planting practices, and competition among trees.

Table 16 Details of plantation enumerated in Madanapalle range

Sl. no.	Plantation /Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Thettu	1	*Terminalia arjuna*	N 13.584408 E 78.411917	89.06	3.45 ±0.32	28.68 ±1.90	-
		2	*Terminalia arjuna*	N 13.584023 E 78.412028	87.50	3.61 ±0.39	-	29.59 ±2.25
		3	*Pterocarpus santalinus*	N 13.58364 E 78.412966	57.81	3.30 ±0.26	20.41 ±1.57	-
		4	*Hardwickia binata*	N 13.583104 E 78.414201	89.06	1.85 ±0.31	16.37 ±2.13	-
		5	*Hardwickia binata*	N 13.582596 E 78.414111	92.18	2.10 ±0.37	17.83 ±2.65	-
Plantation average					**83.12**	**2.86**	**20.82**	**29.59**

Comparative assessment of plantations in Chittoor west division during 2017-18

At Keenatampalli plantation (Chittoor West range), *Hardwickia binata* (88.97 %) and *Pterocarpus santalinus* (84.29 %) recorded high survival, confirming strong site adaptability. At Santhapeta plantation (Chittoor West range), *Pterocarpus santalinus* showed good establishment with a survival rate of 85.54 %. At Thotakanuma plantation (Palamaner range), *Terminalia arjuna* achieved the highest survival (87.75 %), followed by *Phyllanthus emblica* (81.63 %) and *Azadirachta indica* (79.68 %), while *Pterocarpus santalinus* (73.51 %) and *Pterocarpus marsupium* (67.34 %) exhibited lower survival, reflecting moderate suitability. At Thettu plantation (Madanapalle range), *Hardwickia binata* (90.62 %) and *Terminalia arjuna* (86.78 %) demonstrated strong site compatibility, whereas *Pterocarpus santalinus* showed poor establishment with the lowest survival of 57.81 %.

At Keenatampalli plantation (Chittoor West range), trees attained heights of 4.03–5.15 m and girths of 25.28–31.46 cm, reflecting robust growth under favorable site conditions. In contrast, at Santhapeta plantation (Chittoor West range), *Pterocarpus santalinus* exhibited comparatively modest growth, with tree heights of 2.62–3.58 m and girths of 17.96–21.66 cm, influenced by soil and site-specific factors.

At Thotakanuma plantation (Palamaner range), growth was consistent across species, with heights ranging from 2.42–5.33 m and girths between 22.09–28.98 cm, suggesting healthy establishment overall. Meanwhile, at Thettu plantation (Madanapalle range), tree growth showed wider variation, with heights of 1.85–3.61 m and girths of 16.37–29.59 cm, indicating that differences in soil quality, water availability, species traits, and management practices played a role in growth variation.

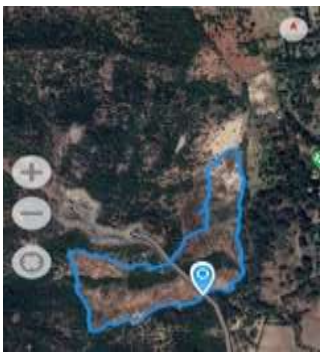
Verification of plantation area and boundaries: Plantation boundaries and extents were verified using KML files specific to each location. These geospatial references were processed using GIS tools to generate accurate maps and compute the actual area covered under each plantation.

Table 17 Details of plantation area perambulation in Chittoor west division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 6.20 Ha (2017) ACA road side plot in Keenatampalle RF & beat	6.20 Ha	6.92 Ha
2	Advance cum raising of 1.51 Ha (2017) CA area plantation adjacent to Vavilthota reserve forest, Santhapeta beat	1.51 Ha	2.04 Ha
3	Raising of 20 Ha NTSH (SMM) plantation in Allapalle RF, compartment no. 244 of Thotakanuma beat	20 Ha	22.27 Ha
4	Raising of 20 Ha. NTSH (LIM) plantation in compartment. no. 19 extension RF of Thettu beat of Horsley hills section	20 Ha	21.04 Ha

Perambulation of plantation areas revealed that the physically verified extents were consistently larger than the officially recorded areas. At Thotakanuma, the perambulated area exceeded the records by 2.27 hectares, while at Keenatampalle and Santhapeta, the excess areas were 0.72 hectares and 0.53 hectares, respectively. Similarly, at Thettu, the perambulated area was found

to be 1.04 hectares larger than the official record. These discrepancies arose primarily due to natural obstructions such as dense jungle growth and protective trenches that made it difficult to follow the exact plantation boundaries, resulting in the perambulation being carried out along the outer perimeters. The verification process was undertaken using the Geo Tracker mobile application, supported by the local forest beat officers, and spatial analysis with QGIS software confirmed the discrepancies. Photographic evidence and GIS mapping outputs were generated to document the findings.



Keenatampalli 6.92 Ha

Santhapeta 2.04Ha

Thotakanuma 22.27 Ha

Thettu 21.04 Ha

Health Status of Plantations: At some sites such as Thotakanuma, visible insect and pest damage to leaves and stems was observed, indicating ongoing infestations that may reduce overall health, growth, and survival rates if not addressed. In other plantations, including, Thettu, Keenatampalle, and Santhapeta, no incidences of pest or insect damage were recorded, and the plantations appeared healthy.

Protection Measures: Fire prevention measures including creation and regular maintenance of fire lines, establishment of inspection paths, and deployment of fire watchers were effectively implemented across sites. These efforts contributed to a noticeable reduction in fire incidents.

Biotic (Human/Cattle) Pressure: Grazing and browsing pressure was reported in several plantations, including Thotakanuma, Ramiganipalle, Thettu, M.V. Giri, and Santhapeta. To mitigate this, peripheral trenches were constructed and plantation watchers were engaged, which significantly reduced cattle intrusion in some areas. Despite these measures, biotic pressure remains a concern and requires continued monitoring.

Maintenance of Records and Signage: Plantation journals were generally well maintained, but periodic updates of plantation parameters were recommended to ensure accuracy and relevance. Plantation boards and signage were present in most plantations, marking boundaries

clearly, though upkeep is necessary in some locations. Plantations are inspected by the concerned forest officials, and their observations are duly recorded.

Vana Samrakshana Samithi (VSS): Vana Samrakshana Samithi (VSS) involvement was inconsistent across sites. At Thotakanuma VSS participation was noted, and Focus Group Discussions (FGDs) were conducted. At other sites, including Keenatampalle, Santhapeta, and Thettu, VSS participation was absent, and FGDs could not be organized.

Thettu Plantation

Keenatampalli Plantation

Santhapeta Plantation

Thotakanuma Plantation

2 Monitoring and Evaluation of Maintenance Activities

Maintenance was the most frequently implemented activity, with 64 instances, and 14 were sampled during 2017-18. Chittoor west: 9 activities implemented (2 sampled), Palamaner: 13 activities implemented (3 sampled), Kuppam: 17 activities implemented (3 sampled), Punganur: 7 activities implemented (1 sampled), Madanapalle: 18 activities implemented (5 sampled).

Table 18 Maintenance activities selected for evaluation in Chittoor west division

Sl. No.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Chittoor west range			
1	Fourth year maintenance of 2.10 Ha safety zone plot in Kammapalli beat for M/s Divya granites	N 13.077149 E 78.913345	RSO 14 (2017-18)
2	Fifth year maintenance of 1.65 Ha (2013) safety zone plot in Chittapara RF & beat M/s Shiva granites	N 13.064975 E 79.090582	RSO 13 (2017-18)
Palamner range			
3	First year maintenance of 20 Ha NTSH (SMM) plantation in Basivireddipalle RF, of Kolamasinapalle beat	N 13.133874 E 78.631407	DSO 61 (2017-18)

4	First year maintenance of 20 Ha NTSH (SMM) plantation in Pathikonda RF, compartment no. 272 of Pathikonda beat	N 13.17574 E 78.682467	DSO 63 (2017-18)
5	Second year maintenance of 20 Ha NTSH plantation (LIM) in Allapalle RF, compartment no. 243 of Thotakanuma beat	N 13.13911 E 78.629094	DSO 59 (2017-18)
Kuppam range			
6	First year maintenance of 10 Ha plantation (LIM) in Kangundhi beat of Kuppam range	N 12.771119 E 78.452923	DSO 84 (2017-18)
7	Second year maintenance of 10 Ha plantation (SMM) in Nadimur beat of Kuppam range	N 12.64014 E 78.36400	DSO 152 (2017-18)
8	Second year maintenance of 5 Ha plantation (LIM) in Kangundhi beat of Kuppam range	N 12.79179 E 78.44933	RSO 1 (2017-18)
Punganur range			
9	First year maintenance of 10 Ha NTSH plot at Muthukur beat	N 13.2552139 E 78.62128	DSO 69 (2017-18)
Madanapalle range			
10	Second year maintenance of 10 Ha NTSH (LIM) plantation in Kukkarajupalle RF, compartment no. 34 of Ramiganipalle beat of Thamballapalle section	N 13.721787 E 78.558998	DSO 74 (2017-18)
11	First year maintenance of 10 Ha NTSH plantation (LIM) in Gundluru RF, compartment no. 54 of Marripadu beat of Valmikipuram section	N 13.751659 E 78.761109	DSO 80 (2017-18)
12	First year maintenance of 6 Ha NTSH (SMM) plantation in T. Sadukonda RF, compartment no. 60 of Sangasamudram beat of Gurramkonda section	N 13.783421 E 78.517828	SDSO 07 (2017-18)
13	First year maintenance of 10 Ha NTSH (SMM) plantation in Bathalapuram RF, compartment no. 8 of Vepurikota beat in Madanapalle range	N 13.731518 E 78.293385	DSO 79 (2017-18)
14	First year Maintenanceof 7 Ha C.A. plantation (m/s gulshan granites) in Neredikonda beat	N 13.900549 E 78.368739	DSO 132 (2017-18)

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 of the plantation are as follows;

General recommendations for maintenance activities

- Extend circular weeding operations for at least two more years to effectively control persistent weed and *Lantana* growth, reduce competition, and improve overall plant health.
- Continue pruning activities for the next two years, with regular removal of coppice shoots to promote healthy, upright, and straight bole development.
- Strengthen fire line maintenance by routinely clearing overgrown vegetation to restore visibility, ensure effective firebreaks, and enhance plantation protection.
- Install, repair, or replace plantation boards and boundary stones to ensure proper site identification, clear demarcation, and improved monitoring visibility.
- Implement targeted interventions for NTSH species, including improved soil care, irrigation (where feasible), and consistent maintenance, to strengthen recovery and growth.
- Ensure effective monitoring and supervision by regularly updating plantation records and maintaining clear signage for accountability and transparency.

Kammapalli beat, Chittoor West range

Chittapara beat, Chittoor West range

Muthukur beat, Punganur range

Kolamasanapalle beat, Palamaner range

Marripadu beat, Madanapalle range

Sangasamudram beat, Madanapalle range

3 Monitoring and Evaluation of Protection Activities

There were 3 protection activities recorded in total, and 1 were sampled during 2017-18. Chittoor west: 1 activity implemented (none sampled), Palamaner: 1 activity implemented (1 sampled), No protection activities recorded in Kuppam, Madanapalle and Punganur range during 2017-18.

1. Erection of new solar fence line in Kaluvapalle beat in Palamaner range

GPS location: N 13.150487 E 78.776341 **SO no. and year:** DSO 166 (2017-18)

The new solar fence line in Kaluvapalle beat of Palamaner range was monitored and evaluated against the specifications recorded in the measurement book and the actual field conditions. As per the measurement book, the fence was constructed with a width of 2 m and a length of 500 m. However, field measurement could not be carried out as the entire fence was washed away due to increased water discharge from the dam during the monsoon season.

Solar fence line in Kaluvapalle beat of Palamaner range

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

Only 1 SMC activity was implemented, in Madanapalle, and same was sampled. No SMC activities were recorded in Chittoor, Palamaner, Kuppam and Punganur ranges during 2017-18.

4.1 Formation of earthen bunds in 20 Ha NTSH (SMM) Plantation, compartment no. 48, Guttapalem RF of Kalikiri beat of Valmikipuram section, Madanapalle range

GPS location: N 13.612343 E 78.742044 **SO no. and year:** SDSO 12 (2017-18)

Earthen bunds in 20 Ha NTSH (SMM) Plantation, compartment no. 48, Guttapalem RF of Kalikiri beat of Valmikipuram section, Madanapalle range was monitored and evaluated against the specifications recorded in the measurement book and the actual field conditions. Earthen bund dimensions as per measurement book are; length: 6 m, width: 1.5 m, depth: 0.2 m and volume: 1575 cum. 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. Volume has been reduced because of siltation however, the bunds are well-maintained and have a good water-holding capacity. These structures are designed to retain water, prevent flooding, aid in the collection of surface runoff, increase water infiltration, and prevent soil erosion.

Earthen bunds in 20 Ha NTSH (SMM) plantation, Guttapalem RF of Madanapalle range

5 Monitoring and Evaluation of Construction Activities

There were 2 construction activities implemented in total, but only 1 was sampled. Palamaner: 2 activities implemented (1 sampled) and No construction activities recorded in Punganur, Kuppam, Madanapalle and Chittoor west range during 2017-18.

5.1 Construction of Seeds & Store Room at Field Nursery in Range Office compound at Palamaner Range

GPS location: N 13.2014644, E 78.7469408 **SO no. and year:** DSO 311 (2017-18)

Construction of Seeds & Store Room at Field Nursery in Range Office compound at Palamaner Range was monitored and evaluated against the specifications recorded in the measurement book and the actual field conditions. Dimensions as per measurement book are; length: 9.30 m, width: 8.45 m, height: 4.5 m. 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. Building is in good condition and presently the room is used as range forest office.

Seeds & Store Room at Field Nursery in Range Office compound at Palamaner Range

6 Monitoring and Evaluation of Other activities

The "Others" category accounted for the highest number of activities in the Chittoor West Division during 2017–18, with a total of 120 works implemented across the ranges. Out of these, 27 activities were selected and sampled for verification. Distribution of implementation showed that 31 activities were undertaken in Chittoor West range (5 sampled), 26 in Palamaner range (8 sampled), 34 in Kuppam range (7 sampled), 9 in Punganur range (2 sampled), and 20 in Madanapalle range (5 sampled).

Verification of these activities was carried out in the presence of Division and Range office staff, ensuring transparency in the process. The evaluation relied on the review of key documents, including sanction orders, estimation sheets, and work registers. In all cases, the sanctioned amounts were found to be in alignment with the actual expenditures incurred. 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 appropriate and consistent with approved estimates and CAMPA guidelines. Furthermore, both internal audit, conducted by the Conservator of Forests, and external audit, conducted by the Accountant General's office, confirmed adherence to financial and administrative protocols. This approach ensured

transparency, accountability, and compliance in the execution of "Other Activities" under the CAMPA scheme, thereby reinforcing the integrity of implementation and the effective use of resources in Chittoor west division.

Key Findings

- Hardy species like *Hardwickia binata* and *Terminalia arjuna* consistently achieved high survival, while *Pterocarpus santalinus* performed unevenly across sites.
- Maintenance works were numerous and mostly effective but required better fire line clearance, signage, and more uniform fertilizer application.
- Protection activities were minimal and, in the case of solar fencing, ineffective due to damage, leaving plantations vulnerable to biotic pressure.
- SMC efforts were negligible, with only one work carried out, despite the division's vulnerability to erosion and moisture stress.
- Financial records were robust, but area mismatches persisted, underscoring the need for rigorous GIS-based verification.

Recommendations

- Scale up plantations of hardy species like *H. binata* and *T. arjuna*, while restricting *P. santalinus* to proven sites.
- Extend maintenance cycles for at least two years, ensuring uniform fertilizer use, effective weed control, and regular pruning.
- Institutionalize seasonal clearance of fire lines and strengthen protection infrastructure, including repairing or rebuilding solar fences.
- Expand SMC interventions such as trenches, bunds, and percolation tanks to meet the ecological needs of semi-arid and erosion-prone areas.
- Adopt GIS-based verification as a standard procedure for plantation area demarcation and record reconciliation.
- Ensure consistent VSS involvement across all plantations, with FGDs mandated and incentives tied to measurable outcomes.

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 across vulnerable areas.

In Rajampet division, a total of 74 CAMPA activities were carried out, of which 18 activities (around 25 %) were selected for detailed monitoring and evaluation. In Rajampet range, 41 activities were implemented, and 9 were sampled. In Kodur range, 7 activities were implemented, and 3were sampled. In Chitvel range, 15 activities were implemented, with 3 sampled. In Sanipaya range, 11 activities were implemented, and 3 were sampled. Among activity types, maintenance dominated with 30 activities (6 sampled), followed by others (27; 4 sampled), soil and moisture conservation (11; 4 sampled), plantation (4; 2 sampled), construction (2; 2 sampled) none of the activity reported in protection.

1. Monitoring and Evaluation of Plantation Activities

In Rajampet division, a total of 4 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 Sanipaya with 1 (1 sampled).

1.1 Rajampet range

During 2017–18, a total of one plantation activity was carried out under the CAMPA scheme in the Rajampet Range. As part of the monitoring and evaluation process, 100 % of the activities equivalent to one plantation site was selected randomly for assessment.

Table 19 Details of plantation selected in Rajampet range

Sl. no.	Plantation	SO no. and year
1	Advance Cum Raising of 28 Ha. (Effected 8.5 Ha.) NTSHW plantation in S.R.Palem beat.	DSO 103 B (2017-18)

The plantation sites at S.R. Palem are predominantly characterized by red, hard, and gravelly soils. These conditions pose challenges in terms of root penetration and moisture retention, indicating low soil fertility and poor water-holding capacity. To ensure successful plant establishment and growth under these constraints, specific soil management practices such as deep ploughing and mulching are recommended.

Survival Percentage: At the S.R. Palem site, the following survival rates were recorded: *Hardwickia binata* – 91.45%, *Terminalia arjuna* – 96.92%, *Azadirachta indica* – 93.94%, *Holoptelea integrifolia* – 96.87%. These figures indicate a high degree of species-site compatibility and effective plantation maintenance.

Growth Performance: In S.R. Palem, average height ranged from 5.38 to 5.69 meters, and girth ranged from 29.92 to 38.61 cm. These values reflect healthy physiological development across both sites.

Table 20 Details of plantation enumerated in Rajampet range

Sl. no.	Planation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	S.R Palem 28 Ha NTSH plantation	1	*Hardwickia binata*	N 14.127603 E 79.084239	89.28	5.48 ±0.47	34.92 ±8.20
			Terminalia arjuna		96.92	5.38 ±0.48	33.86 ±6.63
		2	*Azadirachta indica*	N 14.127067 E 79.084385	94.73	5.61 ±0.64	38.61 ±9.24
			Holoptelea integrifolia		96.87	5.52 ±0.60	37.42 ±8.49
		3	*Hardwickia binata*	N 14.126551 E 79.084589	86.44	5.69 ±0.67	33.12 ±8.55
			Azadirachta indica		95.16	5.69 ±0.63	35.97 ±8.62
		4	*Azadirachta indica*	N 14.126315 E 79.085248	96.49	5.61 ±0.62	33.13 ±7.50
			Hardwickia binata		93.75	5.55 ±0.69	32.65 ±8.51
		5	*Hardwickia binata*	N 14.126729 E 79.085531	96.36	5.49 ±0.74	29.92 ±7.63
			Azadirachta indica		89.39	5.38 ±0.73	31.58 ±8.69
Plantation average					**93.53**	**5.54**	**34.11**

1.2 Sanipaya range

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

Table 21 Details of plantation selected in sanipaya range

Sl. no.	Plantation	SO no. and year
1	Raising of 25 Ha Red Sanders plantation in Natural Forest in Sanipaya beat of Sanipaya section.	DSO 95 (2017-18)

The plantation sites at Shikaripalem (25 ha) are situated in a southern tropical dry deciduous forest zone. The soil is primarily red loamy sandy with sandstone formations, presenting moderate challenges for root penetration and moisture retention. The region receives annual rainfall ranging from 600 mm to 700 mm, indicating a semi-arid climate that necessitates drought-tolerant species.

Survival Percentage: The species planted showed moderate adaptability to site conditions:

Sikaripalem: *Hardwickia binata* – 58.18 %, *Pterocarpus santalinus* – 53.92 %. These survival rates suggest partial success in plantation establishment, with scope for improvement through soil enrichment and moisture conservation techniques.

Growth: In Sikaripalem plantation Average height: 0.78 to 1.05 meters and Average girth: 8.91 to 13.29 cm**.** These measurements reflect early-stage growth, with relatively slow development possibly influenced by climatic and edaphic factors.

Table 22 Details of plantation enumerated in Sanipaya range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Sanipaya 25 Ha RS plantation	1	*Hardwickia binata*	N 14.067719 E 78.905892	58.29	1.02 ±0.40	16.42 ±6.44
			Pterocarpus santalinus		52.30	0.93 ±0.37	13.94 ±4.49
		2	*Hardwickia binata*	N 14.067768 E 78.905748	50.87	0.88 ±0.39	12.93 ±4.70
			Pterocarpus santalinus		50.00	1.00 ±0.40	11.94 ±5.42
		3	*Hardwickia binata*	N 14.065897 E 78.906981	50.84	0.80 ±0.31	11.10 ±3.67
			Pterocarpus santalinus		54.83	0.88 ±0.37	10.62 ±3.38
		4	*Pterocarpus santalinus*	N 14.066088 E 78.90693	59.64	0.85 ±0.37	10.29 ±4.31
			Hardwickia binata		59.37	0.87 ±0.39	12.87 ±6.03
		5	*Hardwickia binata*	N 14.06621 E 78.906987	58.18	0.92 ±0.39	15.56 ±6.03

			Pterocarpus santalinus		54.54	0.99 ±0.39	13.53 ±6.03
Plantation average					**54.88**	**0.91**	**12.92**

Comparative assessment of plantations in Rajampet division during 2017-18

Survival performance: The plantations at S.R. Palem demonstrated excellent performance, with survival rates exceeding 90% across all species and robust growth reflected in average heights of 5.38–5.69 m and girths of 29.92–38.61 cm, indicating strong species-site compatibility and effective management. In contrast, Shikaripalem recorded moderate survival (53.92–58.18%) and slow growth (height 0.78–1.05 m; girth 8.91–13.29 cm), pointing to partial adaptability and highlighting the need for soil enrichment and moisture conservation interventions to improve establishment success.

Verification of plantation area and boundaries

In Rajampet division during 2017-18 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 23 Details of plantation area perambulation in Rajampet division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Advance Cum Raising of 28 Ha. (Effected 8.5 Ha.) NTSHW Plantation in in S.R. Palem Beat.	28 (8.5 effected)	10.81
2	Raising of 25 Ha. Red Sanders plantation in Natural Forest in Sanipaya Beat	25	59.74

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

- S R palem Plantation (Rajampet range) (28 Ha): 10.81 Ha (lesser by 20.19 Ha but 2.14 Ha exceeded than the affected area)
- Shikaripalem (Sanipaya range) (25 Ha): 59.74 Ha (exceeded by 34.74 Ha)

S.R Palem 10.81 Ha

Shikaripalem 59.74 Ha

Health Status of Plantations: Field observations revealed that the overall condition of the plantation was satisfactory; however, pest-related damage was observed in *Terminalia* species at Rajampet range, necessitating close monitoring and timely remedial measures.

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: Field observations recorded only a few instances of grazing and browsing, suggesting that the plantations are generally well-protected against biotic pressures. The limited occurrence of such disturbances indicates that protective measures have been largely effective, ensuring minimal impact on plant survival and growth. Nevertheless, continued vigilance is essential to prevent potential escalation of future biotic interference.

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 in both plantations. Each plantation is periodically inspected by the concerned forest official, and their observations are duly recorded.

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

S.R Palem, Rajampet range

Shikaripalem, Sanipaya range

2. Monitoring and Evaluation of Maintenance Activities

A total of thirty maintenance activities were carried out in Rajampet division during 2017-18, of which six activities were selected for monitoring. Sanipaya accounted for the maximum with 10 activities (2 sampled), Chitvel 9 (1 sampled), Rajampet 8 (2 sampled) and Kodur 3 (1).

Table 24 Maintenance activities selected for evaluation in Rajampet division

Sl no.	Maintenance Activities	GPS Co ordinates	SO no. and year
Rajampet range			
1	Maintenance of 50 Ha CA plantation tending and cultural operations, under Gollavagu project SR Palem beat	N 14.139575 E 79.089871	DSO 155 (2017-18)

2	Second year maintenance of 10 Ha red sanders plantation in CC kunta beat of T Bylu section	N 14.071847 E 79.130218	DSO 98 (2017-18)
Kodur range			
3	Second year maintenance of 20.0 Ha red sanders LIM plantation in M Bhavi beat, Gadela section	N 13.962853 E 79.226895	DSO 93 (2017-18)
Chitvel range			
4	First year maintenance of 10.0 Ha of red sanders plantation (SMM) in compartment no. 993 of Vippalakona locality of RV Palli beat	N 14.043835 E 79.377760	DSO 80 (2017-18)
Sanipaya range			
5	First year maintenance of 20 Ha NTSHW plantation in natural forest in compartment no. 811 of Sanipaya beat	N 14.066202 E 78.854545	DSO 101 (2017-18)
6	Second year maintenance of 20 Ha NTSHW plantation in natural forest in compartment no.814 of Sanipaya beat	N 14.080075 E 78.901391	DSO 105 (2017-18)

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.

CC Kunta beat, Rajampet range

M. Bhavi beat, Kodur range

RV Palli beat, Chitvel range

Sanipaya range

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

A total of eleven SMC activities were carried out during 2017-18, of which four were sampled. The Rajampet range reported 8 activity (2 sampled), chitvel with 2 activity (1 sampled) and kodur 1 activity (1 sampled).

3.1 Construction of check dam-2 at CA land in CC Kunta beat of T Bylu section

GPS Location: N 14.079581 E 79.130639 **SO no. and year:** DSO 194 (2017-18)

3.2 Construction of check dam at CA land in CC Kunta beat of T Bylu section

GPS Location: N 14.088218 E 79.116893 **SO no. and year:** DSO 195 (2017-18)

Check dam constructed in CC Kunta beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the check dams were: Length- 9.0 m, breadth- 0.45 m and depth- 1.50 m. The field measurements matched those in the measurement book, indicating no deviations. Repair of apron, body wall and core wall are required as to stop the seepage of water and the silt that comes along through it. De-silting of the check dam is required to increase the storage capacity.

3.3 Construction of percolation tank in M. Bhavi beat of Gadela section

GPS Location: N 13.962832 E 79.227655 **SO no. and year:** RSO 23 (2017-18)

Percolation tank constructed in M. Bhavibeat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the percolation tank were: Length- 30 m, width- 15 m, depth- 1.00 m with volume 300 cum as in measurement book. The dimensions of the percolation tank in field: Length- 24 m, width- 13 m, depth- 0.60 m with volume 300. The percolation tank, located in a low-lying area, has accumulated silt as a result of monsoon water overflow. The structure is partially

damaged and largely covered with silt and dense growth of bushy vegetation. De-silting and weed removal are necessary to restore its full storage capacity.

3.4 Construction of mini perculation tank in Allichetlabanda locality in Rajukunta beat

GPS Location: N 14.246764 E 78.362956 **SO no. and year:** RSO 26 (2017-18)

Mini percolation 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 mini perculation tank were: Length- 20 m, width- 15 m and depth- 1.00 m with volume 300 cum. The percolation tank, located in a low-lying area, has accumulated silt due to water overflow during the monsoon. While the structure remains intact, it is covered with silt. De-silting is necessary to restore its full storage capacity.

CC Kunta beat, Rajampet range

M. Bhavi beat, Kodur range

Rajukunta beat, Chitvel range

CC Kunta beat, Rajampet range

4. Monitoring and Evaluation of Construction Activities

There were two construction activities in the division during 2017-18, of which two was sampled. One activity taken up in the Rajampet range and 1 sampled in Kodur range. No construction activities were recorded in other ranges of Rajampet division.

4.1 Construction of Permanent cairns at SR Palem beat and section of Rajampet range

GPS Location: N 14.124307 E 79.084691 **SO no.and year:** RSO 37 (2017-18)

Construction of permanent cairns at SR Palem 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 6 boundary pillars are constructed for the boundary demarcation and were in good condition. The basal part of the pillar has been submerged under the soil.

4.2 Construction of compound wall for the frontline staff quarters present in Kodur of Balapalli East beat in Balapalli section of Kodur range

GPS Location: N 13.953734 E 79.353434 **SO no. and year:** DSO 140 (2017-18)

Construction of compound wall at Balapalli East beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the compound wall is as follows; height: 1.20 m, Top width: 0.30 m and bottom width: 0.45 m with length: 210 m. The compound wall demarcating the staff forest quarters in Kodur Range is generally found to be in good condition. However, some sections show signs of plaster withering, indicating the need for maintenance.

S R Palem beat, Rajampet range

Balapalli east beat, Kodur range

5. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 27 activities were carried out during 2017-18, of which 5 were sampled for verification. The maximum number of activities was reported from Rajampet range with 23 activities (4 sampled), followed by Chitvel with 3 activities (1 sampled), and Kodur with 1 activity (1 sampled). No activity was reported from Sanipaya range. Document verification and cross-checking were undertaken in the presence of Division and Range office staff. The review covered sanction orders, estimation sheets, and work registers, and it was observed that sanctioned amounts were in alignment with actual expenditures. Financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO), with fund utilization found to be appropriate and consistent 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. However, certain lapses were noted specifically, in Chitvel range, the estimate for DSO 91 (2017-18) was not made available for verification, and in Rajampet range, estimates for DSO 36 (2017-18), DSO 35 (2017-18), and RSO 36 (2017-18) were not presented for scrutiny.

Key Findings

- Plantations showed contrasting outcomes: excellent survival and growth at S.R. Palem contrasted with poor survival and stunted growth at Shikaripalem.
- Verification revealed significant discrepancies between recorded and actual plantation extents.
- Maintenance activities were executed but weakened by missing signage and inconsistent updating of journals.
- SMC structures were compliant with design but heavily silted and partially damaged.

- Construction works such as cairns and compound walls were intact and functional but required maintenance.
- "Other works" were financially compliant, though documentation gaps persisted.

Recommendations

- Consolidate successful models like S.R. Palem by replicating effective species-site combinations.
- Improve survival at challenging sites like Shikaripalem through soil enrichment, moisture conservation, and grazing control.
- Enforce accurate area measurement and record-keeping using GIS tools.
- Strengthen maintenance with timely pruning, coppice regulation, and replacement of casualties.
- Institutionalize desilting and repair schedules for SMC structures to restore functionality.
- Ensure periodic upkeep of cairns and compound walls for durability.
- Address documentation lapses by mandating submission of all registers and estimates.

4. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN TIRUPATI IDIVISION

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 105 CAMPA activities were carried out, of which 22 activities (around 20 %) were selected for detailed monitoring and evaluation. In Tirupati range, 45 activities were implemented, and 11 were sampled. In Chamala range, 27 activities were implemented, and 6 were sampled. In Balapalli range, 28 activities were implemented, with 5 sampled. In WLM Tirupati range, 2 activities were implemented, with one sampled. Among activity types, others dominated with 82 activities (17 sampled), followed by protection (9; 2 sampled), soil and moisture conservation (6; 2sampled), maintenance (5; 2 sampled), plantation and construction none are implemented or sampled.

1. Monitoring and Evaluation of Maintenance Activities

A total of five maintenance activities were carried out in Tirupati division during 2017-18, of which two activities were selected for monitoring in Chamala (2;1) and Balapalli ranges (3;1).

Table 25 Maintenance activities selected for evaluation in Tirupati division

Sl no.	Maintenance Activities	GPS Co ordinates	SO no. and year
Chamala range			
1	First year maintenance of 25 Ha Red Sanders plantation in Bhakarapet beat	N 13.642256 E 79.172444	DSO 41 (2017-18)
Balapalli range			
2	Improvement and management of natural Red Sander forest area of 25.00 Ha in Desettipalli beat	N 13.889141 E 79.320789	DSO 40 (2017-18)

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.

Bhakarpet beat Chamala range

Desettipalli beat Balapalli range

2. Monitoring and Evaluation of Protection Activities

During 2017–18 the Andhra Pradesh Forest Department undertook nine protection activities under the CAMPA scheme. For monitoring and evaluation, a representative sample of 20 %, comprising two protection activities, were selected in Tirupati range for detailed assessment.

2.1 Creation of fire line in Yerradona to Kupparalamitta locality in Karakambadi beat of SVNP Tirupati range

GPS location: N 13.670185 E 79.503647 **SO no. and year:** DSO 169 (2017-18)

A fire line was created and maintained in Karakambadi 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 – 6 m, and length – 5000rmt. 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 Creation of Fire lines in compt.no.142 localities from Swamipadalu to Prakrutthi bata in Mamandur North Beat, Section of SVNP Tirupati Range

GPS location: N 13.72436 E 79.624524 **SO no. and year**: DSO 188 (2017-18)

A fire line was created and maintained in Mamandur north 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 – 10000rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was clear, noticeable grass or weed growth was observed, indicating that the fire line has been well-maintained.

Karakambadi beat Tirupati range

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

A total of six SMC activities were carried out during 2017-18, of which two were sampled. The Tirupati range reported 2 activities (1 sampled) and Chamala range reported 4 activities (1 sampled).

3.1 Construction of check dam at MalleruVanka in Napier (N) beat of Mamandur section of S.V. National Park Tirupati range

GPS location: N 13.756259 E 79.469697 **SO no. and year:** DSO 66 (2017-18)

Check dam constructed in Malleru Vanka in Napier (N) beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the check dams were: main dam length – 12 m, breadth – 1.5 m, and depth – 0.15 m. The field measurements matched those in the measurement book, indicating no deviations. Minor repairs are required for the apron, and de-silting is necessary to restore and increase the storage capacity. Seepage of water has been observed from the body wall and core wall. Repairs are needed for the apron, body wall, and core wall.

3.2 Construction of check dam at Pulibonu Bhavi locality in SVNP of Chamala range

GPS location: N 13.720613 E 79.259849 **SO no. and year:** DSO 62 (2017-18)

Check dam constructed in Pulibonu Bhavi locality was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the check dams were: main dam length – 16 m, breadth – 1.2 m, and depth – 0.45 m. The field measurements matched those in the measurement book, indicating no deviations. Major repairs are required in the apron section of the check dam. De-silting is necessary to

restore and enhance the water storage capacity. Seepage has been observed from both the body wall and the core wall, indicating potential structural concerns. Immediate repair work is recommended for the body wall and apron to prevent further deterioration

Napier beat, Tirupati range

Pulibonu Bhavi, Chamala range

4. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 82 activities were undertaken during 2017–18, of which 17 were sampled for verification. The highest number of activities was recorded in Tirupati (38 activities, 8 sampled), followed by Balapalli (23, 4 sampled), Chamala (19, 4 sampled), and WLM Tirupati (2, 1 sampled). Document verification and cross-checking were carried out in the presence of Division and Range Office staff. The review covered sanction orders, estimation sheets, and work registers, revealing that sanctioned amounts matched actual expenditures, financial records were properly maintained and authenticated, and fund utilization was consistent with approved estimates and CAMPA guidelines. Both internal (Conservator of Forests) and external (Accountant General's Office) audits confirmed transparency and compliance with financial and administrative norms. Minor discrepancies were noted in Balapalli Range (DSO 25, 27, 29, and missing estimate for RSO 14), Chamala Range (DSO 18 and 22), and Tirupati Range (missing SO 40, SO 81, and amount mismatches for DSO 10 and 12), which were acknowledged by the respective range offices the latter attributed to typographical errors in the divisional activity list.

Key Findings

- Emphasis moved from raising new plantations to maintenance, protection, and Soil & Moisture Conservation (SMC) measures to sustain forest health and improve soil and water retention.
- Well-designed and effective fire lines, with proper width, alignment, and placement, enhanced forest fire prevention compared to the previous year.
- Trenches, check dams, and contour bunds showed deviations, siltation, partial collapse, and poor maintenance, reducing effectiveness and highlighting the need for better design and upkeep.
- Persistent mismatches in plantation areas, incomplete or missing work registers, and inconsistent financial records affected transparency and accountability, underscoring the need for improved documentation and periodic verification.

Recommendations

- Annual SMC maintenance: Repair and desilt trenches, check dams, and contour bunds before monsoons to ensure water storage, prevent erosion, and support plantation growth.
- Standardize record-keeping: Implement consistent digital or manual documentation of estimates, work registers, and expenditures to eliminate discrepancies and improve transparency.
- Maintain plantation boards: Install durable boards displaying species, planting date, and survival targets to aid monitoring and timely interventions.
- Sustain fire line investment: Regularly maintain and clear fire lines, especially in Red Sanders zones, to prevent fires and protect valuable forests.
- Targeted plantations: Reintroduce plantations based on soil and species suitability, integrating SMC measures to maximize survival and ecological resilience.

5. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN NELLORE DIVISION

Introduction

Nellore division is 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 2017-18**,** a total of 239 CAMPA activities were implemented in the Nellore Forest Division, of which 51 activities (approximately 21%) were selected for detailed monitoring and evaluation**.** Range-wise distribution shows that the Nellore range had the highest number with 68 activities (15 sampled), followed by Kavali with 43 (9 sampled), Udayagiri with 40 (9 sampled), Atmakur with 36 (7 sampled), Venkatagiri with 28 (6 sampled), and Rapur with 24 activities (5 sampled). In terms of activity type, other works constituted the largest share with 119 activities implemented and 24 sampled. This was followed by maintenance activities (85 implemented; 18 sampled), plantation (22; 6), soil and moisture conservation or SMC (8; 2) and protection (5; 1). Notably, no construction works were recorded during this period.

1. Monitoring and Evaluation of Plantation Activities

During 2017-18, Nellore division carried out a total of 22 plantation activities under CAMPA, of which 6 activities (approximately 27%) were selected for monitoring and evaluation. The range-wise distribution indicates that Nellore range carried out 6 activities with 1 sampled; Atmakur 3 activities with 1 sampled; Kavali 5 activities with 1 sampled; Udayagiri 3 activities with 1 sampled; Venkatagiri 4 activities with 1 sampled; and Rapur had 1 activity which was

also sampled. Thus, each range had one plantation activity selected for monitoring ensuring balanced representation across the ranges.

1.1 Nellore range

A total of six plantation activities were implemented under the CAMPA scheme in Nellore range. As part of the monitoring and evaluation process, 20 % of these activities equivalent to one plantation site was selected randomly for assessment.

Table 26 Details of plantation selected in Nellore range

Sl. no.	Plantation	SO no. and year
1	Raising of 2017 Marupuru bit-II 20Ha NTSH plantation	DSO 175 (2017-18)

The selected site for Marupuru 20 Ha plantation is characterized by hard gravel soil with an annual rainfall ranging from 20 to 167 mm.

Survival Percentage: Marupuru 20-hectare plantation shows promising results with *Syzygium cumini* achieving a survival rate of 81.81% and *Sterculia urens* showing an even higher survival rate of 87.6% indicating good site suitability for both species.

Growth Performance: Marupuru 20-hectare plantation recorded average tree heights ranging from 2.27 to 7.06 m and girths ranging from 19.11 to 49.79 cm reflecting healthy growth across the site.

Table 27 Details of plantation enumerated in Nellore range

Sl. no.	Planation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Marupuru 20 Ha NTSH plantation	1	*Sterculia urens*	N 14.375254 E 79.776303	87.60	2.27 ±0.31	19.11 ±1.96	-
		2	*Syzygium cumini*	N 14.374430 E 79.776386	75.20	4.02 ±0.78	-	27.05 ±3.61
		3	*Syzygium cumini*	N 14.373470 E 79.776360	78.51	4.60 ±0.44	-	31.79 ±2.26
		4	*Syzygium cumini*	N 14.372753 E 79.775903	83.47	7.06 ±0.51	-	49.79 ±6.91
		5	*Syzygium cumini*	N 14.371939 E 79.776037	90.08	3.10 ±0.33	-	23.87 ±2.72
Plantation average					**82.97**	**4.21**	**19.11**	**33.12**

1.2 Atmakur range

A total of three plantation activities were implemented under the CAMPA scheme in Atmakur Range. As part of the monitoring and evaluation process, 25 % of these activities equivalent to one plantation site was selected randomly for assessment.

Table 28 Details of plantation selected in Atmakur range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha red sanders for 2017 plantation of Ponugodu VSS	DSO 118 (2017-18)

Ponugodu site spans 20 hectares of flat land with red, iron-rich soil well-suited for afforestation under proper management. The absence of steep slopes and rocky patches provides favourable conditions for plantation establishment and effective monitoring under the CAMPA program.

Survival Percentage: Ponugodu plantation demonstrates favourable site suitability for *Pterocarpus santalinus* achieving a high survival rate of 85.94 %. This outcome indicates effective species selection and supportive environmental conditions that facilitate healthy establishment.

Growth Performance: At Ponugodu, growth parameters reflect healthier development with average tree height ranging from 7.21 m to 9.79 m and girth measurements between 28.58 cm and 31.72 cm underscoring the site's favourable growing conditions.

Table 29 Details of plantation enumerated in Atmakur range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Ponugodu 20 Ha RS plantation	1	*Pterocarpus santalinus*	N 14.708431 E 79.641015	93.38	9.79 ±1.48	31.72 ±5.67
		2	*Pterocarpus santalinus*	N 14.707798 E 79.640783	86.77	8.24 ±0.95	29.12 ±3.55
		3	*Pterocarpus santalinus*	N 14.708768 E 79.640358	85.12	7.51 ±1.02	28.58 ±3.68
		4	*Pterocarpus santalinus*	N 14.709045 E 79.641406	84.29	7.21 ±0.94	30.07 ±4.80
		5	*Pterocarpus santalinus*	N 14.709045 E 79.641406	80.16	7.23 ±0.81	30.43 ±6.84
Plantation average					**85.94**	**7.99**	**29.98**

1.3 Kavali range

A total of five plantation activities were implemented under the CAMPA scheme in Kavali range. As part of the monitoring and evaluation process, 20 % of these activities equivalent to one plantation site was selected randomly for assessment.

Table 30 Details of plantation selected in Kavali range

Sl. no.	Plantation	SO no. and year
1	Raising of 2017 Chowdavaram 20 Ha RS plantation in Kavali range	DSO 92 (2017-18)

Chowdavaram 20 Ha plantation site consists of red sandy soil with a gentle slope offering good drainage but requiring soil conservation measures such as mulching or terracing to prevent moisture loss and erosion.

Survival Percentage: At Chowdavaram plantation, *Pterocarpus santalinus* demonstrated poor adaptability with a survival rate of 40.32 %.

Growth Performance: In Chowdavaram, average tree height was high ranging from 5.45 to 6.40 m with girth measurements between 26.29 and 32.81 cm.

Table 31 Details of plantation enumerated in Kavali range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Chowda Varam 20 Ha RS plantation	1	*Pterocarpus santalinus*	N 14.938817 E 79.803345	33.88	5.49 ±0.55	26.29 ±4.10
		2	*Pterocarpus santalinus*	N 14.938751 E 79.804027	30.57	5.97 ±0.55	30.08 ±3.29
		3	*Pterocarpus santalinus*	N 14.938502 E 79.803831	38.01	6.40 ±0.49	32.76 ±3.91
		4	*Pterocarpus santalinus*	N 14.938015 E 79.803903	63.63	5.96 ±0.49	32.81 ±3.09
		5	*Pterocarpus santalinus*	N 14.937713 E 79.804389	35.53	5.45 ±0.52	26.93 ±4.02
Plantation average					**40.32**	**5.85**	**29.77**

1.4 Udayagiri range

A total of three plantation activities were implemented under the CAMPA scheme in Udayagiri range. As part of the monitoring and evaluation process, 33 % of these activities equivalent to one plantation site was selected randomly for assessment.

Table 32 Details of plantation selected in Udayagiri range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 NTSH Kaniyamapadu plantation in V.K.padu beat	DSO 155 (2017-18)

The selected site for Kaniyamapadu 20 Ha plantation is characterized by red soil with good drainage.

Survival Percentage: 20 Ha plantation at Kaniyamapdu has shown good suitability for *Hardwickia binata* and *Azadirachta indica* with survival rates of 96.27% and 93.65% respectively.

Growth Performance: Kaniyamapadu 20 Ha plantation recorded average tree height ranging from 2.99 to 4.79 m and girth ranging from 19.17 to 27.82 cm.

Table 33 Details of plantation enumerated in Udayagiri range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth	GBH (cm)
1	Kaniyama padu 20 Ha NTSH plantation	1	*Hardwickia binata*	N 15.001848 E 79.158306	98.34	4.47 ±0.33	-	27.82 ±3.42
		2	*Azadirachta indica*	N 15.003247 E 79.457436	93.38	3.26 ±0.25	-	20.86 ±2.52
		3	*Hardwickia binata*	N 15.002755 E 79.457812	94.21	4.79 ±0.33	-	26.05 ±2.95
		4	*Azadirachta indica*	N 15.002963 E 79.457524	93.38	3.27 ±0.25	-	19.82 ±2.52
		5	*Azadirachta indica*	N 15.003138 E 79.457037	94.21	2.99 ±0.31	19.17 ±2.17	-
Plantation Average					**94.70**	**3.75**	**19.17**	**23.63**

1.5 Venkatagiri range

A total of four plantation activities were implemented under the CAMPA scheme in Venkatagiri range. As part of the monitoring and evaluation process, 25 % of these activities equivalent to one plantation site was selected randomly for assessment.

Table 34 Details of plantation selected in Venkatagiri range

Sl. no.	Plantation	SO no. and year
1	Raising of Sreerampalli 20 Ha NTSH plantation	DSO 132 (2017-18)

Sreerampalli 20 Ha site consists of laterite soil and red-black loamy soil; while laterite soil is well drained but less fertile, the loamy soil is nutrient-rich. The gentle slope aids in water management making the site suitable for plantation with proper soil care.

Survival Percentage: Sreerampalli 20 Ha plantation demonstrates good suitability for *Hardwickia binata* and moderate growth for *Sterculia urens* with survival rates of 90.08% and 71.07% respectively.

Growth Performance: Sreerampalli 20 Ha plantation recorded average tree height ranging from 1.43 m to 6.00 m and girth from 18.63 to 32.04 cm.

Table 35 Details of plantation enumerated in Venkatagiri range

Sl. no.	Plantation / village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Sreeram Palli 20 Ha NTSH plantation	1	*Sterculia urens*	N 14.136523 E 79.655245	61.98	1.43 ±0.37	18.63 ±1.79	-
		2	*Hardwickia binata*	N 14.136350 E 79.655928	90.08	6.00 ±0.71	-	23.68 ±2.72
		3	*Sterculia urens*	N 14.135030 E 79.655204	61.15	1.91 ±0.48	20.65 ±3.38	-
		4	*Hardwickia binata*	N 14.130858 E 79.654705	90.09	4.92 ±0.47	-	32.04 ±3.49
		5	*Sterculia urens*	N 14.133660 E 79.655734	90.08	4.17 ±0.50	-	24.63 ±2.80
Plantation average					**78.67**	**3.68**	**19.64**	**26.78**

1.6 Rapur range

A total of one plantation activity was implemented under the CAMPA scheme in Rapur range. In this monitoring and evaluation process, 20 % of these activities equivalent to one plantation site was selected randomly.

Table 36 Details of plantation selected in Rapur range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSH plantation in Yeturu	DSO 87 (2017-18)

The selected Yeturu plantation site (20 Ha) is characterized by hardy gravel soil indicating moderate suitability for hardy and drought-tolerant species.

Survival Percentage: Yeturu 20 Ha plantation demonstrates high suitability for *Dolichandrone crispa*, *Terminalia arjuna* and *Sterculia urens* with average survival rate of 93.93 %, 87.60 % and 91.73 % respectively. The plantation also exhibits good overall growth performance.

Growth Performance: Yeturu plantation recorded average tree height ranges from 4.41 to 7.72 m, while the average girth ranges from 26.79 to 51.76 cm.

Table 37 Details of plantation enumerated in Rapur range

Sl. no.	Plantation/ village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	20 Ha plantation Yeturu	1	*Dolichandrone crispa*	N 14.456394 E 79.649057	91.73	5.64 ±0.55	27.91 ±3.43
		2	*Terminalia arjuna*	N 14.456007 E 79.648896	87.60	6.91 ±0.74	51.76 ±8.59
		3	*Dolichandrone crispa*	N 14.456186 E 79.648178	93.38	6.77 ±0.55	29.73 ±3.89
		4	*Sterculia urens*	N 14.455978 E 79.647505	91.70	4.41 ±0.50	26.79 ±2.80
		5	*Dolichandrone crispa*	N 14.456335 E 79.647148	96.69	7.72 ±0.31	28.84 ±2.80
Plantation average					**92.22**	**6.29**	**33.00**

Comparative assessment of plantations in Nellore division during 2017-18

The assessment shows that Rapur**,** Udayagiri and Atmakur ranges performed the best with high survival rates (above 85 %) and healthy growth indicating strong species-site compatibility. Nellore and Venkatagiri ranges also showed good survival with moderate to strong growth. In contrast, Kavali range had the lowest survival (40.32 %) for *Pterocarpus santalinus*, despite decent growth, pointing to poor species-site suitability. Overall, most ranges showed successful establishment with Kavali requiring corrective measures**.**

Verification of plantation area and boundaries

In Nellore division during 2017-18, 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 38 Details of plantation area perambulation in Nellore division

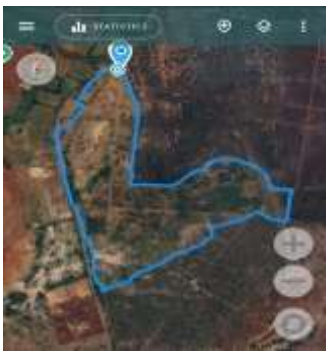
Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Raising of 2017 Marupuru bit-II 20 Ha NTSH plantation	20 Ha	25.23 Ha
2	Raising of 20 Ha red sanders plantation of Ponugodu VSS	20 Ha	30.41 Ha
3	Raising of 2017 Chowdavaram 20 Ha RS plantation	20 Ha	20.93 Ha
4	Raising of 20 NTSH plantation in Kaniyamapdu	20 Ha	23.08 Ha
5	Raising of Sreerampalli 20 Ha NTSH plantation	20 Ha	23.07 Ha
6	Raising of 20 Ha NTSH plantation in Yeturu	20 Ha	22.40 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 six

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 Marupuru plantation (Nellore)**:** Exceeded by 5.23 Ha
- 20 Ha RS Ponugodu plantation (Atmakur)**:** Exceeded by 10.41 Ha
- 20 Ha RS Chowdavaram plantation (Kavali)**:** Exceeded by 0.93 Ha
- 20 Ha NTSH Kaniyamapadu plantation (Udayagiri)**:** Exceeded by 3.08 Ha
- 20 Ha NTSH Sreerampalli plantation (Venakatagiri)**:** Exceeded by 3.07 Ha
- 20 Ha NTSH Yeturu plantation (Rapur): Exceeded by 2.4 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.

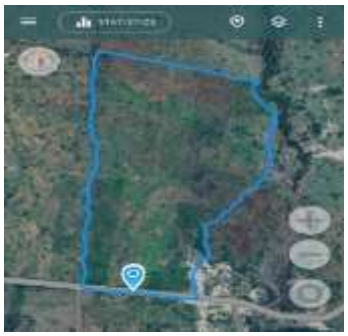


Marupuru 25.23 Ha

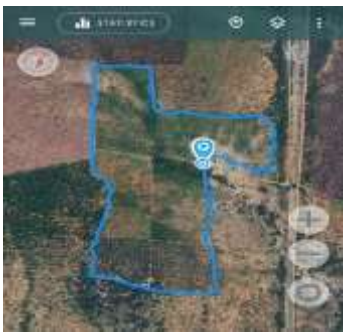
Ponugodu 25.23 Ha

Chowdavaram 20.93 Ha

Kaniyamapadu 23.08 Ha



Sreerampalli 23.07 Ha



Yeturu 22.4 Ha

Health status of plantations: The overall health status of plantation across all six plantations- Marupuru, Ponugodu, Chowdavaram, Kaniyamapadu, Sreerampalli and Yeturu 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.

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 six 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 six 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 the plantation board at Marupuru (Nellore range) was damaged. 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 the Vana Samrakshan Samithi (VSS) or Joint Forest Management Committee (JFMC) was evident in five out of the six plantation sites with the exception of the Sreerampalli plantation in Venkatagiri range. Consequently, the Focus Group Discussion (FGD) could not be conducted at this location. The active participation of VSS members in the other sites highlights the integration of community-based forest management practices, contributing to the protection, maintenance and monitoring of the plantations and supporting the overall objectives of sustainable forest regeneration.

Marupuru plantation, Nellore range

Ponugodu plantation, Atmakur range

Chowdavaram plantation, Kavali range

Kaniyamapadu plantation, Udayagiri

Sreerampalli plantation, Venkatagiri

Yeturu plantation, Rapur range

2. Monitoring and Evaluation of Maintenance Activities

During the period 2017-18, a total of 85 maintenance activities were implemented in Nellore Forest Division, of which 18 activities (approximately 20 %) were selected for monitoring and evaluation. Range-wise analysis shows that Kavali range recorded the highest number of maintenance activities with 26, of which 5 were sampled. This was followed by Atmakur with 20 activities and 4 sampled. Udayagiri and Venkatagiri implemented 14 activities each with 3 sampled from both ranges. Nellore range carried out 6 activities with 2 sampled, while Rapur range recorded the lowest with only 5 activities, of which 1 was sampled.

Table 39 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 2016 South Mopur 20 Ha NTSH plantation	N 14.417477 E 79.822249	DSO 149 (2017-18)
2	Second year maintenance of 2015 Mittaatmakur 20 Ha NTSH plantation	N 14.221771 E 79.800138	DSO 152 (2017-18)
Atmakur range			
3	First year maintenance of 33 Ha miscellaneous (bit-II) for 2016 plantation of Rampalli VSS	N 14.73695 E 79.427982	DSO 122 (2017-18)
4	First year maintenance of 20 Ha NTSH for 2016 plantation of Marripadu location through Gandhijanasangam VSS	N 14.661354 E 79.854327	DSO 124 (2017-18)
5	Second year maintenance of 20 Ha NTSH for 2015 plantation of Ponugodu VSS	N 14.706073 E 79.640667	DSO 127 (2017-18)
6	Third year maintenance of 20 Ha NTSH plantation at PN Palli	N 14.636268 E 79.336085	DSO 352 (2017-18)
Kavali range			
7	First year maintenance of 2016 K. Bitragunta VSS 20 Ha RS species plantation	N 14.769191 E 79.799941	DSO 103 (2017-18)
8	Second year maintenance of 2015 Manubolupadu VSS 20 Ha NTSH species plantation	N 14.726728 E 79.859220	DSO 105 (2017-18)
9	Second year maintenance of 10 Ha Manubolupadu NTSH plantation	N 14.722788 E 79.862036	SDSO 08 (2017-18)
10	Third year maintenance of 20 Ha bit-I NTSH plantation at Peddavaram	N 15.000965 E 79.926306	DSO 340 (2017-18)
11	Third year maintenance of 20 Ha RS plantation at K. Bitragunta	N 14.791874 E 79.994166	DSO 343 (2017-18)

Udayagiri range			
12	Second year maintenance of 2015 Nandipadu 20 Ha NTSH plot in Nandipadu beat	N 14.804213 E 79.31559	DSO 113 (2017-18)
13	Third year maintenance of 20 Ha NTSH plantation at Utukur	N 14.855584 E 79.501553	DSO 337 (2017-18)
14	Third year maintenance of 20 Ha NTSH plantation at Dakkanur	N 14.984021 E 79.471975	DSO 336 (2017-18)
Venkatagiri range			
15	Second year maintenance of Sanganapalli BC colony 30 Ha NTSH plot	N 14. 127731 E 79.571417	DSO 139 (2017-18)
16	Second year maintenance of Pakapudi 20 Ha RS plantation	N 14.028479 E 79.666382	DSO 143 (2017-18)
17	Third year maintenance of 74 Ha bit-II miscellaneous plantation at Dandavolu	N 14.071173 E 79.641813	DSO 357 (2017-18)
Rapur range			
18	Third year maintenance of 20 Ha RS plantation at Nallapalem	N 14.480534 E 79.74233	DSO 364 (2017-18)

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.

Mittaatmakur, Nellore

Rampalli, Atmakur

Bitragunta, Kavali

Utukur, Udayagiri

Dandavolu, Venkatagiri

Nallapalem, Rapur

3. Monitoring and Evaluation of Protection Activities

During the period 2017-18, a total of 5 protection activities were undertaken in Nellore Forest Division, of which 1 activity was selected for monitoring and evaluation. Atmakur and Rapur ranges each implemented 2 protection activities, but none were sampled. Nellore range reported 1 protection activity, which was sampled. No protection activities were undertaken in Kavali, Udayagiri and Venkatagiri ranges during this period.

3.1 Digging of boundary trench to a length of 2 kms in Toderu RF of Marupuru beat

GPS Location: N 14.402246 E 77.782035 **SO no. and year:** DSO 173 (2017-18)

A boundary trench was created at Marupuru beat under the CAMPA-NPV forest fire management scheme and monitored against recorded specifications. While the length (2 km) and depth (2 m) matched the records but width has been reduced by 0.5 m from the specified 1.5 m. The trench is well maintained and effectively serves as a barrier to prevent animal entry, unauthorized access and to control moisture intake in the Toderu Reserve Forest. Regular de-siltation is recommended to maintain its effectiveness.


Boundary trench in Toderu RF of Marupuru beat

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During the period 2017-18, Nellore Division carried out 8 Soil and Moisture Conservation (SMC) activities, all reported from Udayagiri range. Of these, 2 activities were selected for sampling and evaluation. No SMC activities were reported from other ranges.

4.1 Formation of mini-PT across Donabanda vagu at Arlapadia beat

GPS Location: N 15.059417 E 79.249616 **SO no. and year:** RSO 09 (2017-18)

The mini percolation tank at Arlapadia beat was monitored and evaluated against the measurement book specifications. Its dimensions- length 23 m, width 4 m and depth 0.90 m- show deviations from the recorded measurements. Silt accumulation has reduced the tank's capacity. However, due to inadequate maintenance, the percolation tank located in a low-lying area has experienced significant silt accumulation. Additionally, overflow during the monsoon has caused displacement and distortion of the stone dry packing along the edges. To restore and maintain the tank's full storage capacity, regular de-siltation and repair of the stone packing are recommended.

4.2 Construction of check dam no.2 Koyaboduvagu, Peddirlapadu in Arlapadia beat

GPS Location: N 15.054128 E 79.271988 **SO no. and year:** DSO 375 (2017-18)

The check dam constructed across Peddirlapadu in Arlapadia beat was monitored and evaluated against the specifications recorded in the measurement book. The original dimensions were 9 m in length, 1.8 m in width and 1.2 m in depth; however, field measurements showed a reduced depth indicating deviations from the recorded specifications. Despite this, the dam is well maintained. The water holding capacity has decreased due to silt and sediment accumulation which has reduced the total volume. Minor repairs are needed on the apron, and de-silting is recommended to restore the dam's storage capacity.


Mini PT at Arlapadia beat **Check dam in Arlapadia beat**

5. Monitoring and Evaluation of Other Activities

During 2017-18, a total of 119 activities were undertaken under the "Others" category, of which 24 were sampled for evaluation. Nellore accounted for the largest share with 55 activities (11 sampled), followed by Rapur with 16 activities (3 sampled), Udayagiri with 15 activities (3 sampled), Kavali with 12 activities (3 sampled), Atmakur with 11 activities (2 sampled), and Venkatagiri with 10 activities (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. It was found that the sanctioned amounts were in alignment with actual expenditures, and 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 audits by the Conservator of Forests and external audits by the Accountant General's office were conducted, ensuring transparency and adherence to financial and administrative protocols.

Key Findings

- Plantation performance was mixed: *Sterculia urens*, *Syzygium cumini*, and *Dolichandrone crispa* sites were highly successful, while *Pterocarpus santalinus* survival was poor in some locations (Chowdavaram).
- Verification consistently showed greater actual areas than recorded, highlighting survey discrepancies.
- Maintenance was broadly effective, but plantation boards were often missing or damaged.
- Boundary trenching and SMC works were functional but siltation reduced long-term effectiveness.

Recommendation

- Strengthen species-site matching, avoiding unsuitable soils for sensitive species like *Pterocarpus santalinus*.
- Ensure timely maintenance of trenches, check dams, and percolation tanks with regular de-siltation.
- Standardize signage and boundary marking across all plantations for visibility and monitoring.
- Intensify weed and grazing control to support plantation growth.
- Institutionalize VSS involvement in all sites, ensuring community engagement.
- Reconcile recorded vs. actual plantation areas with improved survey methods.
- Rebalance the activity mix by increasing allocations to plantations and ecological works over "other works."

6. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KADAPA DIVISION

Introduction

Kadapa division, 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. Kadapa's forests hold significant potential for ecological restoration and sustainable resource development.

During 2017-18, a total of 110 CAMPA activities were carried out in Kadapa Forest division. Out of these, 24 activities (around 21 %) were selected for detailed monitoring and evaluation. Range-wise analysis shows that Vempalli and Sidhout reported the highest number of activities with 30 each, of which 7 were sampled in both ranges. This was followed by Kadapa with 26 activities, 6 of which were sampled. Vontimitta range implemented 23 activities, of which 5 were sampled. With respect to type of activities, other works constituted the largest share with 83 activities implemented and 17 evaluated, while maintenance works accounted for 19 activities with 4 sampled. Plantation activities were relatively limited, with 4 implemented and 1 sampled. Whereas protection works included 2 activities, both of which were sampled and Construction works included 1 activity that was also sampled. Notably, no SMC activities were implemented during this period.

1. Monitoring and Evaluation of Plantation Activities

During the period 2017-18, Kadapa Forest Division implemented a total of 4 plantation activities under CAMPA, of which one activity approximately 25 % was selected for

monitoring and evaluation. Range-wise, Vempalli carried out two plantation activities but none were taken up for evaluation. Kadapa and Vontimitta ranges reported one activity each; the activity from Kadapa was selected for evaluation, while the one from Vontimitta was not sampled. The Sidhout range did not report any plantation activities during this period.

1.1 Kadapa range

One plantation activity was implemented under the CAMPA scheme in the Kadapa Range during the period 2017–18. Accordingly, one plantation activity (constituting 20 %) was selected for monitoring and evaluation purposes.

Table 40 Details of plantation selected in Kadapa range

Sl. no.	Plantation	SO no. and year
1	Raising in 20 Ha R.S. Plantation in Suddakona, Dayyalakona Locality, in Kanumalopalli Beat	DSO 111 (2017-18)

Kanumalopalli plantation site, located in a dry deciduous forest biome and characterized by flat terrain with red soil, is well-suited for the growth of drought-tolerant and low-maintenance species. Red soil, while well-drained, tends to be low in essential nutrients; therefore, periodic soil enrichment is recommended to enhance plant health and productivity.

Survival Percentage**:** Although the area is designated as an RS (Red Sanders) plantation, the current vegetation does not demonstrate strong ecological compatibility for *Pterocarpus santalinus*. Instead, the plantation is predominantly occupied by non-RS species such as *Azadirachta indica* and *Senegalia chundra*, which have established more successfully. The overall survival percentage is approximately 40 %.

Growth**:** In Kanumalopalli plantation growth with recorded tree height ranging from 5.56 to 6.94 m and girth measurements between 29.73 and 38.66 cm.

Table 41 Details of plantation enumerated in Kadapa range

Sl. no.	Plantation name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Kanumalo palli 20 Ha RS plantation	1	*Pterocarpus santalinus*	N 14.449419 E 78.960325	76.85	5.99 ±1.39	36.31 ±7.10
		2	*Senegalia chundra*	N 14.449406 E 78.959941	27.27	5.09 ±0.67	31.76 ±4.27
		3	*Azadirachta indica*	N 14.449359 E 78.959374	38.00	5.16 ±0.83	34.93 ±4.77
		4	*Azadirachta indica*	N 14.449367 E 78.959179	51.00	5.06 ±0.86	34.38 ±5.59
		5	*Senegalia chundra*	N 14.449345 E 78.959069	30.00	4.91 ±0.78	31.30 ±3.80
Plantation average					**44.62**	**5.24**	**33.73**

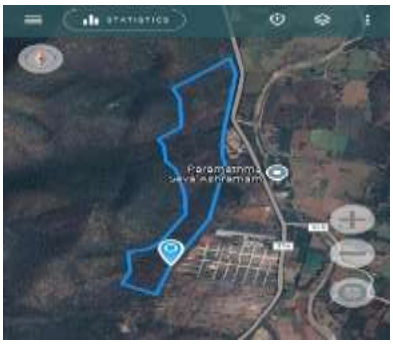
Verification of plantation area and boundaries

In Kadapa division during 2017-18, 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 42 Details of plantation area perambulation in Kadapa division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Raising in 20 Ha R.S. Plantation in Suddakona, Dayyalakona Locality, Kanumalopalli Beat	20 Ha	25.09 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. The perambulated area was found to be slightly larger than the officially recorded extent. This variation resulted from natural field constraints such as rocky terrain, dense jungle growth, trenches and barren patches which necessitated traversing the outer accessible boundary rather than the exact demarcated limits. At Kanumalopalli plantation, the perambulated area measured 25.09 hectares against the recorded 20 hectares, showing a marginal excess of 5.09 hectares. These findings were validated through spatial data analysis using QGIS software and further confirmed through complete boundary walks with the Geo Tracker mobile application. Photographic evidence collected during the exercise supports the observations.



Kanumalopalli 25.09 Ha

Kanumalopalli plantation

Health Status of Plantation: The overall health status of plantation was found to be satisfactory at this site with no observed incidences of insect or pest damage affecting any of the species. All plants appeared healthy, with 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: There was no evidence of biotic pressure, as no signs of cattle grazing, browsing or human interference were observed suggesting that plantation boundaries are effectively secured and preventive measures are functioning well.

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 ongoing monitoring and evaluation. Each plantation is periodically inspected by the concerned forest official and their observations are duly recorded.

Vana Samrakshana Samithi (VSS): The involvement of the Vana Samrakshana Samithi (VSS) or Joint Forest Management Committee (JFMC) was evident at Kanumalopalli site 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 to gather insights from community members regarding their roles, contributions, and challenges in plantation management.

2. Monitoring and Evaluation of Maintenance Activities

During the Period 2017-18, a total of 19 maintenance activities were implemented in the Kadapa Forest Division, out of which 4 activities were selected for monitoring and evaluation. A range-wise analysis shows that the Vempalli range recorded the highest number of activities with 12, of which 2 were sampled. This was followed by the Kadapa range with 4 activities, 1 of which was selected. Vontimitta range implemented 3 activities with 1 selected for evaluation. No maintenance activities were reported in Sidhout range during this period.

Table 43 Maintenance activities selected for evaluation in Kadapa division

Sl no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Vempalli range			
1	First year maintenance of 10 Ha SMM (RS Species) plantation at Darlavanka locality, Gorlapalli beat	N 14.397652 E 78.71046	DSO 94 (2017-18)
2	Third year maintenance of 5 Ha NTSH species plantation at Gornumakulapalli beat	N 14.435976 E 78.495628	RSO 7 (2017-18)
Vontimitta range			
3	Second year maintenance of 10 Ha NTSH species (SMM) plantation in Nadimpalli beat	N 14.355356 E 79.009248	SDSO 04 (2017-18)
Kadapa range			
4	First-year maintenance of 10 Ha (SMM) plantation at Palakonda RF of Madimadugu East beat	N 14.360564 E 78.809841	SDSO 7 (2017-18)

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.

3. Monitoring and Evaluation of Protection Activities

A total of 2 protection activities were undertaken in Kadapa division, both of which were sampled. Range-wise, Vempalli and Vontimitta each reported 1 protection activity and both were selected for sampling. No protection activities were undertaken in Kadapa and Sidhout ranges during this period.

3.1 Creation of fire lines in natural forest in Idupulapaya beat of Vempalli range

GPS location: N 14.33402 E 78.571082 **SO no. and year:** DSO 05 (2017-18)

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

GPS location: N 14.298128 E 79.001262 **SO no. and year:** RSO 20 (2017-18)

A fire line was created and maintained in Idupulapaya beat and 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 lines are width – 3 m and length – 2000 rmt. The field measurements matched those in the measurement book, indicating no deviations. Both fire lines is found to be well maintained and clearly visible as it is established along the baseline near the Red Sander Park. No weed growth was observed indicating effective maintenance across the natural forest.

Idupulapaya beat, Vempalli

Chintarajupalli, Vontimitta

4. Monitoring and Evaluation of Construction Activities

During 2017-18, a total of 2 construction activities were carried out in Kadapa Forest Division, of which 1 was sampled. Range wise, Sidhout and Vontimitta each reported 1 construction activity, with the activity in Sidhout selected for sampling. While no construction works were recorded in Kadapa and Vempalli ranges during this period.

4.1 Construction of gate with pillars at Velugupalli of Maddur beat of Sidhout range

GPS location: N 14.453396 E 79.040042 **SO no. and year:** RSO 14 (2017-18)

A construction activity involving the installation of a gate with pillars at Maddur beat was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the pillar and wall were as follows;

- **Pillar:** length - 0.75 m, width - 0.75 m and height - 2.10 m
- **Wall:** length - 0.9 m, width - 0.23 m and height - 1.5 m

The field verification confirmed that measurements matched those in the measurement book, indicating no deviations. The gate with pillars was found to be well maintained and intact, serving as a clearly defined entry and exit point along the boundary separating the Reserve Forest from the adjoining revenue land.

Gate with pillars at Maddur beat of Sidhout range

5. Monitoring and Evaluation of Other Activities

Under the "Others" category, a total of 83 activities were implemented in Kadapa Forest Division during 2017–18, of which 17 were sampled across four ranges. Document verification and cross-checking were conducted in the presence of Division and Range Office staff. The verification revealed that all relevant records, including sanction orders, estimation sheets, and work registers, were properly maintained and duly authenticated by the concerned officials. The sanctioned amounts were consistent with actual expenditures, and the utilization of funds was in accordance with approved estimates and CAMPA guidelines. Furthermore, both internal (by the Conservator of Forests) and external audits (by the Accountant General's Office) were conducted, ensuring transparency, accountability, and compliance with established financial/administrative protocols.

Key Findings

- The plantation at Kanumalopalli exhibited poor performance for *Pterocarpus santalinus* but moderate survival and growth for *Azadirachta indica* and *Senegalia chundra*.
- Field verification indicated a consistent excess in perambulated plantation area compared to recorded figures, suggesting discrepancies in documentation.
- Maintenance activities were undertaken; however, their effectiveness was undermined by damaged signage and lapses in record-keeping.
- Fire lines created under protection works were found to be well executed and functional, contributing to site protection.

- The construction of a gate with pillars was in accordance with records and observed to be effective in demarcation and access control.
- No Soil and Moisture Conservation (SMC) works were implemented, thereby limiting ecological restoration potential.
- Financial management of "other works" was compliant with audit requirements, and records reflected proper fund utilization.

Recommendations

- Enhance site–species compatibility to prevent establishment failures, particularly in *Red Sanders* plantations.
- Ensure regular updating of plantation journals and proper maintenance of signage and boundary markers.
- Strengthen maintenance regimes through replanting, coppice management, and timely pruning to sustain stand vigor.
- Institutionalize periodic fire line clearance to maintain their effectiveness in fire prevention.
- Replicate successful construction interventions such as gates, pillars, and boundary structures for improved protection and demarcation.
- Broaden the scope of activities to incorporate Soil and Moisture Conservation (SMC) works aimed at enhancing site resilience and ecological stability.
- Sustain and strengthen VSS participation to promote community-based monitoring, transparency, and accountability.

7. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN PRODDATUR DIVISION

Introduction

Proddatur 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 2017-18, a total of 196 CAMPA activities were implemented in Proddatur Forest Division. Of these, 46 activities, representing approximately 23 %, were selected for detailed monitoring and evaluation. Among the five forest ranges, Badvel carried out the highest number of activities with 62, of which 15 were evaluated. Porumamilla followed closely with 41 activities selecting 10 for evaluation. Onipenta implemented 38 activities with 8 included in the evaluation sample. Proddatur carried out 37 activities with 9 sampled, while Muddanur conducted 18 activities, of which 4 were selected for evaluation. In terms of activity type, other works constituted the largest share with 127 activities implemented and 25 sampled. This was followed by maintenance activities (26 implemented; 7 sampled), plantation (20; 5), protection (8; 5), construction (6; 2) and SMC (9; 2).

1. Monitoring and Evaluation of Plantation Activities

During 2017-18**,** Proddatur Forest Division implemented a total of 20 plantation activities under the CAMPA programme, of which 5 activities representing approximately 25% were selected for monitoring and evaluation. At the range level**,** Badvel implemented the highest number of plantations with 10 activities, of which **2** were sampled. Onipenta and Porumamilla implemented 4 each and 1 selected in Porumamilla but not sampled in Onipenta. Muddanur with activities, with one included in the evaluation sample. While no plantation reported from Proddatur during this period.

1.1 Porumamilla range

A total of four plantation activities were implemented under the CAMPA scheme in the Porumamilla range. For monitoring and evaluation, 50 % of these activities, equivalent to two plantation sites, were randomly selected for assessment.

Table 44 Details of plantations selected in Porumamilla range

Sl. no.	Plantations	SO no. and year
1	Raising of 25 Ha species plantation in Itukulapadu beat of Porumamilla range	CSO 04 (2017-18)
2	Raising of 20 Ha Red Sanders plantation in compartment no. 253, Tekurpeta beat	DSO 52 (2017-18)

Itukulapadu (25 Ha) and Tekurpeta (20 Ha) are tropical dry deciduous forest sites with flat terrain but differing soil conditions. Itukulapadu has shallow red soil with loose boulders, limiting moisture retention and root growth. Tekurpeta has red gravelly, nutrient-poor but well-drained soil. Both sites require drought-tolerant, native species and soil and water conservation measures to support successful vegetation and ecological restoration.

Survival Percentage**:** Plantation at Itukulapadu showed moderate to satisfactory survival rates across species. *Gmelina arborea* (78.51%) and *Syzygium cumini* (77.68%) performed the best, followed closely by *Phyllanthus emblica* (77.68%) and *Sterculia urens* (73.55%), while *Melia dubia* showed a slightly lower survival at 69.42%. In contrast, the Tekurpeta site showed mixed results with *Hardwickia binata* exhibiting a high survival rate of 92.10% indicating strong adaptability to the site's dry, gravelly conditions whereas *Pterocarpus santalinus* had a lower survival rate of 54.84% suggesting it may be less suited to the site's soil and moisture conditions.

Growth**:** Itukulapadu (25 Ha) plantation demonstrated overall better growth performance with plant heights ranging from 2.72 to 10.14 m and girths between 19.51 to 46.65 cm indicating favourable establishment for most species despite shallow soils. In contrast, the Tekurpeta site showed comparatively lower growth with heights ranging from 0.60 to 7.10 m and girths between 8.85 to 31.81 cm likely reflecting the site's nutrient-poor, gravelly soil and harsher growing conditions. These differences highlight the influence of soil quality and moisture retention on early growth dynamics across the two sites.

Table 45 Details of plantations enumerated in Porumamilla range

Sl no.	Plantation /Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Itukulapadu 25 Ha NTSH plantation	1	*Syzizium cumini*	N 14.997873 E 78.838465	77.68	3.14 ±0.40	-	23.11 ±2.79
		2	*Phyllanthus emblica*	N 14.998174 E 78.838405	77.68	2.78 ±0.30	19.51 ±2.53	-
		3	*Sterculia urens*	N 14.998064 E 78.838023	73.55	4.81 ±0.57	-	30.11 ±5.16
		4	*Melia dubia*	N 14.997809 E 78.837424	69.42	9.63 ±0.84	-	43.17 ±10.42
		5	*Gmelina*	N 14.997982	78.51	10.14	-	46.65

			arborea	E 78.836231		±0.66		±4.78
Plantation Average					**73.56**	**6.10**	**19.51**	**35.76**
2	Tekurpeta 20 Ha RS plantation	1	*Hardwickia binnata*	N 14.992976 E 79.058695	95.95	3.43 ±3.09	22.48 ±3.91	-
			Pterocarpus santalinus		90.90	0.60 ±0.30	8.85 ±4.51	-
		2	*Hardwickia binata*	N 14.993217 E 79.059284	89.77	3.59 ±0.71	-	26.81 ±3.77
			Pterocarpus Santalinus		42.42	1.04 ±0.37	11.10 ±2.41	-
		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					**84.60**	**3.76**	**14.14**	**31.83**

1.2 Badvel range

A total of 10 plantation activities were implemented under the CAMPA scheme in Badvel range. For monitoring and evaluation, 20 % of these activities, equivalent to two plantation sites, were randomly selected.

Table 46 Details of plantations selected in Badvel range

Sl. no.	Plantations	SO no. and year
1	Raising of 7.80 Ha Miscellaneous plantation under SMM in Ganugapenta beat.	DSO 68 (2017-18)
2	Raising of 20 Ha (bit II) red sanders plantation under SMM in Ganugapenta beat.	DSO 60 (2017-18)

7.8 Ha plantation at Ganugapenta is situated on flat terrain with sedimentary soil and lies within a dry deciduous forest zone receiving approximately 300 mm of annual rainfall indicating arid conditions that demand drought-resilient species and moisture conservation strategies. In contrast, the 20 Ha plantation at Ganugapenta (bit-II) also features flat terrain but with red soil and a relatively higher average rainfall of 530 mm offering comparatively better moisture availability. Both sites fall under the dry deciduous forest category but their differing soil types and rainfall levels will influence species selection and plantation management approaches.

Survival Percentage**:** At Ganugapenta (7.8 Ha), *Soymida febrifuga* demonstrated high suitability to the site's conditions with a strong survival rate of 84.33 % reflecting good adaptation to the sedimentary soil and low rainfall. In Ganugapenta (bit-II) 20 Ha site, *Pterocarpus santalinus* achieved a survival rate of 77.68 % indicating good compatibility with the red soil and relatively higher rainfall. These results suggest both sites support species well-suited to their specific soil and climatic conditions.

Growth**:** In 7.8 Ha plantation at Ganugapenta, tree height ranged from 2.78 to 4.26 m with girth at breast height (GBH) between 28.00 and 33.94 cm indicating healthy growth and good site

suitability for selected species, particularly *Soymida febrifuga*. In contrast, 20 Ha plantation at Ganugapenta (bit-II) showed lower average tree height of 1.91 to 3.60 m and girths between 10.86 and 16.70 cm suggesting slower growth possibly due to younger plantation age, species-specific growth rates or site-specific factors such as soil fertility and water availability.

Table 47 Details of plantations enumerated in Badvel range

Sl. no.	Plantation /Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Ganugapenta (7.80 Ha SMM Plantation)	1	*Soymida febrifuga*	N 14.872525 E 79.069903	78.78	4.26 ±0.56	-	33.94 ±4.00
		2	*Soymida febrifuga*	N 14.872065 E 79.069306	86.36	3.53 ±0.38	-	28.00 ±3.80
		3	*Soymida febrifuga*	N 14.871804 E 79.069621	87.87	2.78 ±0.34	-	28.00 ±3.80
Plantation Average					**84.33**	**3.52**	**-**	**29.98**
2	Ganugapenta (bit II) SMM Plantation	1	*Pterocarpus santalinus*	N 14.888593 E 79.067129	80.16	3.60 ±0.69	16.70 ±4.46	-
		2	*Pterocarpus santalinus*	N 14.888083 E 79.067112	78.51	2.77 ±0.71	11.91 ±2.71	-
		3	*Pterocarpus santalinus*	N 14.887711 E 79.067346	76.03	2.63 ±0.66	10.86 ±2.21	-
		4	*Pterocarpus santalinus*	N 14.887424 E 79.067359	74.38	2.93 ±0.84	14.29 ±4.98	-
		5	*Pterocarpus santalinus*	N 14.886948 E 79.067586	79.33	1.91 ±0.55	11.55 ±2.82	-
Plantation Average					**77.68**	**2.76**	**13.06**	**-**

3. Muddanur range

A total of two plantation activities were implemented under the CAMPA scheme in the Muddanur Range. For monitoring and evaluation, 50 % of these activities, equivalent to one plantation site, was randomly selected.

Table 48 Details of plantation selected in Muddanur range

Sl. no.	Plantation	SO no. and year
1	Raising 25 Ha. NTSH plantation in Mallela beat	CSO 2 (2017-18)

The selected site for Mallela plantation is characterized by red gravelly soil which has demonstrated good suitability by supporting high survival rates and healthy growth of the planted species.

Survival Percentage**:** In Mallela plantation, the following species exhibited high survival rates: *Hardwickia binata* – 87.60% *Azadirachta indica* – 91.73% and *Sterculia urens* – 92.55%**.**

Growth**:** In Mallela plantation, trees exhibited a height range of 2.00 to 2.68 m with girth measurements between 22.12 and 22.83 cm. However, some instances of stunted growth were observed primarily due to the cutting of upper branches by local villagers use as cattle fodder.

Table 49 Details of plantation enumerated in Muddanur range

Sl. no.	Plantation name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Mallela 25 Ha NTSH plantation	1	*Sterculia urens*	N 14.524314 E 78.404882	95.04	2.47 ±0.49	22.58 ±4.09
		2	*Sterculia urens*	N 14.524900 E 78.404780	91.73	2.35 ±0.56	22.12 ±4.19
		3	*Azadirechta indica*	N 14.525862 E 78.405390	91.73	2.32 ±0.61	22.74 ±4.30
		4	*Sterculia urens*	N 14.525976 E 78.405026	90.90	2.68 ±0.60	22.14 ±4.78
		5	*Hardwickia binate*	N 14.526452 E 78.404035	87.60	2.00 ±0.44	22.83 ±3.98
Plantation Average					**91.40**	**2.36**	**22.48**

Comparative Assessment of Plantations in Proddatur Division during 2017-18

The assessment across Porumamilla, Badvel and Muddanur ranges shows varied plantation performance based on species and site conditions. Porumamilla (Itukulapadu) had good survival (up to 78.51%) and strong growth (height up to 10.14 m) while Tekurpeta showed excellent survival of *Hardwickia binata* (92.10%) but lower overall growth due to poor soils. In Badvel, 7.8 Ha Ganugapenta site showed high survival (*Soymida febrifuga* – 84.33%) and healthy growth, while 20 Ha site had slower growth despite decent survival of *Pterocarpus santalinus* (77.68%). Muddanur (Mallela) recorded high survival across species (>87%) but moderate growth due to branch cutting by locals. Overall, Porumamilla and Badvel showed strong site-species compatibility while Muddanur had good potential if protected from biotic interference.

Verification of plantation area and boundaries

In Proddatur division during 2017-18, 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 50 Details of plantation area perambulation in Proddatur division

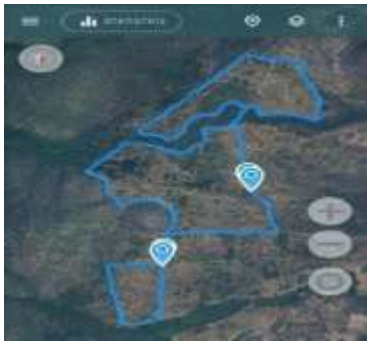
Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 25 Ha Miscellaneous species plantations in Itukulapadu beat	25 Ha	26.54 Ha
2	Raising of 20 Ha red sanders plantation in Tekurpeta beat	20 Ha	21.68 Ha
3	Raising of 7.80 Ha Miscellaneous plantation under SMM in Ganugapenta beat.	7.80 Ha	8.17 Ha
4	Raising of 20 Ha (bit II) red sanders plantation under SMM in Ganugapenta beat.	20 Ha	21.77 Ha

5	Raising 25 Ha NTSH plantation in Mallela beat	25 Ha	30.4 Ha

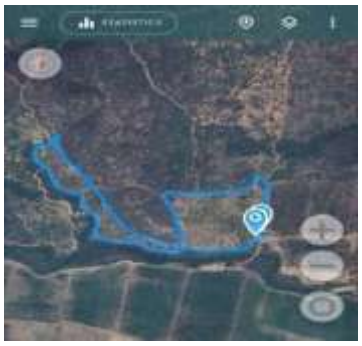
Perambulation of the plantation area was carried out in the presence of the designated Forest Officer and based on the demarcation indicated by the watcher/guard responsible for each site. During the verification process, it was observed that the perambulated area for all four plantations exceeded the 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:

- 25 Ha Misc Itukulapadu plantation (Porumamilla)**:** Exceeded by 1.54 Ha
- 20 Ha RS Tekurpeta plantation (Porumamilla)**:** Exceeded by 1.68 Ha
- 7.80 Ha Misc Ganugapenta plantation (Badvel)**:** Exceeded by 0.37 Ha
- 20 Ha RS Ganugapenta plantation (Badvel)**:** Exceeded by 1.77 Ha
- 25 Ha NTSH Mallela plantation (Muddanur)**:** Exceeded by 5.4 Ha

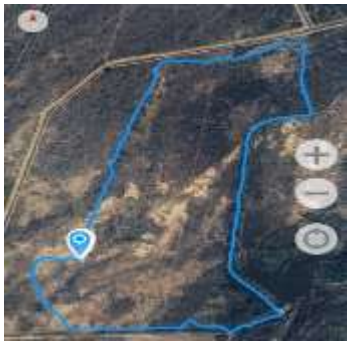
The verification was conducted through physical perambulation using the Geo Tracker mobile application, which facilitated the collection of geotagged photographs and GPS coordinates for accurate documentation. These visual and spatial records are provided below for reference.



26.54 Ha Itukulapadu

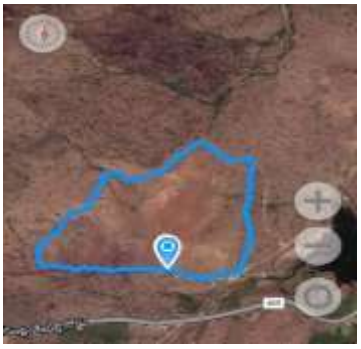


21.68 Ha Tekurpeta



8.17 Ha Ganugapenta

21.77 Ha Ganugapenta bit-II



30.4 Ha Mallela

<u>Health Status of Plantation:</u> The overall health condition of the plantations in Ganugapenta, Itukulapadu, Mallela and Tekurpeta 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.

Protection Measures: To safeguard the plantations from fire hazards and other environmental threats, a series of protection measures were implemented across all five plantation sites. These included the creation and maintenance of fire lines, development of inspection paths and the deployment of fire watchers during vulnerable periods. These preventive actions played a crucial role in enhancing the resilience of the plantations and minimizing potential damage thereby contributing significantly to the overall protection and sustainability of the plantations.

Biotic (human/cattle) Pressure on Plantation: Grazing and browsing pressure from cattle and human activity was observed across all five plantation sites. However, these pressures have been significantly mitigated through the establishment of peripheral trenches and the deployment of plantation watchers which have effectively restricted cattle entry from nearby villages. Despite the overall healthy condition of the plantations, signs of biotic pressure were particularly evident at the Mallela plantation. Here villagers were found to have cut the upper portions of trees for use as cattle fodder resulting in partial tree damage and stunted growth.

Maintenance of Plantation Journals and Records: Plantation journals and records are generally well-maintained at three of the five plantation sites 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. At Mallela and Tekurpeta plantation, the journal was not presented during the inspection marking a lapse in documentation and limiting verification of maintenance activities and plantation history.

Vana Samrakshana Samithi (VSS): The involvement of the Vana Samrakshana Samithi (VSS) or Joint Forest Management Committee (JFMC) was evident across all five plantation sites. 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.

Tekurupeta plantation

Ganugapenta plantation

Ganugapenta bit-II plantation

Mallela plantation

2. Monitoring and Evaluation of Maintenance Activities

During 2017-18, a total of 26 maintenance activities were implemented across Proddatur division. Of these, 7 activities were selected for monitoring and evaluation. A range-wise analysis revealed that Porumamilla range had the highest number of activities 9 with 2 selected for sampling. This was followed by the Badvel range with 6 activities, of which 2 were sampled. Muddanur range recorded 5 activities with 1 selected for monitoring. Both the Onipenta and Proddatur ranges had 3 activities each with 1 activity sampled from each range.

Table 51 Maintenance activities selected for evaluation in Proddatur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Porumamilla range			
1	First year maintenance of 20 Ha (bit - II) Red Sander plantation at Venkatapuram beat	N 15.124406 E 97.038298	DSO 54 (2017-18)
2	First year maintenance of 20 Ha (bit - I) Red Sander plantation at Venkatapuram beat	N 15.123483 E 79.036363	DSO 56 (2017-18)
Badvel range			
3	Third year maintenance of 20 Ha NTSH plantation in Jangamarajupalli beat	N 14.756313 E 78.945388	DSO 107 (2017-18)
4	Third year maintenance of 25 Ha RS plantation in Lothuvanka beat	N 14.71677 E 78.984421	DSO 108 (2017-18)
Proddatur range			
5	First year maintenance of 20.83 Ha Nagasanipalli CA plantation Nagasanipalli beat	N 14.669235 E 78.818796	DSO 70 (2017-18)
Muddanur range			
6	Third year maintenance of 25 Ha NTSH plantation in B.K. Mala beat	N 14.654766 E 78.289172	DSO 170 (2017-18)
Onipenta range			
7	First year maintenance of 20 Ha R.S. plantation in M.R palli beat.	N 14.875493 E 78.799207	DSO 63 (2017-18)

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. 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.

Venkatapuram beat, Porumamilla

Nagasanipalli beat, Proddatur

B.K.Mala beat, Muddanur

Mudireddypalli beat, Onipenta

3. Monitoring and Evaluation of Protection Activities

During 2017-18, Proddatur Forest Division undertook a total of 8 protection activities across various ranges, of which 5 were selected for monitoring and evaluation. The distribution of these activities was as follows: Onipenta range implemented 4 protection activities with 2 activities were sampled. The remaining ranges - Proddatur, Muddanur, Badvel and Porumamilla each implemented 1 activity. Among these, the activities in Proddatur, Badvel, and Porumamilla were sampled while the activity in Muddanur was not.

3.1 Creation of new fire lines in natural forests at Ganjikunta beat of Ganjikunta section

GPS location: N 14.887996 E 78.725051 **SO no. and year:** RSO 12 (2017-18)

3.2 Creation of new fire lines in natural forests in Maddivaripalli beat of Onipenta section of Onipenta range

GPS location: N 14.873463 E: 78.836786 **SO no. and year:** RSO 14 (2017-18)

As per official records, a fire line measuring 5 m in width and 1,000 rmt in length was established in Ganji kunta beat under the CAMPA-NPV scheme. During the monitoring and evaluation visit, the fire line was found to be visible and relatively well maintained with minimal growth of grass or weeds. However, a reduction in effective width was noted due to coppice growth of weeds and grasses along the alignment indicating the need for continued maintenance. In Maddivaripalli beat, a fire line of 5 m in width and 703 rmt in length was similarly established. However, the fire line was not clearly visible across the hill with moderate growth of grass and weeds observed along its alignment. This suggests that the fire line is not adequately maintained especially within the natural forest area. Coppice growth of weeds and grasses was also recorded during the field visit.

3.3 Creation of fire-line at Bayanapalli beat of Khajipeta in Proddatur range

GPS location: N 14.580568 E 78.82142 **SO no. and year:** RSO 35 (2017-18)

The fire line at Bayanapalli beat, established under the CAMPA-NPV scheme in 2017-18, measures 3 meters in width and 1,802 meters in length. It is clearly visible and well maintained with minimal coppice growth observed. However, seasonal growth of weeds and grasses during the monsoon may pose a fire risk in summer highlighting the need for annual maintenance.

3.4 Creation of new fire line in natural forests in 5m width in Thaduku beat and Balayapalli beat of Thamballapalli section of Porumamilla range

GPS location: N 15.128921 E 78.85607 **SO no. and year:** RSO 14 (2017 -18)

The fire line at Thaduku beat, established under the CAMPA-NPV scheme in 2017-18, measures 5 meters in width and 2,724 meters in length. Fire lines were also created in Balayapalli beat during the same period. Both fire lines are clearly visible and well maintained with minimal growth of grass and weeds along the cleared areas. While low coppice growth is observed seasonal growth during the monsoon could increase fire risk in summer if not managed. Regular annual maintenance is therefore recommended to ensure effective fire prevention.

3.5 Erection of chain link fence with RCC poles around Cheekativaripalli central nursery of Jangamrajupalli beat

GPS location: N 14.727289 E 78.901364 **SO no. and year:** DSO 166 (2017-18)

A chain-link fence with 95 RCC poles, constructed under the CAMPA-NPV (Forest Fire Management) scheme at Jangamarajupalli beat was found to match the specifications recorded in the measurement book- 1.2 meters in height and 285 running meters in length. Field inspection confirmed that the structure is well maintained with no damage and all RCC pillars intact. The fence effectively prevents animal entry and protects nursery seedlings. Annual maintenance is recommended to ensure its continued effectiveness.

Ganjikunta beat

Bayanapalli beat

Thaduku and Balayapalli beat

Jangamarajupalli beat

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During the period 2017-18, a total of 9 Soil and Moisture Conservation (SMC) activities were implemented in the Proddatur Forest Division. Out of these, 2 activities were selected for monitoring and verification. All the 9 SMC activities were carried out in Badvel range with 2 activities sampled. No SMC works were reported from the other ranges, including Proddatur, Muddanur, Onipenta and Porumamilla during this period.

4.1 Construction of check dam at Balayapalli beat, Badvel range

GPS location: N 14.665519 E 78.981626 **SO no. and year:** DSO 161 (2017-18)

A check dam constructed across Balayapalli 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: length: 14.00 m, width: 0.75 m and depth: 0.90 m. Field verification confirmed that the actual measurements matched the specifications in the measurement book, indicating no deviations from the approved design. The structure was found to be well maintained; however, the total water holding capacity has been reduced due to the accumulation of silt and sediment. In addition, minor repairs are required in the apron section. It is recommended that de-silting operations be carried out to restore the storage capacity and ensure the continued effectiveness of the check dam.

4.2 Development and maintenance/formation of new saucer pits in Ramapuram beat

GPS location: N 14.660895 E 79.136066 **SO no. and year:** RSO 28 (2017-18)

Three saucer pits were constructed across Ramapuram beat, each measuring 3.14 m in length, 7.02 m in width and 0.15 m in depth. Field measurements matched the recorded specifications with no deviations. Of these, two saucer pits were found to be in good condition and well maintained. However, desilting is recommended to increase their storage capacity.

Check dam at Balayapalli beat

Saucer pits at Ramapuram beat

5. Monitoring and Evaluation of Construction Activities

During the period 2017-18, a total of 6 construction activities were implemented in Proddatur Forest Division. Out of these, 2 activities were selected for monitoring and verification. All 6 activities were carried out in Badvel range, of which 2 were selected. No construction works were reported from the other ranges including Proddatur, Muddanur, Onipenta and Porumamilla during this period.

5.1 Construction of RCC cairns in Lothuvanka beat under BDC-SLMWLS

GPS location: N 14.719379 E 78.988922 **SO no. and year:** DSO 109 (2017-18)

Fourteen RCC cairns were constructed across Lothuvanka beat, each measuring 1.20 meters in length, 0.30 meters in width and 1.20 meters in height. Field measurements confirmed alignment with the recorded specifications with no deviations. The cairns are intact and effectively demarcate the boundary between the SLM Wildlife Sanctuary and adjoining revenue land with one cairn placed approximately every 100 meters. Although the cairns located in the hilly region are partially obscured by weed growth, the structures are largely undamaged and the boundary demarcation remains clear and well-defined.

5.2 Construction of residential shed at Reddibhvi base camp in Balayapalli beat

GPS location: N 14.63927 E 78.959088 **SO no. and year:** DSO 248 (2017-18)

A residential shed was constructed at the Reddibavi base camp in Balayapalli beat. The structure includes long walls (2) measuring 0.60 × 4.37 × 0.60 m, short walls (2) at 0.60 × 2.17 × 0.60 m, one door measuring 0.23 × 1.20 × 2.10 m and three windows each measuring 0.23 × 1.20 × 1.35 m. Field measurements confirmed full alignment with recorded specifications, with no deviations. The shed is well maintained and in good condition providing a safe and functional living space for forest watchers stationed in this remote area. The facility supports their efforts in monitoring illegal activities and recording wildlife sightings. Both electricity and water facilities have been provided to ensure comfort and operational efficiency.

RCC cairns at Lothuvanka beat

Residential shed at Balayapalli beat

6. Monitoring and Evaluation of Other Activities

During 2017–18, a total of 127 activities were implemented under the "Others" category in the Proddatur Forest Division, of which 25 were selected for monitoring and evaluation. Range-wise, Proddatur reported the highest number of activities with 33 (7 sampled), followed by Badvel with 30 (6 sampled), Onipenta and Porumamilla with 27 each (5 sampled in both), and Muddanur with 10 activities (2 sampled). Document verification and cross-checking of the sampled activities were carried out in the presence of Division and Range Office staff. The review covered sanction orders, estimation sheets, and work registers, confirming that sanctioned amounts were consistent with actual expenditures and that financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was appropriate and in accordance with approved estimates and CAMPA guidelines. Internal audits by the Conservator of Forests and external audits by the Accountant General's Office ensured transparency and compliance with financial and administrative protocols. However, during verification, minor amount mismatches were observed in several DSO and RSO records across different ranges. In Proddatur Range, discrepancies were noted for DSO 46 (2017–18), which were acknowledged and attributed to typographical errors in the activity list issued by the Kadapa Divisional Office. Similar mismatches were identified in Onipenta Range for DSO 23 and 24 (2017–18), and in Porumamilla Range for DSO 30, 38, 42, and RSO 1 (2017–18), all of which were traced back to typographical errors in the division's activity list. These discrepancies were duly acknowledged and recorded by the respective ranges.

Key Findings

- Plantation results were mixed, with strong outcomes at Itukulapadu, Ganugapenta (7.8 Ha), and Mallela, but weaker performance at Tekurpeta and Ganugapenta (20 Ha).
- Actual plantation areas consistently exceeded recorded values, reflecting survey and documentation gaps.
- Maintenance works were executed but weakened by signage gaps and incomplete journals.
- Fire lines and fencing were functional but required annual upkeep to sustain effectiveness.
- Soil and moisture conservation structures were structurally sound but compromised by siltation.
- Construction works were robust and supported protection and monitoring.
- Financial management was largely sound, though minor discrepancies in records persisted.

Recommendations

- Ensure tree species, especially Pterocarpus santalinus, match site conditions for better survival and growth.
- Institutionalize regular clearing of invasive species in plantations and fire lines.
- Keep plantation boards, journals, and markers current for monitoring and accountability.
- Regularly de-silt and repair trenches, check dams, and contour bunds.
- Clear fire lines annually and maintain fences to protect plantations.
- Keep boundary markers visible through weed removal and upkeep.
- Implement uniform record-keeping to prevent discrepancies.
- Strengthen VSS involvement to support monitoring, protection, and ownership.

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.

Across all six ranges in Ananthapuramu division during 2017-18, a total of 175 activities were undertaken across various ranges, with 44 were sampled and verified. In Ananthapuramu Range a total of 26 (6 sampled) activities were recorded. Among 26 activities, 19 (3 sampled) in Maintenance, 2 (1 sampled) in Protection, 2 (1 sampled) in Construction, and 3 (1 sampled) in others. No activities were reported under Plantation and SMC in Ananthapuramu range. Bukkapatnam Range recorded 17 (5 sampled) activities. These include 16 (4 sampled) in Maintenance, 1 (1 sampled) in Construction. No activities were reported under plantation, Protection, SMC, or others. In Kadiri Range highest number of activities with 56 (15 sampled) were recorded. The major contribution was from 42 (12 sampled) in Maintenance, followed by 11 (2 sampled) in others, 2 (1 sampled) in Protection, and 1 (0 sampled) in Construction. No Plantation and SMC activities were reported in Kadiri range. Gooty range had 19 (4 sampled) activities. These include 8 (2 sampled) in Maintenance, 7 (1 sampled) in Construction, 3 (1 sampled) in SMC, and 1 (0 sampled) in others. No Plantation and Protection activities were recorded in Gooty range. Activities in Kalyandurga range reported were 44 (9 sampled). Among these include 24 (5 sampled) in Maintenance, 14 (3 sampled) in others, and 6 (1 sampled) in plantation. No activities were reported under Protection, SMC, and Construction in Kalyandurga range. Penukonda Range had the lowest total with 13 (5 sampled) activities. These include 7 (3 sampled) in Maintenance, 1 (1 sampled) in SMC, and 5 (1 sampled) in others. No activities were reported under Plantation, Protection and Construction in Penukonda range during 2017-18.

1. Monitoring and Evaluation of Plantation Activities

A total of six plantation activities were reported across the division during 2017-18, with one sampled and verified. Kalyandurga range accounted for the majority, with 6 plantations (only 1 sampled). Ananthapuramu, Kadiri, Gooty, Penukonda and Bukkapatnam range had no plantation activity during 2017-18.

1.1 Kalyandurga range

Under the CAMPA scheme, the Forest Department of Andhra Pradesh undertook six plantation activities in Kalyandurga range during the period 2017–18. As part of the monitoring and evaluation process, three plantation sites (50 %) were randomly selected.

Table 52 Details of plantation selected in Kalyandurga range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSH plot in Belugppa RF	DSO 92 (2017-18)

The 20 Ha plantation site in Belugppa is characterized by red sandy soil, and the planted tree species exhibit good survival and growth rates.

Survival percentage: In 20 Ha plantation in Belugppa, the survival percentages for *Hardwickia binnata*, *Azadirachta indica*, and *Sterculia urens* are 84.89 %, 78.12 %, and 71.85 %, respectively.

Growth: In 20 Ha plantation in Belugppa, the average tree height ranges from 1.80 to 3.86 m, and the average girth ranges from 16.61 to 38.30 cm.

Table 53 Details of plantation enumerated in Kalyandurga range

Sl. no.	Plantation/ Village name	Plot no	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Belugppa 20 Ha	1	*Hardwickia binata*	N14.695681 E 77.072778	81.25	3.70± 0.53	-	27.10 ±6.92
		2	*Hardwickia binata*	N 14.695496 E 77.07315	89.06	3.26± 0.50	-	28.54 ±5.26
		3	*Sterculia urens*	N 14.695415 E 77 073678	71.87	1.80± 0.29	16.61± 3.45	-
		4	*Azadirachta indica*	N 14.695958 E 77.074266	78.12	3.59± 0.48	-	26.42 ±3.33
		5	*Hardwickia binata*	N 14.696237 E 77.074715	84.37	3.86± 0.56	-	38.30 ±6.14
Plantation average					**80.934**	**3.242**	**16.61**	**30.09**

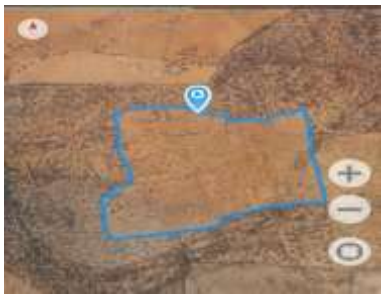
Verification of area/length/boundary of plantation area: In Ananthapuramu division during 2017-18 measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 54 Details of plantation area perambulation in Ananthapuramu division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Raising of 20 Ha NTSH plot in Belugppa RF	20 Ha	25.71 Ha

Perambulation of selected NTSH plantation was carried out with the assistance of the local Forest Beat Officer. 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. Plantation-wise findings Belguppa (20 Ha): 25.71 Ha (exceeded by 5.71 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.



Belguppa 25.71 Ha

Health Status of Plantations: Field inspections revealed visible damage from insect and pest infestations across the plantation sites. While not widespread, the presence of pest activity indicates the need for regular monitoring and early intervention measures.

Protection Measures: To mitigate risks from fire and other environmental threats, fire lines were established, inspection paths created, and fire watchers deployed. These efforts contributed to the basic protection of the plantation area, though maintenance and visibility of these features require continual attention.

Biotic Pressure: Signs of grazing and browsing pressure by both wild and domestic herbivores were evident. This biotic stress led to stunted apical growth in some seedlings, particularly in areas lacking fencing or community surveillance.

Maintenance of Plantation Journals and Records: Plantation journals and records were generally well maintained at the range level. However, periodic updates of key parameters such as survival percentage, growth metrics, and maintenance activities are essential to ensure data relevance and accuracy. 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 Samrakshana Samithi (VSS): Plantations evaluated in the Kalyandurga range, no involvement of the Vana Samrakshana Samithi (VSS) or Joint Forest Management Committees (JFMCs) was recorded in plantation establishment or maintenance. Consequently, no Focus Group Discussions (FGDs) were conducted for community feedback or qualitative evaluation.

Belguppa 20 Ha Plantation

2. Monitoring and Evaluation of Maintenance Activities

Maintenance was the most widespread and intensive activity, with 116 works undertaken, and 29 sampled and verified during 2017-18. Kadiri range led with 42 maintenance activities (12 sampled), followed by Kalyandurga – 24 (5 sampled), Ananthapuramu – 19 (4 sampled), Bukkapatanam – 16 (4 sampled) Gooty – 8 (2 sampled) Penukonda – 7 (3 sampled). Every range had maintenance works, making it the most uniformly distributed activity.

Table 55 Maintenance activities selected for evaluation in Ananthapuramu division

Sl. No.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Ananthapuramu Range			
1	First year maintenance of 26 Ha NTSH plantation in Yellutla RF and beat	N 14.636215 E 77.685802	DSO 75 (2017-18)
2	Third year maintenance of CA plantation for 22 Ha (27.66) in (bit-2) Chillavaripalli additional block in Dadithota beat	N 14.606902 E 77.932582	DSO 182 (2017-18)
3	Third year maintenance of 20 Ha (Bit-1) NTSH plot at Marutla (S) Beat	N 14.765746 E 77.499858	DSO 182 (2017-18)
4	Fourth year maintenance of CA plantation for 5.50 Ha in (bit-1) adjoining to Bhadrapuram RF of Baddalapuramu beat	N 14.443878 E 77.427436	RSO 20 (2017-18)
Gooty Range			
5	Second year maintenance of 10.80 Ha C. A plantation in Mutchukota additional block -19 (Smt. M. Venkata Rajini)	N 14.738106 E 77.91021	DSO 172 (2017-18)
6	Third year maintenance of 8.52 Ha (bit no.1) CA plantation in CA land of M/s Enercon India limited Hyderabad) in Maddipalli beat	N 14.754302 E 77.898098	RSO 10 (2017-18)
Penukonda Range			
7	Third year maintenance of 20 Ha NTSH plantation (bit-II) at Chalakur block of Yerrakonda north beat of Penukonda range	N 13.929704 E 77.580343	DSO 177 (2017-18)
8	Fourth year maintenance of 29 Ha plantation near Kogira block of Penukonda beat of Penukonda range	N 14.146423 E 77.544043	DSO 180 (2017-18)
Bukkapatnum Range			
9	Second-year maintenance of 14 Ha (Bit No. 5) CA plantation of CA land of M/s JPBC adjacent to Kothakota in Yerlampalli beat	N 14.218493 E 77.901912	SDSO 12 (2017-18)
10	Second-year maintenance of 8.88 Ha CA plantation of CA land adjacent to Thummalamala RF in Nallamada beat	N 14.163912 E 77.981234	RSO 02 (2017-18)
11	Second-year maintenance of 4.18 Ha (Bit No. 6) CA plantation of CA land of M/s JPBC adjacent to Kothakota RF in Yerlampalli beat	N 14.223907 E 77.895599	RSO 07 (2017-18)
12	Third-year maintenance of 6.84 Ha CA plantation (Bit No. 6) adjacent to Yerlampalli, Narasimpalli RFs in Yerlampalli beat	N 14.213327 E 77.946169	RSO 14 (2017-18)
Kalyandurga Range			
13	Second year maintenance of 20 Ha NTSH LIM plot in Budikonda RF	N 14.591474 E 77.043425	DSO 63 (2017-18)
14	Second year maintenance of 20 Ha NTSH LIM plot in Khiarevu RF	N 14.450834 E 77.125468	DSO 65 (2017-18)
15	Second year maintenance of 20 Ha NTSH SMM plot in Dharmapuri RF	N 14.746921 E 76.916364	DSO 69 (2017-18)

16	Third year maintenance of 20 Ha NTSH plot in Setturu RF	N 14.451945 E 77.024134	SDSO 31 (2017-18)
17	Fifth year maintenance of 13 Ha PCA LIM plot in M. N. Palli RF of Kalyandurga range	N 14.584399 E 77.263755	RSO 21 (2017-18)
Kadiri Range			
18	First year maintenance of 25 Ha (bit - 2) miscellaneous plantation in CA land near Myrada (V) in Peddannavaripalli	N 14.219976 E 78.377862	DSO 116 (2017-18)
19	Second year maintenance of 6.36 Ha (7 Ha.) miscellaneous plantation in CA lands at Motukupalli beat near Joggannapeta	N 14.037374 E 78.207495	SDSO 25 (2017-18)
20	Second year maintenance of 5 Ha (6.37 Ha) miscellaneous plantation in CA land adjacent to Peddannavaripalli beat	N 14.249051 E 78.369168	RSO 05 (2017-18)
21	Second year maintenance of 4 Ha (4.99 Ha) miscellaneous plantation in CA land of Jaypee cement adjacent to Gorivikanuma RF of Peddannavaripalli beat near Sangativaripalli(V)	N 14.262557 E 78.409306	RSO 06 (2017-18)
22	Second year maintenance of 3 Ha (3.63 Ha) miscellaneous plantation in CA land of Jaypee cement adjacent to Eswaramala RF near Pedaballi(V) in Edurudona beat	N 13.976273 E 78.385426	RSO 09 (2017-18)
23	Second year maintenance of 10.80 Ha (14 Ha) miscellaneous plantation in CA lands of (8) different applicants at Kurli beat near Patnam (V) in Kadiri range	N 14.229721 E 78.131288	SDSO 22 (2017-18)
24	Third year maintenance of 27 Ha miscellaneous plantation in CA land of Jaypee cement adjacent to Kokkanti RF of Kokkanti beat near Malameedapalli(V) in Kadiri range	N 14.02925 E 78.250528	DSO 178 (2017-18)
25	Third year maintenance of 12 Ha. Part of 22 Ha miscellaneous plantation in CA land adjacent to Gorivikanuma RF in Peddannavaripalli beat near Gunduvaripalli (V)	N 14.281302 E 78.34067	SDSO 21 (2017-18)
26	Fourth year maintenance of 8 Ha miscellaneous plantation in CA land of Jaypee cement adjacent to Velichelamala RF of Tallakalva	N 14.024439 E 78.057428	RSO 16 (2017-18)
27	Fourth year maintenance of 3 Ha miscellaneous plantation in CA land of Jaypee cement adjacent to Thummala RF of Thummala	N 14.281302 E 78.340681	RSO 21 (2017-18)
28	Fifth year maintenance of 3.94 Ha CA plantation in Marrikommadinne block of Tallakalva beat in Kadiri range	N 13.941008 E 78.133173	RSO 23 (2017-18)
29	Fifth year maintenance of 3.50 Ha bit - 2 miscellaneous plantation in CA land of M/s SR Minerals in Turakavaripalli (V) of Tanakal	N14.181647 E 78.055138	RSO 24 (2017-18)

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.

General recommendations for maintenance activities

- Strengthen weed management, especially targeting *Lantana* and invasive grasses along boundaries, through regular circular weeding and soil working.
- Regularly clear and maintain fire lines, including areas adjacent to revenue land, to ensure visibility and effective fire prevention.
- Install and maintain boundary stones and display boards for clear demarcation and easy site identification. Restore damaged markers as needed.
- Maintain accurate records and ensure all plantation markers are in place to support effective tracking and community-based monitoring.
- Continue pruning, coppice cutting, and implement soil and moisture conservation measures. Replant empty pits using drought-resilient species to improve survival rates.

Yellutla of Ananthapuramu range

Dadithota of Ananthapuramu range

Mutchukota of Gooty range

Y. K. beat of Penukonda range

Budikonda of Kalyandurga range

Khairevu of Kalyandurga range

Peddanavaripalli of Kadiri range

Nallamada of Bukkapatnam range

3. Monitoring and Evaluation of Protection Activities

Protection efforts were minimal, with only 4 activities reported (2 sampled) during 2017-18. Ananthapuramu and Kadiri range each had 2 protection activities (1 sampled each). No protection work was taken up in Bukkapatanam, Gooty, Kalyandurga, or Penukonda.

3.1 Formation of new fire lines in natural forest area in Marutla RF & beat of Ananthapuramu range

GPS location: N 14.769847 E 77.500444 **SO no. and year:** RSO 35 (2017-18)

3.2 Creation of new fire lines in Eswaramala RF of compt. no. 1, 3 in Edurudona beat of Kadiri range under forest fire management scheme

GPS location: N 13.95663 E 78.325711 **SO no. and year:** SDSO 55 (2017-18)

A fire line was created and maintained in the natural forest area of Marutla Beat in the Ananthapuramu Range, and similarly, in Eswaramala Reserve Forest (Compartment Nos. 1 and 3) of Edurudona Beat in the Kadiri Range. These fire lines were monitored and evaluated based on the specifications recorded in the measurement book, and verified through actual field measurements. In the Ananthapuramu Range, the new fire line measured 10 meters in width and 2,000 meters in length. In the Kadiri Range, the fire line measured 6 meters in width and 3,245 meters in length. Field measurements in both locations were consistent with the entries in the measurement book, confirming no deviations. The fire line in Ananthapuramu Range was established along an inspection path, ensuring clear visibility. In contrast, the fire line in Kadiri Range was not aligned with an inspection path or baseline, resulting in limited visibility. However, in both areas, no dense grass/weed growth was observed, indicating that the fire lines were well-maintained across the natural forest areas.

Fire lines in Marutla RF and beat

Fire lines in Eswaramala RF of Edurudona beat

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

Four SMC activities were reported in Ananthapuramu division during 2017-18. Among four, two SMC activities were sampled, each in Gooty and Penukonda range. No SMC activity was carried in Ananthapuramu, Bukkapatanam, Kadiri, and Kalyandurga range during 2017-18.

4.1 Construction of check dam at Sy.no.669 in Kogira Block of Penukonda beat, Penukonda

GPS location: N 14.146996 E 77.539707 **SO no. and year:** DSO 331 (2017-18)

A check dam constructed in the Kogira block of Penukonda Beat was monitored and evaluated against the specifications recorded in the measurement book and verified through actual field measurements. The dimensions of the check dam are as follows: length – 10.0 meters, width – 0.5 meters, and depth – 1.5 meters. The field measurements were found to be consistent with the recorded specifications, indicating no deviations. The structure is well maintained and effectively demonstrates good water storage capacity during the monsoon season. However, regular de-siltation is recommended to further enhance its storage capacity, improve water infiltration, and maintain soil moisture levels more effectively.

Check dam at Sy.no.669 in Kogira Block of Penukonda beat, Penukonda range

4.2 Digging of CCT in the CA land offered by 8 different projects adjacent to Muchukota RF in Maddipalli beat of Gooty range

GPS location: N 14.738042 E 77.910296 **SO no. and year:** DSO 310 (2017-18)

A total of 202 Continuous Contour Trenches (CCTs) excavated in Muchukota Reserve Forest within Maddipalli Beat were monitored and evaluated based on the specifications recorded in the measurement book and compared with actual field measurements. Each trench measured 10 meters in length, 0.50 meters in width, and 0.50 meters in depth, with a total calculated volume of 505 cubic meters. The field measurements were found to be in full agreement with the recorded specifications, indicating no deviations. However, in some of the lower-lying trenches within the reserve forest, a slight reduction in depth was observed due to minor accumulation of silt and stony gravels. This reduction was negligible and does not significantly impact the functionality of the structures.

CCT's in the CA land adjacent to Muchukota RF in Maddipalli beat of Gooty range

5. Monitoring and Evaluation of Construction Activities

A total of eleven construction activities were taken up in Ananthapuramu division during 2017-18 and among these three sampled. Gooty range had the highest number with 7 constructions (one sampled). Ananthapuramu range had two construction and Bukkapatanam range had one activity, one in each range sampled. Kadiri range had one construction activity, Kalyandurga and Penukonda range reported no construction activities during 2017-18. List of construction activities taken up during 2017-18 in Ananthapuramu division is as follows;

Table 56 Construction activities selected for evaluation

Sl. no.	Construction activities	GPS Co-ordinates	SO no. and year
1	Construction of 15 no's (17.75 Ha) boundary pillars around the CA land M/s Sarjan Realities Private Limited adjacent to Kondapalli reserve forest of Ananthapuramu range	N 14.497906 E 77.393697	DSO 265 (2017-18)
2	Construction of 67 no's RCC boundary pillars around the CA land of (M/s A. Sreenivasa) in Muchukota additional block-67, Maddipalli beat of Muchukota section	N 14.73378 E 77.91924	DSO 270 (2017-18)
3	Construction of 22 no's (6.05 Ha) RCC boundary pillars around the CA Land of M/s JPBC Haul Road adjacent to Jonnavulapalli reserve forest and Gunipalli beat of Mudigubba section in Bukkapatnam range	N 14.254246 E 77.922882	DSO 309 (2017-18)

Construction of 15 boundary pillars in Kondapalli reserve forest, 67 RCC boundary pillars in Muchukota additional block-67 and 22 boundary pillars in Jonnavulapalli reserve forest 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 in Kondapalli reserve forest and Muchukota additional block-67 area were found intact and effectively demarcating the forest boundaries.

Boundary pillars in Kondapalli RF

R.C.C. boundary pillars in Maddipalli

Boundary pillars in Jonnavulapalli RF

6. Monitoring and Evaluation of Other Activities

During 2017–18, the Ananthapuramu Division implemented thirty-four activities categorized as "other activities" under the CAMPA scheme, of which seven activities (20%) were sampled for detailed monitoring and evaluation. Kalyandurga Range had 14 activities, with 3 sampled; Kadiri Range had 11 activities, with 2 sampled; Penukonda Range had 5 activities, with 1 sampled; and Ananthapuramu Range had 3 activities, with 1 sampled. Internal and external audits were conducted by the Conservator of Forests and the Auditor General, respectively, and document verification at the Division and Range Offices confirmed that sanctioned amounts generally matched recorded expenditures. The evaluation of the sampled activities revealed that sanctioned amounts aligned with actual expenditures, financial records were properly maintained and authenticated by the concerned officials, and fund utilization was appropriate and consistent with approved estimates and guidelines. The estimate for RSO 2 (2017–18) was revised to RSO 16 (2017–18), but the estimate for RSO 16 was missed during file transfer, with a note on the missing estimate provided by Penukonda Range.

Key Findings

- Plantations in Kalyandurga performed well, with survival above 80 percent, but were undermined by pest incidence, grazing, and lack of community engagement.
- Maintenance was widespread and effective, yet uneven fertilizer use, weak fire line upkeep, and missing display boards reduced quality.
- Protection measures were minimal, restricted to fire lines in two ranges, with inconsistent visibility.
- SMC coverage was very limited, though technically sound; long-term effectiveness requires de-silting.
- Boundary pillars were well executed, securing forest demarcation.

- Financial accountability was strong, with robust audits, but documentation updates and GIS-based verification need strengthening.
- Community participation was absent, undermining social sustainability.

Recommendations

- Consolidate plantations in ecologically suitable areas like Kalyandurga, and strengthen pest management and grazing controls.
- Extend maintenance cycles and enforce strict standards for fertilizer distribution, fire line clearance, and plantation demarcation.
- Expand protection measures beyond fire lines, including fencing and watch systems.
- Scale up SMC interventions, with systematic de-silting schedules to preserve functionality.
- Institutionalize GPS/GIS-based verification for accurate area recording.
- Mandate structured VSS involvement and FGDs across all plantations to foster community ownership.
- Rebalance the CAMPA portfolio to reduce reliance on “others” and increase emphasis on plantations, SMC, and protection.

9. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN GIDDALUR DIVISION

Introduction

Giddalur Forest Division, situated in the southern part of Prakasam district in Andhra Pradesh, forms a significant part of the Eastern Ghats landscape and is ecologically classified under the Southern Tropical Dry Deciduous Forests as per the India State of Forest Report (ISFR) and Andhra Pradesh State Forest Inventory. Spanning an approximate forest area of 1,944.51 sq.km which constitutes around 18.68% of the division's total land area, this forest zone plays a critical role in maintaining regional ecological balance and supporting both flora and fauna adapted to semi-arid conditions. The climate of Giddalur is typically dry and hot with temperatures ranging from 19°C to 38°C occasionally peaking higher during summer months. The area receives an average annual rainfall of about 871 mm largely due to the southwest monsoon. The terrain is mostly undulating with rocky outcrops and soils predominantly made up of sandstone, quartzite and occasional shale features that significantly influence the type of vegetation the region can support. The forests in Giddalur Division are primarily dry deciduous with a mix of dense, open and scrub forest types. The vegetation exhibits classic adaptations to water scarcity such as seasonal leaf shedding and deep root systems. Major tree species found in the division include *Wrightia tinctoria, Albizia amara, Anogeissus latifolia, Acacia chundra and Dalbergia paniculata*. These species are well-suited to the prevailing dry conditions and contribute to both the ecological diversity and the timber value of the forests. In terms of biomass and timber resources, the division holds a substantial growing stock volume of approximately 7.02 million cubic meters. Significant contributors to this volume include *Terminalia tomentosa, Pterocarpus marsupium, Anogeissus latifolia, Hardwickia binata and Dalbergia paniculata.* The flora of Giddalur Forest Division is representative of the transitional zone between moist and arid ecosystems supporting not only tree species but also a wide array of shrubs, herbs, climbers and grasses. While detailed understorey vegetation data is limited in the ISFR summaries, *Ziziphus, Lantana, Cassia, Dodonaea* regional floristic studies indicate the presence of species like and various seasonal grasses that provide ground cover and fodder for wildlife and livestock. From an ecological perspective, the Giddalur forests serve as a vital biodiversity buffer and carbon sink especially in a region increasingly threatened by deforestation, overgrazing, and land-use changes. The forest division also has socio-economic significance, supporting local communities through non-timber forest products (NTFPs) such as gums, medicinal plants and fodder. However, challenges like habitat degradation, encroachments and unsustainable resource extraction persist calling for focused conservation and restoration efforts. In summary, Giddalur Forest Division is a critical dry deciduous ecosystem with rich yet vulnerable biodiversity. Its flora is adapted to arid conditions with a dominant presence of drought-resistant and economically valuable tree species. With proper management and conservation, these forests can continue to offer ecological services and livelihoods for generations to come.

During the period 2017-18, a total of 45 CAMPA activities were implemented in the Giddalur division, of which 11 activities approximately 24 % were selected for detailed monitoring and evaluation. The highest number of activities were reported in Turimella range, where 19 activities were carried out and 5 were sampled for evaluation. This was followed by Giddalur range which implemented 13 activities with 4 selected for monitoring. Gundlakamma range

also had 13 activities of which 2 were sampled. Among activity types, other works dominated the implementation with 43 activities, of which 10 were sampled, followed by protection (2; 1 sampled). No plantation, maintenance, SMC and construction activities were implemented during this period.

1. Monitoring and Evaluation of Protection Activities

During the period 2017-18, a total of 2 protection activities were undertaken in Giddalur division, of which 1 was sampled. Both activities were implemented in Giddalur range with one selected for sampling. No protection activities were reported from Gundlakamma and Turimella ranges during this period.

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

GPS Co-ordinates: Stretch 1 (4000 m): Parameswar to Ontibodu N 15.242273 E 78.818543

Stretch 2 (4000 m): Swamy Cheruvu to Bodswarudu N 15.238362 E 78.848426

SO no. and year: RSO 12 (2017-18)

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 Bodi beat, Giddalur range

2. Monitoring and Evaluation of Other Activities

During 2017-18, a total of 43 activities were carried out under the "Others" category in Giddalur Division, of which 10 were sampled for detailed verification. The highest number of activities were recorded in Turimella Range with 19 (5 sampled), followed by Gundlakamma with 13 (2 sampled) and Giddalur with 11 (3 sampled). The verification process was undertaken in the presence of Division and Range office staff, wherein sanction orders, estimation sheets, and work registers were thoroughly reviewed. 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, including the DFO, SDO, and FRO. The utilization of funds 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 compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- During the evaluation period, the division shifted its focus entirely towards protection-related works and activities categorized under "Others." No major plantation or soil and moisture conservation (SMC) initiatives were undertaken, indicating that the priority remained on safeguarding existing forest resources, ensuring vigilance, and addressing operational needs falling under the miscellaneous category.
- It was observed that neither plantation programs nor soil and moisture conservation interventions were taken up during the year. This suggests that the emphasis was not on creating new assets or improving ecological services through plantations or SMC structures but rather on maintaining and strengthening the protection measures already in place.
- The fire lines in the sampled sites were found to be well maintained. Regular upkeep of these fire prevention measures demonstrated the division's commitment to mitigating forest fire risks and protecting existing vegetation. The effective maintenance of fire lines is crucial in reducing the spread of fire and ensuring the long-term sustainability of forest cover.

Recommendations

- Reintroduce Plantation and SMC Activities: Resume plantation works with indigenous species and implement SMC measures (check dams, contour trenches, gully plugs) to improve soil health, groundwater recharge, and biodiversity.
- Sustain Fire Line Maintenance: Continue regular clearance and upkeep of fire lines in vulnerable beats to prevent wildfire spread and protect forest resources.
- Ensure Strict Financial Monitoring: Maintain rigorous internal and external audits, with regular scrutiny of records to uphold accountability, transparency, and effective fund utilization under CAMPA.

10. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KURNOOL DIVISION

Introduction

Kurnool division in western Andhra Pradesh spans 12,904 sq.km, of which 1,202.55 sq.km (9.58%) is notified forest. However, actual forest cover is only 75.98 sq.km (0.39%), including 5.18 sq.km of moderately dense forest and 70.80 sq.km of open forest, while 767.27 sq.km is scrubland, reflecting significant degradation. Forests belong mainly to Tropical Dry Deciduous and Tropical Thorn types, characterized by open canopy, short trees, thorny shrubs, and grasses adapted to hot, dry conditions (>45°C summers, 523 mm rainfall). Dominant species include *Anogeissus latifolia*, *Hardwickia binata*, *Albizia amara*, *Chloroxylon swietenia*, *Terminalia* spp., with limited but valuable *Pterocarpus santalinus* (Red Sanders). Shrubs include *Ziziphus*, *Lantana camara*, *Carissa carandas*, and *Acacia* spp., with sparse drought-tolerant grasses. Conservation-significant species like *Syzygium alternifolium*, *Terminalia pallida*, and *Cycas beddomei* survive in undisturbed patches but face threats from habitat loss and resource extraction. Community participation is notable, with 281 Vana Samrakshana Samitis (VSS) managing 628.35 sq.km, contributing to afforestation, fire prevention, and biodiversity protection. Yet, forest health remains fragile due to poor canopy density, grazing pressure, and human encroachment. In summary, Kurnool forests represent a dry, open, and degraded ecosystem with valuable but vulnerable biodiversity. Strengthening conservation, ecological restoration, and community-based governance is crucial for sustaining these resources.

During the period 2017-18, a total of 49 CAMPA activities were undertaken in Kurnool division, of which 11 activities (around 22 %) were selected for detailed monitoring and evaluation. Among the forest ranges within the division, Dhone range recorded the highest number of CAMPA activities with 22 activities implemented, out of which 5 were selected for sampling. This was followed by Adoni range, where 19 activities were carried out and 4 were sampled for evaluation. Kurnool range had the lowest number among the three with 8 activities implemented and 2 of them selected for sampling. Among activity types, maintenance works dominated with 26 activities (5 sampled), followed by others (18; 4 sampled), plantations (4; 1 sampled). Minimal activity was recorded under protection (1; 1 sampled) and there were no SMC and construction activities implemented during this period.

1. Monitoring and Evaluation of Plantation Activities

During the period 2017-18, a total of 4 plantation activities were carried out under CAMPA in Kurnool Forest Division, of which 1 activity representing approximately 25% was selected for monitoring and evaluation. Among the forest ranges, Adoni and Dhone each reported 2 plantation activities. However, only 1 activity from Dhone was selected for sampling, while no activities from Adoni were included in the evaluation sample. The Kurnool range did not report any plantation.

1.1 Dhone range

During 2017–18, a total of two plantation activities were implemented under the CAMPA scheme in Dhone range. For monitoring and evaluation, 50 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 57 Details of plantation selected in Dhone range

Sl. no.	Plantation	SO no. and year
1	Raising of 25 Ha SMM plantation in Malyala beat	DSO 14 (2017-18)

The selected plantation site at Malyala is characterized by flat terrain with red soil, a condition favourable for dry deciduous species. The planted species have demonstrated a good survival rate under these conditions.

Survival Percentage: At Malyala site, plantation exhibited encouraging survival percentages for all four evaluated species: *Sterculia urens*: 76.03 %, *Azadirachta indica*: 75.20 %, *Hardwickia binata*: 73.55 %, *Soymida febrifuga*: 71.90 %. Despite minor variations, all species achieved survival rates above 70%, indicating that the plantation site offers generally suitable ecological conditions for dry deciduous tree species.

Growth Performance: The average tree height in Malyala plantation ranged from 2.25 to 4.53 m, while the average girth ranged from 22.60 to 30.55 cm. These variations may be attributed to differences in species growth rates, microclimatic conditions, soil quality and competition for light, water and nutrients.

Table 58 Details of plantation enumerated in Dhone range

Sl. no.	Plantation name	Plot no.	Species Name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Malyala 25 Ha NTSH plantation	1	*Azadirachta indica*	N 15.322920 E 72.758939	73.55	4.53 ±0.42	-	30.39 ±3.41
		2	*Soymida febrifuga*	N 15.322564 E 77.758943	71.90	3.77 ±0.27	-	28.30 ±3.48
		3	*Sterculia urenus*	N 15.322714 E 77.758539	76.03	2.25 ±0.25	22.60 ±3.09	-
		4	*Azadirachta indica*	N 15.323147 E 77.758217	76.85	4.26 ±0.25	-	30.55 ±3.37
		5	*Hardwickia binata*	N 15.323349 E 77.757919	73.55	3.61 ±0.37	-	27.35 ±3.80
Plantation average					**74.37**	**3.68**	**22.60**	**29.14**

Verification of plantation area and boundaries

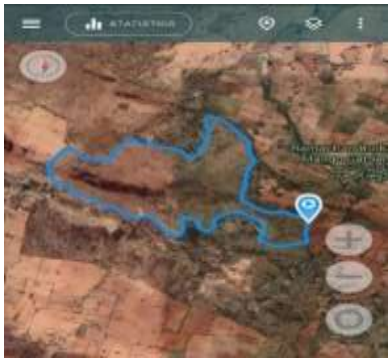
In Kurnool division during 2017-18, measurement of plantation area was conducted using KML files for each location. These were processed to generate accurate maps and calculate the extent of the respective plantation areas.

Table 59 Details of plantation area perambulation in Kurnool division

Sl no.	Plantation	Area as per records	Area as per field perambulation
1	Raising of 25 Ha SMM plantation in Malyala beat	25 Ha	40.65 Ha

Perambulation of Malyala plantation area was conducted in the presence of the designated Forest Officer, following the site demarcation indicated by the plantation watcher/guard in charge. The verification involved a complete physical walk-through using the Geo Tracker

mobile application, which enabled accurate boundary mapping and the collection of GPS coordinates along with geotagged photographs. The spatial data collected during the field visit was subsequently analysed using QGIS software. The analysis revealed that the actual plantation area is 15.65 hectares larger than the area recorded in official documents. This discrepancy is primarily due to the inclusion of rocky terrain, trenches, and barren patches within the plantation boundaries areas that were previously excluded or overlooked during initial documentation. The detailed visual and spatial records obtained during the perambulation are provided below for reference ensuring transparency and accuracy in area verification.



Malyala 40.65 Ha

Malyala plantation

Health status of plantation: The overall health status of plantation in Malyala 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: Several protection measures such as fire lines, inspection paths, and fire watchers were implemented to safeguard plantations from fire and environmental threats. These have reduced vulnerability during the dry season, though regular upkeep and visibility are crucial for sustained effectiveness.

Biotic (human/cattle) Pressure on Plantation: Incidents of grazing and browsing pressure were not observed in the plantation areas indicating effective protection measures and minimal biotic interference from humans or livestock. The absence of such pressures is likely to have contributed positively to the overall health and survival of the plantation.

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 Malyala plantation located in Dhone 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.

2. Monitoring and Evaluation of Maintenance Activities

During 2017-18, a total of 26 maintenance activities were carried out in Kurnool division, of which 5 activities were selected for monitoring. Dhone accounted for the maximum with 13 activities (3 sampled), followed by Adoni with 12 (2 sampled) and only 1 maintenance activity was implemented in Kurnool which was not sampled.

Table 60 Maintenance activities selected for evaluation in Kurnool division

Sl. no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Dhone range			
1	Third year maintenance of 20 Ha SMM plantation in Owk beat	N 15.246931 E 77.076882	DSO 48 (2017-18)
2	Fourth year maintenance of Nereducherla block plantation (2.66 Ha) (CA area given by the user agency for extracting of mines in the reserve forest)	N 15.206158 E 77.892944	RSO 05 (2017-18)
3	Fifth year maintenance of 19 Ha SMM plantation in Malyala beat	N 15.419477 E 77.715473	DSO 55 (2017-18)
Adoni range			
4	Second year maintenance of 20 Ha plantation at Aravani kunta locality in Kuppagal beat	N 15.750776 E 77.222026	DSO 25 (2017-18)
5	Third year maintenance of 20 Ha bit - I plantation in Kuppagal beat of Adoni section	N 15.750776 E 77.222026	DSO 45 (2017-18)

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

- 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.
- Improve the frequency and timing of pruning operations to promote healthy plant structure and better bole formation.

Owk beat, Dhone range

Kuppagal beat, Adoni range

3. Monitoring and Evaluation of Protection Activities

During 2017-18, only one protection activity was undertaken in Kurnool division, which was sampled. This activity was implemented in Adoni range, while no protection activities were recorded in other ranges of Kurnool division during this period.

3.1 Creation of fire line in Tuggali beat of Pathikonda section of Adoni range

GPS location: N 15.380367 E 77.595257 **SO no. and year:** RSO 12 (2017-18)

A fire line created and maintained in Tuggali beat under CAMPA-NPV (forest fire management) scheme was monitored and evaluated against the specifications recorded in the measurement book with the actual field measurements. The dimensions of fire line are width- 3 m and length- 4500 rmt. 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.

Fire line at Tuggali beat

4. Monitoring and Evaluation of Other Activities

During 2017-18, a total of 18 activities were carried out under the "Others" category, of which 4 were sampled for detailed verification. The activities were evenly distributed between Dhone and Kurnool, with 7 activities each (1 and 2 sampled, respectively), while Adoni reported 4 activities (1 sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff, reviewing 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, including the DFO, SDO, and FRO. Fund utilization was appropriate and consistent with approved estimates and guidelines. Internal audits by the Conservator of Forests and

external audits by the Accountant General's office ensured transparency and compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- Plantations showed consistently high survival rates across all species. Selected dry deciduous native species are well-suited to local climatic and soil conditions. Demonstrates ecological adaptability and validates species selection for afforestation programs. Positive survival trends support long-term success of plantation initiatives and restoration of degraded landscapes.
- Some plantation areas exceeded the recorded figures in official documentation. Indicates a systemic mismatch between field implementation and records, highlighting discrepancies in planning, execution, or reporting. Accurate mapping and regular reconciliation between field activities and official records are needed for transparency, effective resource allocation, and proper monitoring.
- Regular maintenance activities (weeding, watering, protection from grazing/fire) improved sapling survival. Incomplete or inconsistent documentation reduced the effectiveness of monitoring and evaluation. Proper record-keeping is essential to track growth trends, plan future interventions, and ensure accountability for funds and labor.

Recommendations

- To ensure accuracy in reporting plantation extents, it is recommended to conduct annual third-party GIS audits. Independent verification using satellite imagery and GIS mapping will help reconcile discrepancies between field activities and official records, provide transparency, and improve planning for future afforestation efforts.
- Priority should be given to expanding plantations of drought- and heat-tolerant native species such as *Sterculia urens* and *Hardwickia binata*. These species are ecologically suited to semi-arid conditions, exhibit high survival rates, and contribute to long-term forest restoration, biodiversity conservation, and ecosystem stability.
- To overcome gaps in record-keeping, all plantation journals should be digitized with geo-tagged survival and growth data. This will allow real-time monitoring, easier verification, and data-driven decision-making for adaptive management of plantations.
- In high fire-risk zones, community-based fire-protection squads should be established. Trained local volunteers can assist with early detection, rapid response, and maintenance of fire lines, enhancing the protection of plantations and natural forests while fostering local participation in forest management.
- Strengthening institutional capacity for modern monitoring tools such as drones and QGIS-based mapping is essential. These technologies enable accurate assessment of plantation survival, canopy cover, and forest health over large areas, improving efficiency, planning, and resource allocation for sustainable forest management.

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 teak-dominated 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 lacunae. 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 six CAMPA activities were carried out, of which 1 activity were selected for detailed monitoring and evaluation. In Baniganapalli range, 6 activities were implemented, and 1 were sampled. None of the activities were implemented or sampled in Panyam range

1. Monitoring and Evaluation of Maintenance Activities

A total of six maintenance activities were carried out in Nandyal division during 2017-18, of which one activities were selected for monitoring in Baniganapalli range.

Table 61 Maintenance activities selected for evaluation in Nandyal division

Sl. no.	Maintenance Activity	GPS Co ordinates	SO no. and year
Baniganapalli range			
1	Fourth-year maintenance of safety zone plantation (0.83 Ha) lease unit of G. Maddilety Reddy	N 15.311807 E 78.188258	RSO 07 (2017-18)

As per the approved maintenance plan, the type of maintenance activities undertaken depends on the year of implementation following plantation establishment. These activities include 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 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.

G. MaddiletyReddy, Banaganapalli range

Key Findings

- CAMPA implementation was minimal in 2017–18, restricted to only six maintenance works in one range.
- No plantation, SMC, protection, or construction activities were undertaken.
- Maintenance works carried out were satisfactory, though identification signage was poor.
- Plantation boards and markers were either damaged or missing, reducing monitoring effectiveness.

Recommendations

- Expand CAMPA coverage to include plantations, SMC structures, and protection activities for greater ecological impact.
- Replace and maintain plantation boundary boards and stones to facilitate monitoring and prevent encroachment.
- Maintain accurate and updated plantation journals to strengthen accountability.
- Continue prioritizing fire line clearance and weed control, particularly against invasive *Lantana*.
- Institutionalize periodic inspections to ensure timely execution of maintenance measures.

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 2017-18, a total of 133 CAMPA activities were carried out, of which 31 activities (around 23 %**)** were selected for detailed monitoring and evaluation. In Atmakur range, 47 activities were implemented, and 9 were sampled. In Srisailam range, 28 activities were implemented, and 5 were sampled. In Bairluty range, 22 activities were implemented, with 5 sampled. In Velgode range, 21 activities were implemented, and 6 were sampled. In Nagaluty range, 15 activities were implemented, and 6 were sampled. Among activity types, other works dominated with 110 activities (23 sampled), followed by maintenance (19; 4 sampled), Protection (2; 2 sampled), soil and moisture conservation (1; 1 sampled), Construction (1; 1 sampled) there were no Plantation activities were implemented.

1. Monitoring and Evaluation of Maintenance Activities

A total of 19 maintenance activities were carried out in Atmakur division during 2017-18, of which 4 activities were sampled for monitoring. Maximum was counted in Srisailam range with 12 activities 1 sampled, Bairluty range with 3 activities 1 sampled, Nagaluty and Velgode ranges with 2 activities 1 sampled in each range. There was no maintenance activities reported from the Atmakur range.

Table 62 Maintenance activities selected for evaluation in Atmakur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Srisailam range			
1	First year maintenance of 10 Ha Bamboo plantation in Pecheruvu (E) beat	N 15.967966 E 78.840625	RSO 19 (2017-18)
Bairluty range			
2	First year bamboo plantation maintenance in Rudracode section of Nallakalva beat	N 15.812298 E 78.646107	RSO 20 (2017-18)

Nagaluty range			
3	Second year maintenance of 37 Ha ANR plantation in Deccan cement CA land area of Indireswaram west	N 15.905437 E 78.659512	RSO 08 (2017-18)
Velgode range			
4	First year maintenance of 10 Ha Bamboo plantation in Pangidi beat	N 15.722143 E 78.661859	RSO 22 (2017-18)

As per the approved maintenance plan, the type of maintenance activities undertaken in the second year of implementation following plantation establishment. These activities include Casualty Replacement, Fertilizer Application, 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;

Note: In Srisailam range first year maintenance of 10 Ha Bamboo plantation in Pecheruvu (E) beat with GPS location N 15.967966 E 78.840625 of RSO 19 (2017-18) ANR (Assisted Natural Regeneration) gap planting for the bamboo plantation, the area was found to be fully waterlogged due to its proximity to Peddacheruvu Lake. This waterlogging condition likely led to the death of the bamboo plants as bamboo typically requires well-drained soil to thrive. However, *Pongamia pinnata* plants, which had been planted prior to the bamboo, were still present but exhibited stunted growth.

General recommendations for maintenance activities

- Weeding: Intensify regular weeding along boundaries to control Lantana and invasive grasses.
- Fire protection: Maintain and widen fire lines before the dry season; ensure regular patrolling and community involvement.
- Replanting: Replace casualties promptly with healthy, site-suitable seedlings and provide proper aftercare.
- Boundary demarcation: Replace damaged boards, install durable stones, and geo-tag markers to prevent encroachment.
- Records management: Maintain accurate, updated plantation journals with GPS-based monitoring for transparency.
- Site-specific action: Replace bamboo in waterlogged areas (e.g., Pecheruvu E beat) with water-tolerant native species and implement drainage measures.

Pecheruvu beat, Srisailam range

Pangidi beat, Velgode range

2. Monitoring and Evaluation of Protection Activities

A total of 2 Protection activities were carried out in Atmakur division during 2017-18, of which 2 activities were selected for monitoring. Each activity in Nagaluty and Velgode range. No Protection activities were reported from other ranges.

2.1 Maintenance of fire tracing operations in Deccan cement CA land area of Indireswaram West beat

GPS location: N 15.923898 E 78.65035 **SO no and year:** DSO 175 (2017-18)

2.2 Maintenance of existing fire lines in GIB Rollapadu sanctuary

GPS location: N 15.750837 E 78.366942 **SO no. and year:** DSO 169 (2017-18)

Fire lines were created and maintained under the CAMPA-NPV (Forest Fire Management) scheme at Deccan Cement CA land area in Indireswaram West Beat, Nagaluty Range, and at the GIB Rollapadu Sanctuary in Velgode Range. The fire line dimensions were recorded as 5 m in width and 148,900 rmt in length at Indireswaram West Beat, and 5 m in width and 18,210 rmt in length at Rollapadu Sanctuary. Field verification confirmed that the actual measurements matched those in the measurement book, with no deviations observed. The fire lines were clearly visible and effectively established around the respective sites. However, periodic maintenance is essential to sustain their effectiveness in providing fire protection.

Fire lines in Indireswaram, Nagaluty range

Fire lines in GIB Rollapadu sanctuary

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

A total of one activity was carried out during 2017-18 in Nagaluty range, 20 % was sampled which is equivalent to single activity. No SMC works were recorded in other ranges of Atmakur division.

3.1 Construction of 2 no's mini percolation tanks at CA Land location of Indireswaram West beat

GPS location: N 15. 916172 E 78.679835 **SO no. and year**: RSO 71 (2017-18)

Digging of mini percolation tanks in CA land area in Indireswaram West beat was monitored and evaluated in Nagaluty range. The percolation tanks were found to be well maintained with the dimensions of width - 10 m, length - 10 m and depth of 1 m, and its measurements align with the recorded specifications. It demonstrates good water facility. However, periodic maintenance and de-siltation is recommended to enhance effectiveness.

Mini percolation tanks in CA land area in Indireswaram west beat

4. Monitoring and Evaluation of Construction Activities

A total of one activity was carried out during 2017-18 in Srisailam 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 iron shed for animal orphanage centre in forest range office complex at Sundipenta

GPS location: Shed-I: N 16.071938 E 78.907874 **SO no. and year:** DSO 216 (2017-18)
Shed-II: N 16.071264 E 78.908041

An iron shed for the Animal Orphanage Centre was constructed within the Forest Range Office complex at Sundipenta in Srisailam Range. As per the measurement book and field verification, Shed–I (15.5 m × 8.5 m × 3 m with 18 iron pillars) and Shed–II (9.5 m × 8.5 m × 3 m with 12 iron pillars) were found to match exactly, with no variation recorded. The shed is in good condition, provided with a roof for protection against sunlight and rain, and enclosed with chain-link fencing to ensure the safety and security of rehabilitated wild spotted deer sheltered within.

Iron shed at Sundipenta in Srisailam range

5. Monitoring and Evaluation of Other activities

During 2017–18, the Atmakur Division undertook 110 activities under the “Others” category, of which 23 were sampled for verification. Range-wise, Atmakur had the highest number with 47 activities (9 sampled), followed by Bairluty (19; 4 sampled), Velgode (18; 4 sampled), Srisailam (15; 3 sampled), and Nagaluty (11; 3 sampled). Document verification, conducted in the presence of Division and Range staff, covered sanction orders, estimation sheets, and work registers. Overall, sanctioned amounts aligned with expenditures, and financial records were

properly maintained and authenticated by DFO, SDO, and FRO. Internal and external audits ensured compliance with CAMPA guidelines.

However, some discrepancies were noted due to missing estimates and work registers across ranges: Atmakur (DSO 1, 7, 13, 24, 49), Bairluty (DSO 33, 34), Nagaluty (DSO 2, 9, 25), Velgode (RSO 22, 38, 54; DSO 43, 169), and Srisailam (DSO 12, 44, 51). While most records were in order, these gaps highlight the need for improved record-keeping and stronger internal controls to ensure full transparency and audit readiness.

Key Findings

- No new plantations were undertaken during 2017–18; the focus remained on maintaining previously established plantations.
- Bamboo plantations under maintenance performed poorly in waterlogged areas such as Pecheruvu, whereas *Pongamia pinnata* exhibited limited but sustained growth.
- Protection works, particularly the creation of fire lines, were effectively executed and served their purpose well; however, regular clearance is essential to ensure their continued functionality.
- Soil and Moisture Conservation (SMC) interventions proved beneficial but were implemented on a very limited scale.
- The construction of animal orphanage sheds in Srisailam significantly enhanced the region's conservation infrastructure.
- Record-keeping for activities under the "Others" category was generally satisfactory; however, incomplete documentation in several Ranges compromised overall transparency.

Recommendations

- Avoid raising bamboo plantations in waterlogged areas; instead, replace them with native species that are more tolerant to such site conditions.
- Strengthen plantation maintenance by ensuring timely replacement of casualties, appropriate application of fertilizers, and regular upkeep of fire lines.
- Expand Soil and Moisture Conservation (SMC) interventions across the division to effectively address site-specific soil and water limitations.
- Institutionalize comprehensive and accurate documentation practices for all activities to improve transparency and facilitate effective monitoring.
- Encourage active community participation in plantation maintenance and fire protection efforts to promote long-term sustainability.

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 2017-18, a total of 124 CAMPA activities were carried out, of which 29 activities (around 23 %) were selected for detailed monitoring and evaluation. In Markapur range, 32 activities were implemented, and 9 were sampled. In Dornala range, 32 activities were implemented, and 6 were sampled. In GV Palli range, 29 activities were implemented, with 7 sampled. In V P south range, 14 activities were implemented, and 4 were sampled. In Y Palem range, 11 activities were implemented, and 2 were sampled. Among activity types, other works dominated with 88 activities (18 sampled), followed by Maintenance (29; 7 sampled), soil and moisture conservation works (3; 1 sampled), construction (2; 1 sampled), protection (1; 1 sampled), and 1 plantation activity was implemented 1 was sampled.

1. Monitoring and Evaluation of Plantation Activities

In Markapur division, a total of one plantation activity was carried out under CAMPA in the Markapur 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 Markapur range

During 2017–18, a total of one plantation activity was carried out under the CAMPA scheme in Markapur range. For monitoring and evaluation, approximately 20 % of these activities, equivalent to one plantation site, was randomly selected.

Table 63 Details of plantation selected in Markapur range

Sl. no.	Plantation	SO no. and year
1	Estimate for raising of 10 Ha. plantation (pitting & planting) in 2016-17 of Kalanuthala CA land of Gottipadiya beat	DSO 161 (2017-18)

Note: Monitoring and Evaluation of 10 NTSH Plantation at Kalanuthala locality in Gottipadiya Beat of Markapur Range compartment no. 579, was raised under the CAMPA-NPV Scheme during 2017-18 through Jammannapalli VSS (DSO 161, 2017-18; GPS: N 15.782568, E 79.132668). During field verification, no plants were observed, indicating plantation poorly performed. The poor performance 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.

Health Status of Plantation: In Gottipadiya 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 Gottipadiya 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, plantation site 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: The plantation journals were well maintained with satisfactory activity records. However, periodic updates on parameters like survival rate, height, girth, and maintenance need improvement for accurate monitoring. Plantation boards, essential for transparency and visibility, were absent and should be installed. Inspections were conducted by concerned forest officials with observations duly recorded.

Vana Samrakshan Samithi (VSS): In the Markapur range, the JFMC (VSS) participated only in the project planning and implementation phases of the Gottipadiya plantation.

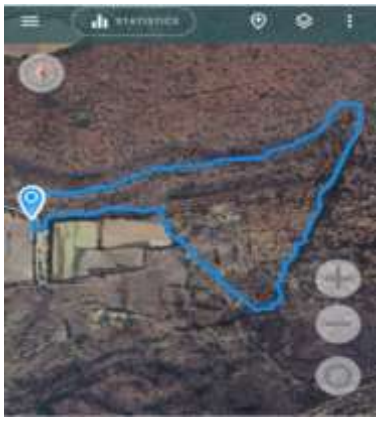
Verification of plantation area and boundaries

In Markapur division during 2017-18 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 64 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 20 Ha. misc plantation bit-II (SMM method) in 2016-17 of Gotlagattu beat	20 Ha	24.58 Ha

Perambulation of the Gottipadiya 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 5.54 Ha for Gottipadiya. Images of the perambulated areas are provided below.



Gottipadiya 15.54 Ha

Markapur, Gottipadiya plantation

2. Monitoring and Evaluation of Maintenance Activities

A total of 29 maintenance activities were carried out in the Markapur division during 2017-18, of which 7 activities were sampled for monitoring. In Markapur 13 activities 3 sampled, in GV Palli 6 activities 2 sampled, in Y Palem 6 activities implemented 1 sampled and in Dornala 4 activities 1 sampled. There was no maintenance activities reported from the V P South range.

Table 65 Maintenance activities selected for evaluation in Markapur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Markapur range			
1	First year maintenance of 20 Ha. Misc SMM plantation Bit-I & Bit-II (12&8 Ha) plantation in Gottipadiya beat	N 15.762169 E 79.089438	DSO 94 (2017-18)
2	Estimate for second year maintenance 2015-16, 1 Ha. Penal CA plantation of Jaflapuram VSS of Podili beat	N 15.517983 E 79.612415	DSO 88 (2017-18)
3	Dibbling Palmyra nuts in 2016-17, Kalanuthala CA land of Gottipadiya beat Markapur section	N 15.767982 E 79.109566	DSO 162 (2017-18)
GV Palli range			
4	First year maintenance of 2016-17, 3 Ha Bamboo plantation along the streams in Regumanupenta beat	N 16.134850 E 79.073162	DSO 119 (2017-18)
5	Estimate for first year maintenance of 4 Ha Bamboo plantation along the streams in Guttalachenu beat	N 16.177521 E 79.029877	DSO 122 (2017-18)
Y Palem range			
6	Estimate for first year maintenance of 20 Ha plantation at Mogullapalli VSS of Komarolu beat of Y. Palem section	N 16.074301 E 79.290646	DSO 83 (2017-18)
Dornala range			
7	First year maintenance of 2016-17 10 Ha Bamboo plantation along the streams in Y.Cherlopalli beat	N 15.82408 E 78.9132	DSO 116 (2017-18)

As per the approved maintenance plan, the type of maintenance activities undertaken in the first and second 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 some of the sites plantation boards were found but in plantations boards were missing, requiring replacement to ensure proper identification and monitoring.

Note: Monitoring and evaluation of Bamboo and Palmyra Plantations in Markapur division during 2017-18 under CAMPA plantations in Regumanupenta (3 Ha), Guttalachenu (4 Ha), and Gottipadiya (20 Ha) were maintained as per FBO statements during 2017–18. Field visits revealed poor survival or complete poorly performed due to forest fires, drought, grazing pressure, and poor soil conditions. Despite first-year maintenance (soil working, weeding, casualty replacement, fire lines, and inspection paths), plantation boards and boundary stones were absent, and moderate to significant weed growth was observed. Plantation records were well maintained. 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 help site demarcation.
- Maintain the current good practice of keeping plantation journals, maintenance books, and work registers for effective monitoring and documentation.
- Implement control measures for lantana to prevent its spread. Continue regular maintenance of fire lines, inspection paths to safeguard against fire risks.
- Undertake soil conditioning to enhance fertility and improve growth conditions for the bamboo.
- Consider alternative species or improved planting techniques to address the low survival rate of *Dendrocalamus strictus*.
- Continue inter-ploughing with suitable heavy-duty machinery to a depth of 30 cm, especially in challenging gravelly soils, to enhance root penetration, improve moisture retention, and aid in effective weed control, promoting healthy plant growth.
- Reassess site suitability for Palmyra plantations, considering water availability and soil quality.
- Adopt drought-resilient practices such as mulching and micro-irrigation, where feasible, to improve plant survival in low-rainfall areas.

Guttalachenu beat, GV Palli

Podili beat, Markapur

Y Cherlopalli, Dornal

Komarolu beat, Y Palem

3. Monitoring and Evaluation of Protection Activities

A total of 1 Protection activity was carried out in Markapur division during 2017-18, of which 1 activity was selected for monitoring in Markapur range. No Protection activities were reported from other ranges.

3.1 Estimate for digging of peripheral trenches (PPT) around of Kalanuthala village of Gottipadiya beat, Markapur section of Markapur range through Jammanapalli VSS

GPS Location: N 15.783824 E 79.126112 **SO no. and year:** DSO 386 (2017-18)

A total of six peripheral trenches were constructed around Kalanuthala village within and across the Inamakula CA land, with a recorded length of 212 m, breadth 2.5 m, and depth 3 m as per the measurement book (MB). Field verification, however, revealed an actual length of 3300 rmt, breadth 2.5 m, and depth 2.5 m, indicating some variation due to siltation, which has reduced trench depth in certain areas. The trench remains clearly visible but has experienced grass and weed overgrowth, as well as silt accumulation. To maintain its effectiveness, regular de-siltation and maintenance are recommended.

Peripheral trench around Inamukkala CA land bit II in Markapur range

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

A total of 3 Soil and moisture conservation activities were carried out in Markapur division during 2017-18, of which 1 activity was selected for monitoring. In Markapur range 3 activities were implemented 1 sampled. No soil and conservation activities were reported from other ranges.

4.1 Estimate for construction of 17 Mt length check dam across Mekalabonda Vagu in Kalanuthala CA block of Gottipadiya beat, Markapur section of Markapur range

GPS Location: N 15.783055 E 79.120883 **SO no. and year:** DSO 315 (2017-18)

The check dam across Mekalabonda Vagu in Kalanuthala CA block of Gottipadita beat consists of a main dam (17 m × 0.70 m × 1.00 m), upstream and downstream side walls (2 m × 0.45 m × 1.60–1.71 m), and two aprons (17 m × 2.00 m × 0.45 m), with a total measured quantity of 48.025 cum, which matches field measurements. During inspection, seepage was observed from both the main dam and side walls, and the side walls require significant repairs. Additionally, de-silting is necessary to enhance storage capacity.

Check dam across Mekalabonda Vagu in Markapur

5. Monitoring and Evaluation of Construction Activities

A total of 1 Construction activity was carried out in Markapur division during 2017-18, of which 1 activity was selected for monitoring in GV Palli range.

5.1 Estimate for road formation of stone pitching and spreading of the gravel from Darabailu base camp to Bakkacheintala Penta road in Regumanupenta beat

GPS Location: N 16.131955 E 79.138460 **SO no. & year:** DSO 463 (2017-18)

The road formation of stone pitching from Darabailu Base Camp to Bakkacheintala Penta spans a length of 12,000 rmt with a width of 3 m, as recorded in the measurement book and verified in the field, showing no variation. The road was generally found to be in good condition; however, some areas exhibited signs of distortion, and weeds were observed on the road surface. Regular maintenance is recommended to address issues and ensure road's long-term usability and stability.

6. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 88 activities were carried out during the year 2017–18, out of which 18 activities were selected for sampling. The highest number of activities was recorded in the Dornala range with 28 activities (5 sampled), followed by GV Palli with 22 activities (4 sampled), V P South with 14 activities (4 sampled), Markapur with 13 activities (3 sampled), and Y Palem with 11 activities (2 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.

Road formation in Regumanupenta beat in GV Palli range

The verification revealed that the sanctioned amounts were consistent with the actual expenditures incurred. All financial records were found to be 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 appropriate and aligned with the approved estimates and guidelines under the CAMPA scheme. Furthermore, both internal and external audits were conducted—internally by the Conservator of Forests and externally by the Accountant General's office. This comprehensive approach ensured transparency and adherence to financial and administrative protocols.

Key Findings

- Plantation programme collapsed entirely, with the only site (Kalanuthala) failing due to unsuitable soils and lack of aftercare.
- Maintenance works were well documented but ineffective in improving survival at bamboo and Palmyra sites.
- Boundary verification continued to show discrepancies between recorded and perambulated areas.

- Protection and soil and moisture conservation works were functional but required regular upkeep (trenches de-siltation, dam repairs).
- Construction works were structurally sound, though prone to natural wear and weed invasion.
- Financial management was transparent and compliant, with full alignment between sanctioned and actual expenditures.

Recommendations

- Strengthen site-species selection and avoid unsuitable rocky soils.
- Introduce soil conditioning, mulching, and micro-irrigation in drought-prone areas.
- Ensure plantation boards, boundary stones, and GPS-based records are consistently maintained.
- Institutionalize periodic de-siltation of trenches and check dams.
- Replace with more resilient native species where site conditions are harsh.
- Regularly service roads and stone-pitched stretches to preserve utility.
- Reduce over-reliance on “other works” and prioritize plantations, protection, and soil-moisture conservation to achieve tangible ecological outcomes.

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 89 activities were implemented across the four ranges, out of which 23 were sampled for monitoring. In Guntur Range, a total of 24 activities were implemented, out of which 7 were sampled. The activities include Plantation (1 implemented, 1 sampled), Maintenance (7 implemented, 2 sampled), Protection, SMC and Construction activities were not implemented during 2017-18 and Others (16 implemented, 4 sampled). In Macherla Range, a total of 12 activities were implemented, out of which 3 were sampled. The activities include Plantation (1 implemented, 1 sampled), Maintenance (4 implemented, 1 sampled), Protection, SMC and Construction activities were not implemented during 2017-18 and Others (7 implemented, 1 sampled). In Vinukonda Range, a total of 48 activities were implemented, out of which 11 were sampled. The activities include Plantation (5 implemented, 1 sampled), Maintenance (14 implemented, 4 sampled), Protection (7 implemented, 2 sampled), SMC activities were not implemented during 2017-18, Construction (3 implemented, 1 sampled), and Others (19 implemented, 3 sampled). In Repalli Range, a total of 5 activities were implemented, out of which 2 were sampled. The activities include Others (5 implemented, 2 sampled). Plantation, Maintenance, Protection, SMC and Construction activities were not implemented.

1. Monitoring and Evaluation of Plantation Activities

Plantation activities accounted for 7 implemented and 3 sampled, with Vinukonda having the highest number (5 implemented, 1 sampled). In Macherla range one plantation activities implemented and one sampled. In Guntur range (1 implemented, 1 sampled) and Repalli range no plantation activities were implemented during 2017-18.

1.1 Vinukonda range

A total of five plantation activities were undertaken under the CAMPA scheme in Vinukonda range during 2017–18. Of these, one plantation activity (20 %) was selected for detailed monitoring and evaluation.

Table 66 Details of plantation selected in Vinukonda range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTSH plantation in Badrupalem VSS in Ipur East beat of Vinukonda range during 2017-18	DSO 117 (2017-18)

The selected site for the 20 Ha Badrupalem plantation also features gently sloping land with hard gravelly red soil.

Survival percentage: The Badrupalem 20 Ha plantation showed excellent suitability for *Azadirachta indica*, *Terminalia arjuna*, and *Holoptelea integrifolia*, with survival rates of 93.93 %, 92.56 %, and 92.56 %, respectively.

Growth: In Badrupalem 20 Ha plantation, the average tree height ranged from 2.90 m to 4.57 m, and the average girth ranged from 24.03 cm to 37.10 cm.

Table 67 Details of plantation enumerated in Vinukonda range

Sl. no.	Plantation / Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Badrupalem 20 Ha	1	*Azadirachta indica*	N 16.249498 E 79.790382	94.21	4.57 ±0.35	-	36.63 ±3.49
		2	*Terminalia arjuna*	N 16.249244 E 79.790596	92.56	4.27 ±0.26	-	28.54 ±3.90
		3	*Azadirachta indica*	N 16.249485 E 79.790558	93.38	4.30 ±0.27	-	37.10 ±3.83
		4	*Azadirachta indica*	N 16.249895 E 79.790887	94.21	3.93 ±0.38	-	33.84 ±3.12
		5	*Holoptelia integrefolia*	N 16.251558 E 79.790114	92.56	2.90 ±0.36	24.03 ±3.49	-
Plantation average					**93.38**	**3.99**	**24.03**	**34.03**

1.2 Macherla range

One plantation activity was implemented under the CAMPA scheme in the Macherla Range during 2017–18. Of these, one plantation activity (100 %) was selected for detailed monitoring and evaluation.

Table 68 Details of plantation selected in Macherla range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha plantation at Jangameswarapadu VSS in Macherla range	DSO114 (2017-18)

The selected plantation site in Jangameswarapadu is characterized by flat terrain and red soil, both of which are conducive to plantation development. The flat topography facilitates easier land preparation, irrigation, and maintenance activities, while also reducing the risk of soil erosion. The red soil, typically well-drained and rich in iron content, provides a suitable medium for root development and supports the healthy growth of a variety of tree species. These features make the site favorable for establishing and sustaining plantations.

Survival percentage: In the Macherla Range, the Jangameswarapadu plantation site has demonstrated good suitability for the growth of Azadirachta indica (Neem) and Sterculia urens (Karaya gum). The observed average survival rates of 84.70 % for *Azadirachta indica* and 84.29 % for *Sterculia urens* indicate that the site offers favourable conditions for these species, reflecting both the appropriateness of the site selection and the effectiveness of plantation management practices.

Growth: In the Jangameswarapadu plantation of the Macherla Range, the growth performance of the plantation species appears satisfactory. The average tree height was observed to range between 1.41 meters and 3.20 meters, while the average tree girth varied from 17.78 cm to 32.31 cm. These measurements reflect healthy growth patterns and indicate that the plantation is developing well under the prevailing site and management conditions.

Table 69 Details of plantation enumerated in Macherla range

Sl. no.	Plantation / Village name	Plot no.	Species Name	GPS Coordinate	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Jangameswarapadu 20 Ha	1	*Azadirachta indica*	N 16.35439 E 79.524215	84.29	3.20 ±0.25	-	32.31 ±4.21
		2	*Sterculia urens*	N 16.354753 E 79.523765	82.64	1.41 ±0.37	17.78 ±2.25	-
		3	*Sterculia urens*	N 16.355058 E 79.523505	84.29	2.16 ±2.33	20.17 ±3.22	-
		4	*Azadirachta indica*	N 16.356955 E 79.524349	85.12	3.11 ±0.34	-	31.04 ±2.81
		5	*Sterculia urens*	N 16.356397 E 79.524672	85.95	2.43 ±0.43	21.39 ±3.43	-
Plantation average					**84.46**	**2.46**	**19.78**	**31.68**

1.3 Guntur range

One plantation activity was implemented under the CAMPA scheme in Guntur Range during 2017–18. For monitoring and evaluation purposes, 20 % of the total plantation activities, corresponding to one plantation activity, was selected.

Table 70 Details of plantation selected in Guntur range

Sl. no.	Plantation	SO no. and year
1	Raising of 20 Ha NTHS plantation in Kondaveedu RF of compartment no.128 through Chowdavaram VSS in Enamandala beat	DSO 113 (2017-18)

In Enamandala, the plantation site features flat terrain and red loamy soil. The red loamy soil, rich in iron and a balanced mix of sand, silt, and clay, offers good drainage and moisture retention. Its texture supports root growth and nutrient uptake, making it highly suitable for diverse crop cultivation.

Survival percentage: In the Guntur range, the Enamandala plantation demonstrates good suitability for *Azadirachta indica*, *Ficus* spp., *Terminalia arjuna*, *Tamarindus indica*, and *Syzygium cumini*, with survival rates of 90.9 %, 84.29 %, 85.12 %, 80.99 %, and 81.81 % respectively.

Growth: In the Enamandala plantation, the average tree height ranges from 3.19 to 4.87 meters, and the average tree girth ranges from 25.93 to 32.60 cm.

Table 71 Details of plantation enumerated in Guntur range

Sl. no.	Plantation / Village name	Plot no.	Species Name	GPS Coordinate	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Enamandala 20 Ha	1	*Azadirachta indica*	N 16.268106 E 80.335524	90.90	4.87 ±0.74	32.03 ±6.80
		2	*Ficus spp*	N 16.26824 E 80.333266	84.29	4.54 ±0.71	28.39 ±5.69
		3	*Terminalia arjuna*	N 16.268511 E 80.332482	85.12	4.73 ±0.84	32.60 ±6.31
		4	*Tamarindus indica*	N 16.268062 E 80.332287	80.99	4.28 ±0.62	28.46 ± 3.76
		5	*Syzygium cumini*	N 16.267992 E 80.331639	81.81	3.19 ±0.71	25.93 ±4.54
Plantation average					**84.62**	**4.32**	**29.48**

Comparative assessment of plantations in Guntur division during 2017-18

The Badrupalem plantation (20 Ha, DSO 117) with gently sloping gravelly red soil recorded the highest survival, with *Azadirachta indica* (93.93 %), *Terminalia arjuna* (92.56 %), and *Holoptelea integrifolia* (92.56 %), and showed good growth with tree heights ranging from 2.90 to 4.57 m and girths from 24.03 to 37.10 cm. In comparison, the Jangameswarapadu plantation (Macherla Range), located on flat red soil terrain, demonstrated slightly lower survival for *A. indica* (84.70 %) and *Sterculia urens* (84.29 %), with more moderate growth ranging between 1.41 and 3.20 m in height and 17.78 to 32.31 cm in girth. The Enamandala plantation (Guntur Range), on flat land with red loamy soil, supported multiple species with survival rates of 90.90 % (*A. indica*), 84.29 % (*Ficus spp.*), 85.12 % (*T. arjuna*), 80.99 % (*Tamarindus indica*), and 81.81 % (*Syzygium cumini*), and also recorded comparatively stronger growth, with heights from 3.19 to 4.87 m and girths from 25.93 to 32.60 cm. Overall, Badrupalem exhibited the best survival, Jangameswarapadu showed moderate performance, and Enamandala combined good survival with robust multi-species growth, making it highly suitable for diverse plantations.

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.

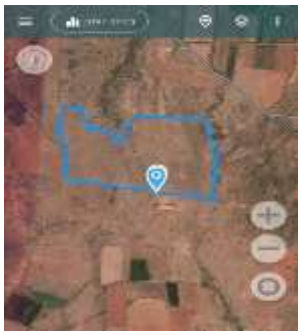
Table 72 Details of plantation area enumerated in Guntur division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Raising of 20 Ha NTSH plantation in Badrupalem VSS in Ipur East beat of Vinukonda range during 2017-18	20 Ha	21.10 Ha

2	Raising of 20 Ha plantation at Jangameswarapadu VSS in Macherla range during 2017-18	20 Ha	24.26 Ha
3	Raising of 20 Ha NTHS plantation in Kondaveedu RF of compartment no. 128 through Chowdavaram VSS in Enamandala beat of Guntur range during 2017-18	20 Ha	33.71 Ha

During the verification of plantation areas at Badrupalem, Jangameswarapadu, and Enamandala, 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 1.10 Ha hectares larger at Badrupalem, 4.26 hectares larger at Jangameswarapadu, and 13.71 hectares larger at the Enamandala 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. Relevant images documenting this process are provided below.

Badrupalem 21.10 Ha



Jangameswarapadu 24.26 Ha

Enamandala 33.71 Ha

Health status of plantations: Across all plantations assessed, the overall health status was consistently good, with no visible signs of insect or pest damage such as defoliation, boreholes, or stem lesions, indicating stable plant health supported by favourable environmental conditions and effective management practices.

Protection of plantations: In terms of protection measures, fire lines and inspection paths were created and maintained at each site, with fire watchers engaged to ensure vigilance and rapid response against fire hazards, thereby enhancing the plantations' resilience.

Biotic (human/cattle) pressure on plantations: Biotic pressure from grazing and browsing was minimal across all plantations, with only a few isolated instances observed, suggesting that boundary protection and monitoring measures are effective in reducing livestock intrusion and supporting healthy establishment.

Maintenance of plantation journals and records: With respect to maintenance of records, plantation journals were generally well maintained, though the presence of plantation boards varied—Badrupalem and Enamandala lacked plantation boards, while Jangameswarapadu had

one in place. A common observation across all sites was the need for regular updating of plantation parameters to keep the records current and comprehensive. Plantations are inspected by the concerned forest officials, and their observations are duly recorded.

Vana Samrakshana Samithi (VSS): Regarding VSS/JFMC involvement, participation varied by site: in the Vinukonda range, VSS engagement was limited only to the planning and implementation of Badrupalem plantations in Ipur East beat; in the Macherla range, the JFMC/VSS was actively involved in the planning and implementation of the Jangameswarapadu plantation; whereas in the Guntur range, the Enamandala plantations operated without VSS involvement, and consequently, no Focus Group Discussions were conducted.

Badrupalem, Vinukonda range

Jangameswarapadu, Macherla range

Enamandala plantation, Guntur range

2. Monitoring and Evaluation of Maintenance Activities

Maintenance was the largest category with 25 implemented and 7 sampled activities, predominantly in Vinukonda (14 implemented, 4 sampled) and Guntur (7 implemented, 2 sampled). In Macherla range 4 maintenance were implemented and one sampled.

Table 73 Maintenance activities selected for evaluation in Guntur division

Sl. No.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Vinukonda range			
1	2nd year maint., of 11.5 Ha 3 X 3 plot at the Neeleswarapalem VSS in Atchampeta Beat of Guntur Range (ACA)	N 16.038717 E 79.586149	DSO 216 (2017-18)
2	2nd year maint., of 20 Ha HWS plot at the Neeleswarapalem VSS in Atchampeta Beat of Guntur Range (CAT)	N 16.159875 E 79.561629	DSO 220 (2017-18)
3	1st year maintenance 20Ha NTSHS plantation in Neelagangavaram VSS in Tangirala Beat	N 16.268377 E 79.617776	DSO 158 (2017-18)

4	2nd year maintenance 20Ha NTSHS plantation in Gutlapalli VSS in Kanumalacheruvu Beat of Vinukonda Range	N 16.200835 E 79.683702	DSO162 (2017-18)
Guntur range			
5	Second year maint., of 14 Ha CRDA plot at the chowdavaram VSS Guntur Range (CAT)	N 16.259874 E 80.323846	DSO 217 (2017-18)
6	Third year Maint., of 10 Ha (HWS) Plot at Chowdavaram VSS	N 16.266462 E 80.330904	DSO 385 (2017-18)
Macherla range			
7	Second year maintenance of 20 Ha Plantation at Nehru Nagar thanda of Macherla range	N 16.354211 E 79.525816	DSO 269 (2017-18)

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

- Install and maintain plantation boards and stones at all sites for clear identification, proper documentation, and accurate tracking of plantation boundaries.
- Extend maintenance activities for an additional two years to ensure healthy plant establishment and long-term sustainability. This extended care will support optimal plant density, uniform growth, and improved survival.
- Continue regular circular weeding for the next two years, with emphasis on boundaries to minimize competition from weeds.
- Carry out deep soil work where required to enhance root development and maintain low weed growth around plants.
- Implement appropriate soil and moisture conservation measures to improve soil fertility, water retention, and resilience against drought stress.
- Maintain and improve fire lines to ensure clear visibility and effective protection against fire risks.
- Engage fire watchers during fire-prone seasons and conduct periodic inspections of fire lines.
- Carry out pruning operations where necessary to promote healthy growth and canopy development.
- Maintain accurate plantation journals, ensuring periodic updates of plantation parameters.

10 Ha (HWS) at Chowdavaram

20 Ha NTHWs at Jangameshwarapadu

20 Ha Tangirala beat plantation

20Ha Ravulapuram beat plantation

3. Monitoring and Evaluation of Protection Activities

Protection had 7 implemented and 2 sampled activities, mainly in Vinukonda.

3.1 Creation of fire lines in Bollpalli RF in Remidicherla beat of Vinukonda range

GPS Location: N 16.237606 E 79.653688 **SO no. and year**: RSO 48 (2017-18)

3.2 Creation of fire lines at Yallamanda block-II & I RF in Thangedumalli beat through Guravayapalem VSS of Vinukonda range

GPS location: N 16.140084 E 80.032688 **SO no. and year**: DSO 49 (2017-18)

In Vinukonda Range, fire lines were created and maintained in both the Remidicherla and Thangedumalli beats, with field measurements matching the specifications recorded in the measurement book, confirming that the prescribed standards were followed without deviation. At both sites, the fire lines were constructed with a uniform width of 3 meters, while the lengths varied 6000 meters in Remidicherla beat and 3000 meters in Thangedumalli beat. In Remidicherla beat, a fire line established along the inspection path of the Bollapalli Reserve Forest was clearly visible and well maintained, with only minimal grass and weed growth. However, coppice growth of weeds and grasses was noted during the monsoon season, which could increase the risk of fire spread in summer, necessitating regular annual maintenance. Similarly, in Thangedumalli beat, fire lines were created along the periphery and inspection paths of Yallamanda Block-I and Block-II Reserve Forests, where they were also clearly visible, though moderate grass and weed growth was observed. As with Remidicherla, seasonal coppice regrowth during the monsoon underscores the need for consistent annual upkeep to ensure their continued effectiveness in fire prevention.

Fire lines in Bollpalli RF

Fire line in Yallamanda block-II

4. Monitoring and Evaluation of Construction Activities

Construction activities 3 implemented and 1 sampled, all in Vinukonda range.

4.1 Providing R.R. masonry adjacent walls at Kotappakonda Saraswathi, Lakshmi and Parvathi statues area through VSS in Thangedumalli beat of Vinukonda range

GPS location: N 16.149975 E 80.0296 **SO no. and year:** DSO 335 (2017-18)

The R.R. masonry adjacent walls constructed near the Kotappakonda Saraswathi, Lakshmi, and Parvathi statues area through Guravayapalem VSS in Thangedumalli beat of Vinukonda range were monitored and evaluated in the field. The recorded field dimensions were 0.45 m in width and 250 rmt in length. However, since the dimensions were not entered in the measurement book, verification against official records was not possible, and potential deviations could not be assessed. These masonry walls function as a sturdy basement foundation supporting the chain-link mesh enclosure surrounding the statues. During inspection, weed regrowth was noted around the base of the walls, highlighting the need for regular weeding and routine maintenance to preserve both the structure and its immediate surroundings.

R.R. Masonry walls at Kotappakonda Saraswathi, Lakshmi and Parvathi statues

5. Monitoring and Evaluation of Other activities

During 2017–18, a total of 47 activities under the "Others" category were implemented across the Guntur Division. Out of these, 10 activities were sampled for verification. Significant contributions came from Vinukonda Range with 19 activities implemented and 3 sampled, and Guntur Range with 16 implemented and 4 sampled. In addition, Macherla Range implemented 7 activities (1 sampled), while Repalli Range implemented 5 activities (2 sampled). The document verification and cross-checking process was conducted in the presence of the Division and Range office staff. The verification included a review of key documents such as sanction orders, estimation sheets, and work registers. It was found that the sanctioned amounts

matched the actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officers DFO, SDO, and FRO. The utilization of funds was deemed to be appropriate and consistent with the approved estimates and CAMPA guidelines. Furthermore, both internal auditing (by the Conservator of Forests) and external auditing (by the Accountant General's Office) were conducted, helping to ensure transparency and adherence to the financial and administrative norms of the CAMPA scheme. However, some documentation issues were observed. In Vinukonda Range, for DSO 107 (2017–18), the expenditure details were not recorded in the work register. In Guntur Division, for RSO 64 (2017–18), the estimates and work registers were not presented for verification during the document review.

Key Findings

- Plantations demonstrated high survival and strong growth across sites, with *Azadirachta indica* performing consistently well.
- Perambulated plantation areas consistently exceeded recorded extents.
- Maintenance operations were implemented but weakened by missing signage and inconsistent record updates.
- Fire lines under protection works were compliant and functional, though regrowth required annual clearance.
- Construction at Kotappakonda was structurally sound but lacked proper documentation in measurement books.
- No SMC activities were implemented, limiting ecological interventions.
- Financial compliance was ensured in "other works," though documentation lapses persisted.

Recommendations

- Consolidate plantation successes by replicating models at Badrupalem, Jangameswarapadu, and Enamandala.
- Ensure plantation boards are installed at all sites and journals updated regularly.
- Extend maintenance duration for two additional years to ensure survival and density.
- Institutionalize annual clearance of fire lines for fire protection.
- Mandate proper documentation and entry of construction dimensions in measurement books.
- Reintroduce SMC works to strengthen ecological restoration.
- Address financial documentation gaps by ensuring all registers and expenditure records are presented.
- Expand VSS involvement in plantations where absent to promote accountability and local participation.

15. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KRISHNA DIVISION

Introduction

Krishna Forest 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. Further strengthening this ecological security, *Casuarina* shelterbelts have been strategically established along the coast. These shelterbelts serve as natural windbreaks, protecting agricultural hinterlands from the adverse effects of sea winds, salt spray, and potential storm damage. 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 87 CAMPA activities were carried out, of which 20 activities (around 22 %) were selected for detailed monitoring and evaluation. In Mylavaram range, 28 activities were implemented, and 7 were sampled. In Nuzvid range, 23 activities were implemented, and 6 were sampled. In Vijayawada range, 36 activities were implemented, with 7 sampled. Among activity types, maintenance dominated with 40 activities (10 sampled), followed by soil and moisture conservation (22; 5 sampled), others (10; 2 sampled), plantation (9; 2 sampled), protection (6; 1 sampled), none were implemented/sampled from construction.

1. Monitoring and Evaluation of Plantation Activities

In Krishna division, a total of 9 plantation activities were carried out under CAMPA, of which 2 activities (about 21 %) were selected for monitoring and evaluation. Among the ranges, Mylavaram with 4 (1 sampled), Vijayawada 4(1 sampled) and Nuzvid with 1 (0 sampled)

1.1 Mylavaram range

A total of four plantation activities were carried out under the CAMPA scheme in the Mylavaram Range. As part of the monitoring and evaluation process, two plantation sites (50 %) were randomly selected.

Table 74 Details of plantations selected in Mylavaram range

Sl. no.	Plantations	SO no. and year
1	Raising of 20 Ha NTSHWS plantation in A. Konduru RF, A. Konduru beat	DSO 33 (2017-18)
2	Raising of 20 Ha NTSHWS plantation in Kakarla RF, Kakarla beat	DSO 34 (2017-18)

The selected plantation site for the Kakarla and A. Konduru 20 Ha plantation is characterized by red loamy sandy soil and small canals, also featuring a well-developed drainage system.

Survival Percentage: In the Mylavaram range, the A. Konduru 20 Ha plantation shows moderate growth for *Pongamia pinnata*, *Azadirachta indica* and *Syzygium cumini*, with survival rates of 70.10 %, 72.72 % and 62.28 % respectively. The Kakarla 20 Ha plantation also shows moderate growth for *Albizia odoratissima*, *Syzygium cumini*, *Pongamia pinnata* and *Azadirachta indica* with survival rates of 65.28 %, 73.55 %, 65.28 % and 70.65 %, respectively.

Growth: In the Mylavaram range, the A. Konduru 20 Ha plantation recorded average tree heights ranging from 1.17 m to 2.48 m and girth measurements ranging from 17.88 cm to 28.59 cm. The Kakarla 20 Ha plantation recorded average tree heights ranging from 1.75 m to 3.10 m and girth measurements ranging from 15.66 cm to 28.22 cm.

Table 75 Details of plantations enumerated in Mylavaram range

Sl. no.	Plantation / Village name	Plot no	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	A.Konduru 20 Ha NTSH plantation	1	*Pongamia pinnata*	N 16.949647 E 80.627982	81.81	1.86 ±0.70	28.59 ±9.27	-
		2	*Azadirachta indica*	N 16.949255 E 80.627259	72.72	2.48 ±0.43	22.98 ±5.85	-
			Pongamia pinnata		68.18	1.97 ±0.86	19.82 ±4.78	-
		3	*Syzygium cumini*	N 16.947975 E 80.626897	79.33	1.28 ±0.57	17.88 ±5.68	-
		4	*Pongamia pinnata*	N 16.946780 E 80.627241	60.33	1.25 ±0.46	21.37 ±5.86	-
		5	*Syzygium cumini*	N 16.966384 E 80.627673	51.23	1.17 ±0.38	21.54 ±6.02	-
Plantation average					**68.93**	**1.66**	**22.03**	**-**
2	Kakarla 20 Ha NTSH plantation	1	*Albizia odoratissima*	N 17.061425 E 80.612828	65.28	2.63 ±1.25	-	23.9 ±6.76
		2	*Syzygium cumini*	N 17.060978 E 80.612957	73.55	3.10 ±0.74	-	28.2 ±6.90
		3	*Pongamia pinnata*	N 17.060534 E 80.612976	65.28	1.81 ±0.47	22.44 ±5.97	-
		4	*Azadirachta indica*	N 17.060457 E 80.612475	67.76	1.75 ±0.56	15.66 ±4.69	-
		5	*Azadirachta indica*	N 17.060095 E 80.611453	73.55	2.10 ±0.60	15.76 ±3.96	-
Plantation average					**69.08**	**2.27**	**17.95**	**26.06**

1.2 Vijayawada range

During 2017–18, a total of four plantation activities were carried out under the CAMPA scheme in Vijayawada Range. As part of the monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 76 Details of plantation selected in Vijayawada range

Sl. no.	Plantation	SO no. and year
1	Raising of 11.45 Ha. NTSHWS plantation Gandrai beat	DSO 36 (2017-18)

The plantation site at Gandrai spans 11.45 hectares and is characterized by ironstone and red soil. These soil types offer good drainage and moderate fertility but may present challenges related to moisture retention and nutrient availability.

Survival Percentage: High survival rates were observed for key species planted at the site: *Sterculia urens*: 90.90%, *Albizia odoratissima*: 86.75 %, *Azadirachta indica*: 84.70 %. This indicates strong site-species compatibility and effective initial establishment.

Growth: The average height of trees ranged from 3.34 to 6.19 meters, while the average girth varied between 25.77 and 34.73 cm, reflecting satisfactory growth under prevailing conditions.

Table 77 Details of plantation enumerated in Vijayawada range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Gandrai 11.45 Ha NTSH plantation	1	*Sterculia urenus*	N16.964719 E 80.090459	90.90	2.10 ±0.45	26.96 ±6.71
		2	*Albezia odoratissima*	N16.964776 E 80.090928	85.90	6.19 ±1.68	34.73 ±7.93
		3	*Azadirachta indica*	N16.965497 E 80.092885	79.33	4.35 ±1.58	29.99 ±8.37
		4	*Azadirachta indica*	N16.96169 E 80.094311	90.08	3.34 ±0.58	26.44 ±5.76
		5	*Albezia odoratissima*	N16.966146 E 80.094126	87.60	5.46 ±1.19	25.77 ±4.88
Plantation average					**86.76**	**4.28**	**28.77**

Comparative Assessment of Plantations in Krishna division during 2017-18

Survival performance: Mylavaram plantations (A. Konduru and Kakarla) recorded only moderate survival (62–74 %) and modest growth (1.17–3.10 m height; 15.66–28.59 cm girth), whereas the high-survival site showed excellent survival (85–91 %) and superior growth (3.34–6.19 m height; 25.77–34.73 cm girth), highlighting better site-species compatibility and establishment success.

Verification of plantation area and boundaries

In Krishna division during 2017-18 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 78 Details of plantation area perambulation in Krishna division during 2017-18

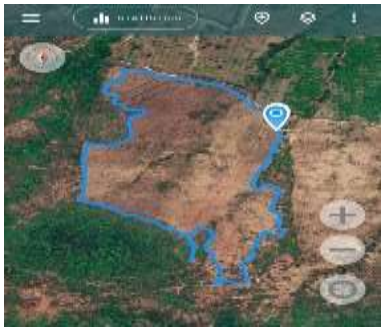
Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of 11.45 Ha. NTSHWS plantation in Gandrai beat	11.45 Ha	27.07 Ha

2	Raising of 20 Ha NTSHWS plantation in A.Konduru beat	20.00 Ha	20.27 Ha
3	Raising of 20 Ha NTSHWS plantation in Kakarla beat	20.00 Ha	25.56 Ha

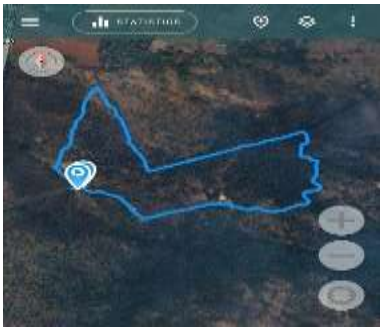
Perambulation of selected plantations was carried out with the assistance of the local Forest Beat Officer. In these cases, the perambulated area was found to exceed in some plantations due to the presence of rocky terrain, trenches, and barren patches within plantation boundaries. Measurements were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

- Gandrai Plantation (Vijayawada range) (11.45 Ha): 27.07 Ha (Exceeded by 15.62 Ha)
- A. Konduru Plantation (Mylavaram range) (20 Ha): 20.27 Ha (Exceeded by 0.27 Ha)
- Kakarla plantation (Mylavaram range) (20 Ha): 25.56 Ha (Exceeded by 5.56 Ha)

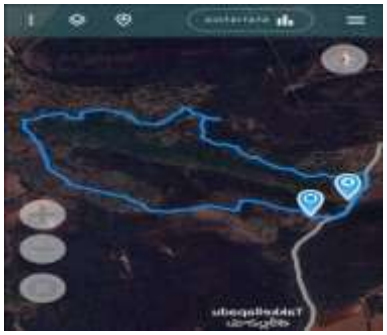
Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.



A. Konduru 20.27 Ha



Kakarla 25.26 Ha



Gandrai 27.07 Ha

Health Status of Plantations: Field observations confirmed that A.Konduru and kakarla beat plantations were completely free from any visible damage caused by insects or pests. The seedlings and saplings appeared healthy, with no evidence of leaf defoliation, boring marks, fungal growth, or other biotic stress symptoms. This indicates that the plantations are currently not under any significant pest pressure. In Vijayawada range as per field visit observations, an incidence of insect and pest damage was noted in the Gandrai plantation.

Protection Measures: Fire prevention measures such as the creation and maintenance of fire lines, inspection paths, and the deployment of fire watchers were implemented to protect the plantations from fire and other environmental threats.

Biotic Pressure on Plantations: Evidence of grazing and browsing pressure was observed within the both ranges. This biotic interference can negatively impact seedling survival, slow down growth, and result in poor stocking density if not addressed in time. Implementation of protective measures, such as fencing, watch-and-ward arrangements, and coordination with local communities, is recommended to safeguard the plantation and ensure healthy establishment.

Maintenance of Plantation Journals and Records: Plantation journals are being maintained adequately; however, there is a need for more frequent and systematic updates of plantation parameters to ensure accurate and up-to-date record-keeping. Regular documentation of key parameters such as survival percentage, growth performance, biotic and abiotic damages, and

maintenance activities will help in effective monitoring and timely decision-making. Periodic verification of entries by supervisory staff is also recommended to maintain the reliability and consistency of the records. Plantation is inspected by concerned forest official and entered the observations.

Vana Samrakshana Samithi (VSS): In the Mylavaram range, the plantations at A. Konduru (20 Ha) and Kakarla were developed without the involvement of the Vana Samrakshana Samithi (VSS). Consequently, no Focus Group Discussions (FGDs) were conducted at these sites. In the Vijayawada range, the Gandrai plantation involved in the Vana Samrakshana Samithi (VSS). Hence Focus Group Discussions (FGDs) were conducted.

A. Konduru plantation Mylavaram range

Gandrai plantation, Vijayawada range

2. Monitoring and Evaluation of Maintenance Activities

A total of 40 maintenance activities were carried out in Krishna division during 2017-18, of which ten activities were selected for monitoring. Mylavaram accounted for the maximum with 15 activities (4 sampled), followed by Vijayavada with 13 (3 sampled) and Nuzvid with 12 (3 sampled).

Table 79 Maintenance activities selected for evaluation in Krishna division

Sl. no.	Maintenance Activities	GPS Co ordinates	SO no. and year
Mylavaram range			
1	First year maintenance of 10 Ha BHA plantation in A. Konduru RF, Vinagadapa beat	N 16.987586 E 80.584296	DSO 68 (2017-18)
2	Second year maintenance of 15 Ha NTSHWS plantation in Kakarla RF and beat	N 17.062302 E 80.612751	DSO 73 (2017-18)
3	Third year maintenance of 10 Ha Bamboo with Eucalyptus plantation in Chandragudem RF and beat	N 16.821116 E 80.58796	RSO 45 (2017-18)
4	Third year maintenance of 20 Ha Bamboo with Eucalyptus plantation in A.Konduru beat	N 16.948583 E 80.631520	DSO 70 (2017-18)
Nuzvid range			
5	First year maintenance of 15 Ha BHA (NTSHWS) plantation at Kotapadu RF	N 17.049799 E 80.951084	DSO 65 (2017-18)
6	Second year maintenance of 15 Ha BHA plantation at Kotapadu RF	N 17.049702 E 80.951177	DSO 59 (2017-18)
7	Third year maintenance of 25 Ha NTSHWS plantation at Somavaram RF	N 16.914173 E 80.915671	DSO 53 (2017-18)
Vijayawada range			
8	Second year maintenance of 5 Ha NTSHWS plantation at Gandrai RF bit -II, in Jaggaiahpeta section	N 16.951831 E 80.095016	RSO 57 (2017-18)

9	Third year maintenance of 5.00 Ha Teak plantation at Kothuru RF in K.Tadepalli beat in vijayawada section	N 16.598085 E 80.639602	RSO 59 (2017-18)
10	Third year maintenance of 5 Ha Teak plantation at Kothuru RF, K.Tadepalli beat in Vijayawada section	N 16.597131 E 80.637884	RSO 61 (2017-18)

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.
- 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.

T. Gannavaram beat Mylavaram range

Kotapadu beat in Nuzvid range

K. Tadepalli beat Vijayawada range

A Konduru beat, Mylavaram range

3. Monitoring and Evaluation of Protection Activities

During 2017–18 Andhra Pradesh Forest Department undertook six protection activities under the CAMPA scheme. For the purpose of monitoring and evaluation, a representative sample of 20 %, comprising one protection activities, was selected in Nuzvid range for detailed assessment.

3.1 Creation of firelines at Katrenipadu beat in Nuzvid range

GPS location: N 16.768024 E 80.932076 **SO no. and year:** RSO 53 (2017-18)

A fire line was created Katrenipadu 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 – 2000rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fire line was clear, although moderate weed and grass growth was observed along the strip. This indicates that while the fire line has been effectively established, regular maintenance is recommended to control vegetative growth and ensure its continued effectiveness in preventing and containing forest fires.

Katrenipadu beat Nuzvid range

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

A total of 22 SMC activities were carried out during 2017-18, of which five were sampled. The Vijayawada reported 14 activity (3 sampled), mylavaram range reported 5 activity (1 sampled), Nuzvid range reported 3 activity (1 sampled).

4.1 Digging of continuous contour trench in Jagnalapalli RF, Velvadam beat

GPS location: N 16.810758 E 80.649602 **SO no. and year:** DSO 221 (2017-18)

Continuous Contour Trenches (CCTs) dug in Jagnalapalli RF, Velvadam beat in Mylavaram range was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the CCTs were: length – 138 m, width – 1.75 m, and depth – 1.50 m with volume of 362 cum as per measurement book. The dimensions of the CCTs in field: length – 140 m, width – 1.50 m, and depth – 1.0 m with volume of 362 cum. Due to the accumulation of silt and stony gravels, negligible reduction of depth is seen in some of the lower trenches in the reserve forest. While the current condition of the CCTs is generally good, a lack of regular maintenance has led to silt accumulation due to water overflow and other factors. It is recommended that regular desilting be carried out to ensure their continued effectiveness.

4.2 Digging of staggered trenches at Parvathapuram RF

GPS location: N 17.022711 E 80.950334 **SO no. and year:** DSO 223 (2017-18)

A total number of 132 Staggered Trenches dug in Parvathapuram RF, was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the STs were: length – 10 m, width – 0.50 m, and depth – 0.50 m with volume of 330 cum as per measurement book. The dimensions of the CCTs in field: length – 8 m, width – 0.50 m, and depth – 3.0 m with volume less than 330 cum. Due to accumulation of silt and plant residues trench capacity has been reduced. Hence, there is a need for de-siltation activity. Staggered trenches (STs) in the plantation area, particularly in low-lying ground, were found to be filled with silt and dried plant residues due to water overflow. De-siltation is required to restore their storage capacity and ensure effective soil and moisture conservation.

4.3 Desilting of percolation tank in Jaggaiahpeta section under Vijayawada range

GPS location: N 16.867141 E 80.044283 **SO no. and year:** RSO 97 (2017-18)

Percolation tank in Jaggaiahpeta section in Vijayawada range 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 as per measurement book. The dimensions of the CCTs in field: length – 3.50 m, width – 2.60 m, and depth – 0.30 m with volume less than 205 Cu.mtr. Due to accumulation of silt, tank capacity has been reduced. While the tank is not completely covered with silt, the overflow of water during floods has contributed to sediment build-up. To maintain the tank's storage capacity at its optimal level, de-siltation is necessary. This process will help restore the tank's ability to store and percolate water effectively, ensuring its continued utility for moisture conservation.

4.4 Estimate for desilting of percolation tank at Kondapalli RF

GPS location: N 16.670038 E 80.495884 **SO no. and year:** RSO 106 (2017-18)

Percolation tank in Kondapalli RF 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 as per measurement book. The dimensions of the CCTs 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, but being located in a low ground, it has experienced increased accumulation of silt. Additionally, the stone dry packing along the tank's length has been distorted at the edges due to overflowing water during the monsoon. To ensure the tank maintains its full storage capacity, regular de-siltationis necessary. This will not only help remove the accumulated silt but also preserve the integrity of the stone packing, allowing the tank to function effectively for water retention and conservation.

4.5 Estimate for digging of continuous contour trench in Budawada RF

GPS location: N 16.866793 E 80.044183 **SO no. and year:** DSO 225 (2017-18)

Continuous Contour Trenches (CCTs) dug in Budawada RF, was monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions of the CCTs were: length – 229 m, width – 1.75 m, and depth – 1.50 m with volume of 601 cum as per measurement book. The dimensions of the CCTs in field: length – 229 m, width – 1.6 m, and depth – 1.0 m with volume less than 601 cum. Due to the accumulation of silt and stony gravels, negligible reduction of depth is seen in trenches in the reserve forest. Total number of CCT's and its total volume is less than mentioned in the records. However, the current condition of the CCTs shows that they have been completely accumulated with silt due to the floods that occurred in Vijayawada. To restore their functionality and effectiveness, it is recommended to carry out regular de-silting of the CCTs. This will ensure they continue to serve their intended purposes, improving soil and water conservation in the region.

Jaggaiahpeta section Vijayawada range

Velvadam beat of Mylavaram range

Parvathapuram RF in Nuzvid range

5. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 10 activities were carried out during 2017-18, of which 2 were sampled for verification. The maximum activities were reported in Mylavaram with 4 (1 sampled), followed by Nuzvid with 4 (1 sampled), and Vijayawada with 2 (none 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, and it was observed that sanctioned amounts were in line with actual expenditures. Financial records were properly maintained and duly authenticated by the concerned officials, including the DFO, SDO, and FRO. The utilization of funds 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 compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- Sites in Gandrai demonstrated outstanding survival and growth, clearly indicating the suitability of fertile soils and effective plantation practices.
- In contrast, plantation sites in Mylavaram showed only modest results, reflecting the variability of site conditions and management practices.
- Significant and consistent discrepancies were observed in the plantation area records, which undermined the accuracy and reliability of official documentation.
- Soil and Moisture Conservation (SMC) assets such as check dams and contour trenches were present but had deteriorated due to siltation and lack of proper maintenance, reducing their functional effectiveness.
- Vana Samrakshana Samithi (VSS) participation was completely absent in A. Konduru and Kakarla, whereas in Gandrai active involvement of VSS was observed, contributing directly to the notable success of plantations there.

Recommendations

- Make third-party GIS audits mandatory to curb area discrepancies, ensure accurate boundary demarcation, and strengthen transparency.
- Scale up successful practices like Gandrai by aligning species selection with site-specific conditions to improve survival and sustainability.
- Enforce routine desilting of SMC assets with dedicated budgets and integrate maintenance indicators into monitoring systems.
- Mandate VSS participation in all plantations to ensure community ownership, protection, and long-term sustainability.
- Introduce geo-referenced digital record-keeping with periodic supervisory verification to enhance accuracy, efficiency, and accountability.

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 154 CAMPA activities were carried out, of which 35 activities (around 22 %) were selected for detailed monitoring and evaluation. In Eluru range, 54 activities were implemented, and 11 were sampled. In J R Gudem range, 23 activities were implemented, and 5 were sampled. In Kannapuram 30 activities were implemented, with 8 sampled. In kukunoor range, 6 activities were implemented, and 2 were sampled. In polavaram range 36 activities implemented, with 8 sampled and amaravaram 5 implemeted 1 sampled. Among activity types, others dominated with 76 activities (15 sampled), followed by maintenance (35; 7 sampled), soil and moisture conservation (30; 7sampled), plantation (8; 3 sampled), protection (5; 3) and none were selected from construction activity.

1. Monitoring and Evaluation of Plantation Activities

In eluru division, a total of 8 plantation activities were carried out under CAMPA, of which 3 activities (about 37 %) were selected for monitoring and evaluation. Among the ranges, eluru with 3 (1 sampled), J R Gudemwith 3 (1 sampled), kannapuram with 1 (1 sampled).

1.1 Eluru range

During 2017–18, a total of three plantation activities were carried out under the CAMPA scheme in Eluru Range. As part of the monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected.

Table 80 Details of plantation selected in Eluru range

Sl. no.	Plantation	SO no. and year
1	Estimate for raising operations in 20.00 ha at Fathimapuram (V)	DSO 69 (2017-18)

Velagalapalli 20 Ha plantations were established on red sandy loam soil, indicating suitable site conditions for afforestation.

Survival Percentage: Velagalapalli plantation (20 Ha): High survival rates were recorded for multiple species *Pterocarpus marsupium* (90.08%), *Dalbergia latifolia* (91.73%), *Hardwickia binata* (90.08%), *Sterculia urens* (90.90%), and (92.56%).

Growth**:** In Velagalapalli range, average height ranged from 3.08 m to 5.34 m, with girth ranging from 20.86 cm to 44.31 cm.

Table 81 Details of plantation enumerated in Eluru range

Sl. no	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Velagalapalli 20 Ha plantation	1	*Pterocarpus marsupium*	N 16.978084 E 80.985637	90.08	5.34 ±0.86	25.83 ±5.54
		2	*Dalbergia latifolia*	N 16.977055 E 80.985146	91.73	3.14 ±0.78	20.86 ±3.40
		3	*Hardwickia binata*	N 16.976827 E 80.985421	90.08	3.75 ±0.84	22.85 ±4.52
		4	*Sterculia urens*	N 16.978194 E 80.985584	90.90	3.08 ±0.71	21.47 ±3.79
		5	*Albizia chinensis*	N 16.977295 E 80.985436	92.56	4.81 ±1.03	44.31 ±8.65
Plantation average					**91.07**	**4.02**	**27.06**

1.2 J R Gudem range

A total of three plantation projects were implemented under the CAMPA scheme in JR Gudem Range during 2017–18. For evaluation purposes, 20 % of these projects, amounting to one plantation site, was selected using the random sampling method.

Table 82 Details of plantation selected in J R Gudem range

Sl. no.	Plantation	SO no. and year
1	Raising of 2017 non-Teak secondary hardwood (NTSHW) (20 ha) plantation at Tatiyakulagudem bit-II, Jeelugumilli beat	DSO 71 (2017-18)

Jeelugumilli 20 Ha Plantation: This plantation site features flat terrain with red sandy soil, which was observed to be well-suited for specific hardwood species.

Survival Percentage: Jeelugumilli 20 Ha Plantation: The plantation recorded a survival rate of 91.73% for *Albizia chinensis* and 88.83% for *Terminalia arjuna*. These figures indicate good site-species compatibility and reflect high overall survival rates for the plantation.

Growth: Jeelugumilli 30 Ha Plantation: Jeelugumilli 20 Ha Plantation: The average height of the plantation ranges from 3.93 meters to 8.91 meters, and the average girth varies between 26.90 cm and 66.06 cm. This range of growth indicates favorable establishment and suggests strong potential for robust stand formation in the future.

Table 83 Details of plantation enumerated in J R Gudem range during 2017-18

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Jeelugumilli	1	*Albizia chinensis*	N 17.216363 E 81.106838	92.56	5.18 ±1.61	35.85 ± 12.12

	20 Ha NTSHW plantation	2	*Albizia chinensis*	N 17.216946 E 81.106928	90.08	3.93 ±0.75	26.94 ± 6.72
		3	*Albizia chinensis*	N 17.216221 E 81.105672	92.56	8.91 ±2.13	66.06 ± 21.76
		4	*Terminali aarjuna*	N 17.217307 E 81.106904	89.25	4.90 ±0.62	34.31 ± 3.21
		5	*Terminali aarjuna*	N 17.217976 E 81.106777	88.42	4.90 ±0.60	28.99 ± 2.50
Plantation average					**90.57**	**5.56**	**38.43**

1.3 Kannapuram range

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

Table 84 Details of plantation selected in Kannapuram range

Sl. no.	Plantation	SO no. and year
1	Raising of 2017 (NTSHW) for planting 20.00 ha at Karakapadu beat	DSO 74 (2017-18)

The selected site for the 20-hectare plantation at Karakapadu is characterized by a red soil with gravel.

Survival Percentage: In the Kannapuram Range, the Karakapadu 20-hectare plantation demonstrated good species adaptability, with high survival rates across all species. *Albizia chinensis* recorded a survival rate of 85.08%, *Albizia procera* 82.64%, *Pterocarpus marsupium*

Growth: The growth performance at the site is notable. The average tree height ranges between 4.20 to 5.15 meters, and the average girth varies from 20.40 to 41.02 cm, reflecting healthy development under existing site conditions.

Table 85 Details of plantation enumerated in Kannapuram range

Sl no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average	
						Height (m)	GBH (cm)
1	Karakapadu 20 Ha NTSHW plantation	1	*Albizia chinesis*	N 17.166687 E 81.507165	84.29	4.94 ±0.80	20.40 ±3.05
		2	*Albizia procera*	N 17.166701 E 81.507311	82.64	4.95 ±0.76	45.09 ±4.91
		3	*Albizia chinesis*	N 17.166968 E 81.508238	87.87	4.36 ±0.89	26.55 ±4.89
			Dalbergia latifolia		100.00	4.58 ±0.90	26.34 ±7.08
			Pterocarpus marsupium		90.90	4.43 ±0.74	27.05 ±4.06
		4	*Albiziachinesis*	N 17.167013 E 81.508533	84.84	4.34 ±0.75	29.09 ±6.96
			Dalbergia latifolia		83.63	4.20 ±0.79	30.20 ±7.25
		5	*Albiziachinesis*	N 17.167056 E 81.508766	83.33	5.15 ±0.93	41.02 ±15.1

			Dalbergia latifolia		83.63	4.93 ±0.80	38.20 ±12.88
Plantation average					**86.85**	**4.65**	**31.53**

Comparative assessment of plantations in Eluru division during 2017-18

Overall, all three plantations (Velagalapalli, Jeelugumilli, and Karakapadu) showed high survival rates (82.64–92.56 %) and healthy growth (heights 3.08–8.91 m; girths 20.40–66.06 cm), indicating good site-species compatibility and robust establishment.

Verification of plantation area and boundaries

In Eluru division during 2017-18 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 86 Details of plantation area perambulation in Eluru division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Estimate for raising operations in 20.00 ha at Fathimapuram (V) under CAMPA-NPV-NFM	20 Ha	22.21 Ha
2	Raising of 2017 non-Teak secondary Hardwood (NTSHW) (20 ha) plantation Jeelugumilli beat	20 Ha	21.59 Ha
3	Raising of 2017 (NTSHW) for planting 20.00 Ha at Karakapadu beat	20 Ha	22.73 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 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

- (Eluru range) (20 Ha): 22.21 Ha (exceeded by 2.21 Ha)
- (JR Gudem range) (20 Ha): 21.59 Ha (exceeded by 1.59 Ha)
- (Kannapuram range) (20 Ha): 22.73 Ha (exceeded by 2.73 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.

22.21 Ha Velagalapalli

21.59 Ha Jeelugumilli

22.73 Ha Karakapadu

Health Status of Plantation: 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 seen in all three plantations.

Vana Samrakshan Samithi (VSS): The Velagalapalli, jeelugumilli and karakapaduplantations were implemented and maintained with the involvement of any VanaSamrakshanaSamithi (VSS). Consequently, Focus Group Discussion (FGD) activities were conducted.

Velagalapall, Eluru

Jeelugumilli, JR Gudem

Karakapadu, Kannapuram

2. Monitoring and Evaluation of Maintenance Activities

A total of thirty-five maintenance activities were carried out in Eluru division during 2017-18, of which seven activities were selected for monitoring. Eluru accounted for the maximum with 20 activities (4 sampled), JR Gudem 7 (2 sampled) and Kannapuram 4 (1 sampled).

Table 87 Maintenance activities selected for evaluation in Eluru division

Sl no.	Maintenance Activities	GPS Co ordinates	SO no. and year
Eluru range			
1	Second year maintenance operations in 10.00 ha. 2015 non-teak hard wood plantation in Bhogole(V)	N 16.904663 E 81.044864	RSO 03 (2017-18)
2	First year maintenance operations in 20.00 ha. 2016, Bamboo mixed non-teak hard wood plantation in Balavarigudem (V)	N 17.055427 E 81.036186	DSO 80 (2017-18)
3	Second year maintenance operations in 10.00 ha. 2015 non-teak hard wood plantation in G.Kothapalli (V)	N 17.080181 E 81.034395	RSO 04 (2017-18)
4	Third year maintenance operations in 10 ha 2014 teak wood in namavaram	N 17.141122 E 80.964045	DSO 88 (2017-18)
JR Gudem range			
5	First year maintenance of 2016 mixed (Bamboo+NTSHW) plantation (20 Ha) Jeelugumilli beat	N 17.189489 E 81.102081	DSO 101 (2017-18)
6	Second year maintenance of non-Teak secondary hardwood (10 Ha) plantation at Mulagalampalli	N 17.230903 E 81.212077	DSO 102 (2017-18)
Kannapuram range			
7	Second year maintenance 20 Ha plantation 2015(NTSHW) Karakapadu beat.	N 17.185614 E 81.494161	DSO 87 (2017-18)

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.

Bhogole, Eluru range

Karakapadu, Kannapuram range

Mulagalampalli, JR Gudem range

Jeelugumilli, JR Gudem range

3. Monitoring and Evaluation of Protection Activities

During 2017–18 the Andhra Pradesh Forest Department undertook five protection activities under the CAMPA scheme in the eluru division. For the purpose of monitoring and evaluation, a representative sample of 20 %, comprising two protection activities, was selected for detailed assessment.

3.1 Creation of new fire lines in Kovvada RF-I of LND Peta beat

GPS Location: N 17.234537 E 81.511093 **SO no. and year:** RSO 27 (2017-18)

A fire line created and maintained in LND peta Beat under the 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 the newly established fire line were recorded as 3 m in width and 2100rmt in length, the field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The fire lines were clearly visible and well-defined, reflecting proper implementation.

3.2 Creation of new fire lines in Goparajugudem beat of Kukunoor section

GPS Location: N 17.541053 E 81.117713 **SO no. and year:** RSO 37 (2017-18)

A fire line created and maintained in goparajugudem Beat under the 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 the newly established fire line were recorded as 3 m in width and 2000rmt in length, the field

measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The fire lines were clearly visible and well-defined, reflecting proper implementation.

LND Peta beat, Kannapuram range

Goparajugudem beat, Kukunoor range

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

A total of thirty SMC activities were carried out during 2016-17, of which four were sampled. The polavarm range reported 13 activity (4 sampled).The kannapuram range reported 11 activity (2 sampled). The JR Gudem reported 6 (1 sampled).

4.1 Construction of check dam at Gummadi Chettu Kaluva Doramamidi beat

GPS Location: N 17.303945 E 81.341384 **SO no. and year:** DSO 55 (2017-18)

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- 11m, 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. De-silting is necessary to enhance the storage capacity, and removal of weed growth is recommended for proper maintenance.

4.2 Construction of rock fill dams on Tadikalagandikaluva of Kopalli beat

GPS Location: N 17.269172 E 81.469309 **SO no. and year:** DSO 104 (2017-18)

Rock fill dam in kopalli beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 6.25 m, breadth-1.55 m and depth-0.75 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. Major repairs are required in the apron section of the dam. De-silting is necessary to enhance the storage capacity by removing accumulated sediment. Additionally, seepage of water has been observed from both the main dam structure and the apron, indicating potential structural weaknesses. Urgent repair and reinforcement of the main dam and apron are recommended.

4.3 Construction of check dam on Campanykaluva of Kallumamidi beat

GPS Location: N 17.362743 E 81.455614 **SO no. and year:** DSO 43 (2017-18)

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- 1.80 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.

4.4 Digging of percolation tank in Teni Konda CA area

GPS Location: N 17.387566 E 81.580492 **SO no. and year:** RSO 23 (2017-18)

Percolation tank 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- 10 m, width- 10 m and depth-1.00 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations. The percolation tank, situated in a low-lying area, has significant silt accumulation caused by monsoon overflow. De-silting is necessary to restore its full storage capacity.

4.5 Construction of check dam at Jamaoilchettukalava - 2 in Chilakaluru beat

GPS Location: N 17.39277 E 81.48343 **SO no. and year:** DSO 51 (2017-18)

4.6 Consturction of check dam at Bandarukoyyabata in Nettappakota beat

GPS Location: N 17.288352 E 81.570966 **SO no. and year:** DSO 44 (2017-18)

4.7 Consturction of check dam at PedagandiKalava in Thutigunta beat

GPS Location: N 17.348351 E 81.573356 **SO no. and year:** DSO 54 (2017-18)

Check dams constructed in chilakaluru, thutigunta and nettapakota beat were monitored and evaluated against the specifications recorded in the measurement book and the actual field measurements. The dimensions were: length- 10m, breadth- 1.50 m and depth-1.40 m. the length in thutigunta is 15 m. The field measurements were found to be consistent with the entries in the measurement book, indicating no deviations.The check dams are visible, but significant damages were observed in the main body wall, side wing walls, and apron. Major repairs and de-silting are required to restore structural integrity and storage capacity.

Kopalli beat, J R Gudem range

Kopalli, Kannapuram range

Thuntigunta Polavaram range

Tenikonda Polavaram range

5. Monitoring and Evaluation of Other activities

During 2017–18, a total of 76 activities were carried out under the "Others" category, of which 15 were sampled for monitoring and evaluation. Range-wise, Eluru recorded the highest number of activities with 31 (6 sampled), followed by Polavaram with 18 (5 sampled), Kannapuram with 12 (3 sampled), J.R. Gudem with 7 (1 sampled), Amaravaram with 5 (1 sampled), and Kukunoor with 4 (1 sampled). Document verification and cross-checking of the sampled activities were conducted in the presence of Division and Range Office staff. The review of records including sanction orders, estimation sheets, and work registers confirmed that sanctioned amounts were in alignment 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. Internal audit by the Conservator of Forests and external audit by the Accountant General's Office ensured transparency and compliance with financial and administrative protocols under the CAMPA scheme. However, certain records were not presented during document verification. In Amaravaram Range, RSO 14 (2017–18) estimates were not available for verification in Eluru Division. In J.R. Gudem Range, DSO 17 (2017–18) estimates and work registers were not presented. In Kannapuram Range, DSO 3 (2017–18) and DSO 18 (2017–18) sanction orders were not made available. Similarly, in Kukunoor Range, DSO 6 (2017–18) sanction orders were not presented for verification.

Key Findings

- Plantation activities across Eluru, J.R. Gudem, and Kannapuram showed uniformly high survival and strong growth, indicating good species-site compatibility.
- Verification revealed that perambulated plantation areas consistently exceeded recorded extents.
- Maintenance activities were executed as planned but weakened by damaged signage and inconsistent record updates.
- Fire lines under protection works were well implemented and visible.
- SMC works were structurally compliant but degraded by siltation and seepage.
- "Other works" were financially compliant but documentation was incomplete in some ranges.

Recommendations

- Replicate species–site matching: Consolidate plantation successes by applying proven species–site alignment models from Velagalapalli, Jeelugumilli, and Karakapadu.
- Standardize records and signage: Maintain consistent plantation boards, markers, and updated journals for effective monitoring and auditing.
- SMC maintenance: Institutionalize routine desilting and repairs of trenches, check dams, and contour bunds to maintain functionality.
- Fire line management: Sustain regular clearance and inspection of fire lines to prevent and control forest fires.
- Close documentation gaps: Mandate submission of all estimates, work registers, and records during audits to ensure transparency.
- Grazing control: Strengthen protection through fencing and active community (VSS) participation.

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 2017-18, a total of 85 CAMPA activities were carried out, of which 19 activities (around 22 %) were selected for detailed monitoring and evaluation. Among activity types, other works dominated with 82 activities (17 sampled), followed by construction (2; 1 sampled), Maintenance (1; 1 sampled). None of the plantation projects, protection, soil and moisture conservation works were implemented.

1. Monitoring and Evaluation of Maintenance Activities

In Eluru WLM Division during 2017-18, a total of one maintenance activity was carried out under CAMPA, of which one activity (approximately 20%) was selected for monitoring and evaluation.

1.1 Plants and its Maintenance at Atapaka Pelican Paradise in Kaikaluru Range

GPS location: N 16.568419 E 81.226410 **SO no. and year:** SDSO 14 (2017-18)

As per the approved maintenance plan, the following activities, weeding operations, formation of saucers, fertilizer applications and other contingencies were committed and executed at Atapaka. However, during the field visit infrastructure with the planted species of *Pongamia pinnata, Azadirachta indica* and other miscellaneous species was found to be well maintained. Some of the general recommendations for better growth of the plantation are as follows;

General recommendations for maintenance activities

- Intensify weeding, especially along boundaries, to control invasive species and promote healthy growth.
- Carry out soil tilling and adopt mulching or bunding to improve soil aeration and moisture retention.
- Replant casualties with healthy seedlings to maintain stocking density and ensure uniform growth. Install and maintain boundary pillars and boards to prevent encroachment and aid monitoring.
- Keep plantation records updated, with GPS or digital monitoring for accountability.
- Implement protective fencing, supplemental watering, and soil amendments to enhance resilience.

Maintenance of plants at pelican paradise center at Atapaka (Kolleru wild life sanctuary)

2. Monitoring and Evaluation of Construction Activities

A total of 2 Construction activities were carried out in Eluru WLM division during 2017-18, of which 20 % 1 activity was selected for monitoring.

2.1 Providing equipment in children park at pelican paradise centre, Atapaka

GPS Location: N 16.568419 E 81.226410 **SO no. and year:** SDSO 3 (2016-17)

As per the approved construction plan, several activities were committed, including the repair and replacement of existing equipment as well as the provision of new equipment in the children's park at Atapaka. However, during the recent monitoring visit, only a subset of these activities was observed to have been executed. The Children's Park at Kolleru Wildlife Sanctuary has taken a positive step by introducing well-designed children's play equipment to enhance its recreational value. This initiative not only provides entertainment but also encourages physical activity in a natural environment, which benefits children by improving physical fitness, motor skills, and social interaction. Additionally, the park encourages families to spend quality time outdoors. The equipment has been thoughtfully placed to blend harmoniously with the natural surroundings of the bird sanctuary. The successful procurement and installation of children's play equipment such as the rainbow ladder, swings, family self-Jula, and seesaw is noteworthy. All equipment was found to be in good condition, ensuring that the play area remains a cherished space for children and families.

Children Park at pelican paradise centre, Atapaka in Kaikaluru range WLM

Children Park at pelican paradise centre, Atapaka in Kaikaluru range WLM

3. Monitoring and Evaluation of Other activities

During 2017–18, a total of 82 activities were implemented under the "Others" category, of which 17 were sampled for monitoring and evaluation. Document verification and cross-checking of the sampled activities were carried out in the presence of Division and Range Office staff. The verification process involved reviewing key documents such as sanction orders, estimation sheets, and work registers. It was observed that sanctioned amounts were 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 found to be appropriate and in accordance with approved estimates and CAMPA guidelines. Furthermore, internal audits conducted by the Conservator of Forests and external audits by the Accountant General's Office ensured transparency and compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- Plantation maintenance at Atapaka Pelican Paradise was well executed, with *Pongamia pinnata* and *Azadirachta indica* showing healthy survival and growth.
- The installation of children's play equipment enhanced the recreational value of the site and strengthened community engagement within the sanctuary.
- No new plantations, protection, or Soil and Moisture Conservation (SMC) works were undertaken during the period, thereby limiting ecological restoration outcomes.
- "Other works" constituted the major share of activities, which were implemented in compliance with financial norms and subjected to regular audit oversight.

Recommendations

- Continue and strengthen maintenance of plantations at Atapaka through enhanced protective measures, regular monitoring, and prompt gap-filling to sustain plant survival.
- Institutionalize periodic upkeep and hygiene checks for the children's park infrastructure to ensure safety, usability, and long-term functionality.
- Broaden the scope of activities to include new plantations, Soil and Moisture Conservation (SMC) works, and protection measures for improved ecological restoration and resilience.
- Rebalance financial allocations to reduce dependence on "other works" and prioritize core ecological interventions.
- Foster active participation of local communities and Vana Samrakshana Samithis (VSS) in both ecological and recreational initiatives to promote ownership and sustainability.

18. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN CHINTUR DIVISION

Introduction

Chintur 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 2017-18, a total of 68 CAMPA activities were implemented in the Chintur Forest Division. Out of these, 17 activities representing approximately 25% were selected for detailed monitoring and evaluation. Among the five forest ranges in the division, V.R. Puram had the highest number of activities implemented (22) with 4 sampled for evaluation. Nellipaka followed with 17 activities and 5 were sampled. Lakkavaram had 14 activities with 3 sampled. Kunavaram implemented 7 activities with 3 sampled. Chintur had the lowest number of sampled activities, with 8 implemented and only 1 selected for evaluation. In terms of activity type, SMC works constituted the largest share with 22 activities implemented and 5 sampled. This was followed by other activities (20 implemented; 4 sampled), maintenance (11; 3), plantation (9; 2) and protection (6; 2). Notably, no construction works were reported during this period.

1. Monitoring and Evaluation of Plantation Activities

During 2017-18, Chintur Forest Division implemented a total of 9 plantation activities under the CAMPA programme, of which 2 activities (approximately 22 %) were selected for monitoring and evaluation. Range-wise, V.R. Puram recorded the highest number of plantation activities, with 5 implemented and 1 sampled. Nellipaka followed with 4 plantation activities, of which 1 was sampled. No plantation activities were reported in the Chintur, Kunavaram and Lakkavaram ranges during this period.

1.1 VR Puram range

During 2017–18, a total of five plantation activities were implemented under the CAMPA scheme in VR Puram range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected.

Table 88 Details of plantation selected in V.R. Puram range

Sl. no.	Plantation	SO no. and year
1	Raising of NTSHW plantation (25 Ha) at Mattapally beat, Buruguwada section	DSO 78 (2017-18)

The 25-hectare plantation at Mattapally, evaluated on 05.03.2025 in the presence of forest department staff was found to be a complete poor performance with no evidence of survival or establishment of the intended plantation species. The site, characterized by red soil with poor fertility coupled with inadequate rainfall proved unsuitable for the species selected under the plantation scheme. During field assessment, only natural regeneration of native species like *Diospyros melanoxylon*, *Lannea coromandelica*, *Tephrosia purpurea* and *Wrightia tinctoria* were observed indicating the resilience of indigenous flora under adverse site conditions. This affirms the need for assessing species-site suitability before taking up any plantation work.

1.2 Nellipaka range

During 2017–18, a total of four plantation activities were implemented under the CAMPA scheme in Nellipaka Range. For monitoring and evaluation purposes, 20 % of these activities, equivalent to one plantation site, was randomly selected for assessment.

Table 89 Details of plantation selected in Nellipaka range

Sl. no.	Plantation	SO no. and year
1	Raising of non-Teak secondary hard wood (NTSHW) plantation (25 Ha) Palamadugu beat, Thunikicheruvu section	DSO 56 (2017-18)

The Palamadugu plantation, established on a site characterized by hard, gravelly red soil has shown very poor survival and limited growth indicating a near-total poor performance. The soil conditions were found to be unsuitable for the major species planted with survival rates recorded at only 6.81 % for both *Syzygium cumini* and *Diospyros melanoxylon*, 6.06 % for *Albizia chinensis* and 2.27 % for *Pongamia pinnata*. Growth performance was weak with average tree height ranging from 1.00 to 3.00 meters and girth from 10.00 to 17.00 cm. Field inspection and sample plot enumeration confirmed that severe grazing pressure, cattle intrusion and possible encroachment were key factors preventing sapling establishment and survival. Patches of natural regeneration of *Wrightia tinctoria* were observed reflecting the adaptability of native species under the prevailing site conditions. Overall, the findings highlight the need for better species-site matching, stronger protection measures and community involvement to ensure plantation success in such challenging environments.

Table 90 Details of plantation enumerated in Nellipaka range

Sl. no.	Plantation/ village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average	
						Height (m)	GBH (cm)
1	Palamadagu 25 Ha NTSH plantation	1	*Pongamia pinnata*	N 17.728663 E 81.000430	2.27	1.00 ±0	10.0 ±0
			Diospyros melanoxylon		6.81	2.25 ±1.06	13.50 ±2.12
			Albizia chinensis		6.06	2.25 ±0.35	10.25 ±0.35

		2	*Pongamia pinnata*	N 17.728138 E 81.000383	2.27	3.00 ±0	20.0 ±0
			Syzygium cumini		6.81	2.00 ±0.70	16.0 ±1.41
			Albizia chinensis		6.06	1.25 ±0.35	11.25 ±1.76
Plantation average					**5.04**	**1.95**	**13.50**

Comparative assessment of plantations in Chintur division during 2017-18

The plantations in VR Puram and Nellipaka ranges have largely very poorly performed due to unsuitable site conditions. The 25-hectare VR Puram plantation on red, low-fertility soil with poor rainfall showed no survival of the intended species. Similarly, the Nellipaka plantation on hard, gravelly red soil exhibited very low survival rates (around 2–7%) for key species like *Syzygium cumini* and *Albizia chinensis*. Growth was weak, with small tree heights and girths. Additionally, heavy grazing, cattle intrusion, and encroachment further hindered sapling survival and plantation success.

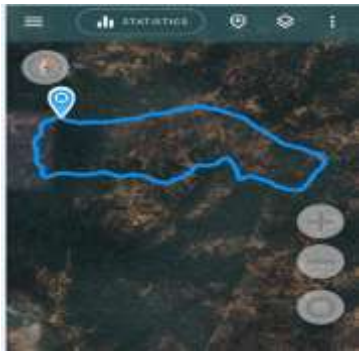
Verification of plantation area and boundaries

In Chintur division during 2017-18, 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 91 Details of plantation area perambulation in Chintur division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of NTSHW plantation (25 Ha) at Mattapally beat, Buruguwada section	25 Ha	28.88 Ha
2	Raising of non-Teak secondary hard wood (NTSHW) plantation (25 Ha) Palamadugu beat	25 Ha	21.22 Ha

As part of the monitoring and evaluation of CAMPA plantation activities in Chintur Forest Division during 2017-18, perambulation and area verification were conducted at two plantation sites: Mattapally and Palamadagu. These exercises were carried out with the active support of local Forest Beat Officers, utilizing GPS-based tracking through the Geo Tracker app and QGIS software for accurate area calculation. To ensure transparency and credibility, photographic documentation was also captured during the visits. At Mattapally plantation, the area calculated from the perambulated boundary when analyzed using QGIS, showed excess of 3.88 hectares, compared to the officially recorded area. The plantation boundaries were surrounded by dense jungle growth and sparsely dispersed trenches which rendered the original demarcated paths largely inaccessible. As a result, the perambulation had to be conducted along the outer edges of the plantations rather than along the precise recorded boundaries. In contrast, Darapally plantation showed a shortfall in the area recorded. The GPS-based measurement revealed only 21.22 hectares, indicating a discrepancy of 3.78 hectares from the area recorded in the plantation journal. The cause of this shortfall could not be conclusively established during the field verification. The perambulation was guided by the boundary demarcation provided by the plantation watcher or guard and conducted under the supervision of the Forest Beat Officer.



Mattapally 28.88 Ha

Palamadagu 21.22 Ha

Health Status of Plantation: In both 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 both Mattapally and Palamadagu 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, both 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 both sites, discrepancies between recorded data and actual field conditions underscore the need for regular updates, verification and improved record management. Additionally, the absence of plantation displays boards at both locations reduced visibility and awareness of the plantation sites.

Vana Samrakshan Samithi (VSS): At Mattapally, 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 plantation lacked VSS involvement, and consequently, no FGD was organized, reflecting limited community engagement in its management.

Mattapally plantation, VR Puram

Palamadagu plantation, Nellipaka

2. Monitoring and Evaluation of Maintenance Activities

During 2017-18, a total of 11 maintenance activities were implemented under CAMPA across Chintur Forest Division, of which 3 activities were selected for monitoring and evaluation. A range-wise analysis indicates that V.R. Puram undertook the highest number of maintenance

activities with 7 implemented and 2 sampled for evaluation. Chintur and Nellipaka each implemented 2 activities; however, only 1 activity in Nellipaka was sampled, while none were selected in Chintur. Notably, no maintenance works were reported from the Lakkavaram and Kunavaram ranges during this period.

Table 92 Maintenance activities selected for evaluation in Chintur division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
VR Puram range			
1	First year maintenance of Bamboo plantation (10 Ha), Darapally beat of Jeeduguppa section	N 17.552621 E 81.354895	DSO 74 (2017-18)
2	First year maintenance of Bamboo plantation (50 Ha) Darapally beat of Jeediguppa section	N 17.559471 E 81.367804	DSO 77 (2017-18)
Nellipaka range			
3	First year maintenance of BAMBOO plantation 10 Ha in Bandirevu (S) beat and section	N 17.736574 E 81.117988	DSO 55 (2017-18)

As per the approved maintenance plan, the nature of maintenance activities undertaken depends on the year of implementation following plantation establishment. According to the work register, the maintenance operations undertaken included casualty replacement, weeding operations, coppice management, fertilizer application, fire line management, and other contingency measures aimed at ensuring plantation survival and growth. However, during the monitoring visit it was observed that the Bamboo growth at the Darapally plantation was poor and stunted. Additionally, the plantation board was missing at the Darapally site. In contrast, Bandirevu plantation showed good Bamboo growth and the plantation board was present and clearly visible indicating better maintenance and monitoring at this location.

General recommendations for maintenance activities

- Ensure timely and consistent execution of all scheduled maintenance operations including weeding, casualty replacement, coppice management, fertilizer application and fire line upkeep.
- Take corrective action at underperforming sites like Darapally, including assessing soil conditions, replanting where necessary and improving site-specific care.
- Install and maintain plantation boards at all sites for clear identification, accountability and ease of monitoring.
- Increase supervision by field-level staff to ensure whether maintenance is being carried out as per the approved plan and plantation progress is regularly tracked.

Darapally beat, VR Puram

Bandirevu beat, Nellipaka

3. Monitoring and Evaluation of Protection Activities

During 2017-18, Chintur division undertook a total of 6 protection activities, out of which 2 were selected for monitoring and evaluation. The range-wise distribution of these activities are as follows: Chintur implemented 1 activity, which was not sampled; Kunavaram implemented 2 activities with 1 sampled, and Lakkavaram carried out 3 activities with 1 sampled. No protection activities were reported from the Nellipaka and V.R. Puram ranges during this period.

3.1 Creation of fire lines in Kunavaram range

GPS location: N 17.748596 E 81.32534 **SO no and year:** RSO 21 (2017-18)

3.2 Creation of new fire lines at Lakkavaram beat and section

GPS location: N 17.767218 E 81.556112 **SO no and year:** RSO 22 (2017-18)

Under the CAMPA-NPV scheme, fire lines have been established in both Buradagudem (Kunavaram range) and Lakkavaram beat (Lakkavaram range), measuring 3 m in width and 2000 rmt and 1000 rmt in length respectively, consistent with official records. While the fire lines have been created as planned, lack of proper maintenance has led to poor visibility in both locations. Field observations revealed significant accumulation of grass, dried leaves, and weed growth along the fire lines, reducing their effectiveness. Regular and timely maintenance is recommended to ensure these fire lines serve their intended purpose in preventing and controlling forest fires.

Fire lines in Buradagudem beat

Fire lines in Lakkavaram beat

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During 2017-18, a total of 22 Soil and Moisture Conservation (SMC) activities were implemented across five ranges in Chintur division, with five selected for monitoring. Chintur had three activities (one sampled), Kunavaram two (one sampled), Lakkavaram seven (one sampled), Nellipaka six (two sampled), and VR Puram four (none sampled).

4.1 Formation of new percolation tank in Pothampally beat

GPS location: N 17.760748 E 81.493079 **SO no. and year**: DSO 134 (2017-18)

4.2 Formation of new percolation tank in Buradagudem beat

GPS location: N 17.744699 E 81.323238 **SO no. and year**: DSO 91 (2017-18)

4.3 Formation of new percolation tank in Lakkavaram beat of Lakkavaram section

GPS location: N 17.768495 E 81.559210 **SO no. and year**: RSO 32 (2017-18)

4.4 Construction of new percolation tank at Bandirevu(S) beat of Bandirevu section

GPS location: N 17.738503 E 81.118534 **SO no. and year**: RSO no. 06 (2017-18)

4.5 Formation of new staggered trenches in Bandirevu(S) beat of Bandirevu section

GPS location: N 17.736696 E 81.117886 **SO no. and year**: DSO 86 (2017-18)

Percolation tanks constructed at Pothampally (Chintur range), Buradagudem (Kunavaram range), Lakkavaram (Lakkavaram range) and Bandirevu beats (Nellipaka range) along with staggered trenches at Bandirevu (Nellipaka range) were monitored and evaluated against specifications recorded in the measurement book (MB). Field measurements confirmed that all structures adhered to the approved dimensions—percolation tanks measured 10 m in length and width with depths ranging from 1 to 1.5 m and staggered trenches measured 10 m in length, 0.5 m in width and 0.5 m in depth. No deviations were noted from the MB records. However, varying degrees of silt accumulation damaged or displaced stone dry packing and weed or plant residue growth were observed across most sites, primarily due to monsoon overflows and low-lying locations. While the tanks at Buradagudem and Lakkavaram were generally better maintained, the tank at Pothampally showed significant degradation and trenches at Bandirevu were largely filled. Regular de-siltation and minor structural repairs are recommended across all sites to restore and maintain their full water storage and soil moisture retention capacity.

Percolation tank in Pothampally beat

Percolation tank in Buradagudem beat

Percolation tank in Lakkavaram beat

Percolation tank in Bandirevu beat

Staggered trenches at Bandirevu beat

5. Monitoring and Evaluation of Other Activities

Under the "Others" category, a total of 20 activities were implemented during 2017–18 in the Chintur Forest Division, out of which 4 activities were selected for monitoring and evaluation. Among the ranges, V.R. Puram recorded the highest number of activities with 6 (1 sampled), followed by Nellipaka with 5 (1 sampled), Lakkavaram with 4 (1 sampled), and Kunavaram with 3 (1 sampled). The Chintur Range implemented 2 activities, but none were selected for monitoring. Document verification and cross-checking were carried out in the presence of Division and Range Office staff. The evaluation included a review of sanction orders, estimation sheets, and work registers. It was observed that the sanctioned amounts aligned with actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). The utilization of funds was appropriate and consistent with the approved estimates and CAMPA guidelines. Additionally, both internal (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.

Key Findings

- Several plantations very poorly performed primarily due to species-site mismatch, uncontrolled grazing, and inadequate sustained protection measures.
- Though structurally sound, many SMC interventions were found to be functionally ineffective owing to lack of periodic maintenance.
- The existing fire lines require regular clearing and upkeep to ensure effectiveness in fire prevention and control.
- The observed regeneration of native species in plantation areas reflects the inherent resilience and ecological recovery potential of the site.

Recommendations

- Ensure appropriate matching of species to local soil and ecological conditions prior to plantation establishment to enhance survival and growth.
- Strengthen grazing control and improve boundary demarcation to safeguard plantation areas from biotic interference.
- Regularly de-silt percolation tanks and trenches to maintain their water-holding efficiency and long-term functionality.
- Improve record-keeping practices and ensure that all plantations are equipped with clearly visible and updated plantation boards.
- Enhance local stakeholder involvement through active engagement of VSS/JFMCs to promote shared responsibility and long-term sustainability.

19. MONITORING AND EVALUATION OF CAMPA ACTIVITIES IN KAKINADA DIVISION

Introduction

Kakinada Forest Division, located in East Godavari district, spans diverse landscapes from coastal plains and deltaic lowlands to uplands and the Eastern Ghats. As per ISFR 2023, the district has 544.13 sq. km of forest cover, showing a net increase of 4.12 sq. km since 2021. This includes 184.33 sq. km of Moderately Dense Forest, 359.78 sq. km of Open Forest, and a minimal 0.02 sq. km of Very Dense Forest. Vegetation is dominated by tropical dry and moist deciduous forests in the uplands, while the Godavari estuary sustains ecologically critical mangroves. The Coringa Wildlife Sanctuary harbours one of the largest mangrove stretches on India's east coast, supporting rich biodiversity and coastal protection. Key species include teak, asan, tendu, satinwood, anogeissus, and lagerstroemia in deciduous forests, and *Avicennia, Rhizophora, Sonneratia, Excoecaria, and Aegiceras* in mangroves. Soils vary from fertile alluvial loams in deltas to lateritic and red sandy loams in uplands. Management measures include fire prevention, afforestation, and biodiversity conservation, though challenges like grazing, invasive species, and illegal felling persist. Community participation through Vana Samrakshana Samithi (VSSs) has improved forest health and reduced pressure in several areas, though issues remain in pockets with limited involvement. Overall, Kakinada Division is an ecologically significant zone combining biodiversity richness, productive ecosystems, and community-based governance. Sustained investment in restoration, scientific management, and stronger community institutions is essential for its long-term ecological security.

During the period 2017-18, a total of 221 CAMPA activities were implemented in Kakinada Forest Division, out of which 50 activities approximately 22% were selected for detailed monitoring and evaluation. Range-wise distribution shows that the RC Varam range reported the highest number of activities with 85 (19 sampled), followed by Gokavaram with 32 (9 sampled), Rajavommangi with 24 (7 sampled), and Kakinada with 23 (5 sampled). Yeleswaram and Sudikonda each implemented 20 activities, with 4 and 2 sampled respectively, while Addatheegala recorded 17 activities, of which 4 were sampled. In terms of activity type, Soil and Moisture Conservation (SMC) works constituted the largest share with 76 activities implemented and 18 sampled. This was followed by other activities (58 implemented; 12 sampled), maintenance (48; 11 sampled), plantation (23; 6 sampled), protection (9; 2 sampled).

1. Monitoring and Evaluation of Plantation Activities

During 2017-18, Kakinada division implemented a total of 23 plantation activities under CAMPA, of which 6 activities (approximately 26 %) were selected for monitoring and evaluation. Range-wise distribution shows that Addatheegala carried out 6 activities with 2 sampled, followed by Rajavommangi with 5 activities and 2 sampled. Kakinada and Sudikonda each implemented 3 activities with 1 and 0 sampled respectively. Yeleswaram, RC Varam and Gokavaram implemented 2 activities each with none sampled in Yeleswaram and 1 activity sampled in both RC Varam and Gokavaram.

1.1 Kakinada range

During 2017–18, a total of three plantation activities were implemented under the CAMPA scheme in Kakinada range. As part of the monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected.

Table 93 Details of plantation selected in Kakinada range

Sl. no.	Plantation	SO no. and year
1	Raising of Teak plantation over 2 Ha at Atchutapuram beat	SDSO 1 (2017-18)

The selected 2-hectare plantation site at Rekhavanipalem is characterized by a gentle slope and red soil interspersed with black and red stones with approximately 50% of the surface covered by stones.

Survival percentage: Rekhavanipalem plantation site has shown moderate suitability for *Tectona grandis* with an average survival rate of 53.9%.

Growth performance: In Rekhavanipalem plantation, the average tree height ranges from 1.13 to 1.19 m while the average girth ranges from 13.79 to 14.33 cm.

Table 94 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	Rekhavani palem 2 Ha NTSH plantation	1	*Tectona grandis*	N 17.383324 E 82.537277	58.59	1.13 ±0.49	13.79 ±4.63
		2	*Tectona grandis*	N 17.383439 E 82.537223	55.46	1.19 ±0.44	14.33 ±5.04
		3	*Tectona grandis*	N 17.383299 E 82.537274	47.65	1.17 ±0.53	13.97 ±4.83
Plantation average					**53.90**	**1.16**	**14.03**

1.2 Addatheegala range

During 2017–18, a total of six plantation activities were implemented under the CAMPA scheme in Addatheegala range. As part of the monitoring and evaluation process, approximately 33 % of these activities, equivalent to two plantation sites, were randomly selected.

Table 95 Details of plantations selected in Addatheegala range

Sl. no.	Plantations	SO no. and year
1	Raising of 5.00 Teak Plantation in Chavitidibbalu Beat	DSO 21 (2017-18)
2	Raising of 5.00 Teak Plantation in Addatheegala Beat	DSO 22 (2017-18)

The proposed 5-hectare Teak plantation site at Chavitidibbalu is characterized by undulating hilly terrain, predominantly consisting of well-drained red soils. The topography and soil conditions are conducive to teak cultivation offering good aeration and moderate fertility which support healthy root development and sustainable growth of Teak plantations. The 5-hectare site selected for teak plantation at Addatheegala beat is characterized by red soil mixed with sand. This soil composition provides moderate drainage and supports root penetration making it suitable for Teak cultivation under proper management practices.

Survival Percentage: 5 Ha teak plantation site at Chavitidibbalu beat has demonstrated moderate suitability for *Tectona grandis* with an observed average survival rate of 52.18%. The

5-hectare Teak plantation site at Addatheegala demonstrates good suitability for *Tectona grandis* with an average survival rate of 60.23%.

Growth Performance: In Chavitidibbalu beat Teak plantation, the average tree height ranges from 2.36 to 3.42 m while the average girth ranges from 11.62 to 21.49 cm. In Addatheegala plantation the average tree height ranges from 4.47 to 7.65 m with girth ranging from 11.62 to 21.49 cm.

Table 96 Details of plantations enumerated in Addatheegala range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Chaviti Dibbalu 5 Ha Teak plantation	1	*Tectona grandis*	N 17.614369 E 81.918989	53.90	2.74 ±0.47	15.09 ±4.56
		2	*Tectona grandis*	N 17.614697 E 81.917874	51.56	2.49 ±0.40	11.62 ±3.03
		3	*Tectona grandis*	N 17.614473 E 81.918203	50.78	2.36 ±0.36	12.78 ±4.31
		4	*Tectona grandis*	N 17.614431 E 81.918595	55.85	2.60 ±0.42	12.36 ±3.68
		5	*Tectona grandis*	N 17.614388 E 81.919011	48.82	3.42 ±0.77	21.49 ±5.02
Plantation average					**52.18**	**2.72**	**14.66**
2	Adda Theegala 5 Ha Teak plantation	1	*Tectona grandis*	N 17.474775 E 82.027063	60.15	7.65 ±0.96	31.36 ±10.2
		2	*Tectona grandis*	N 17.474605 E 82.026693	58.59	5.54 ±0.96	36.19 ±9.69
		3	*Tectona grandis*	N 17.474037 E 82.027045	61.71	4.89 ±1.29	29.16 ±8.94
		4	*Tectona grandis*	N 17.473826 E 82.027223	57.42	4.47 ±1.20	29.78 ±9.74
		5	*Tectona grandis*	N 17.473738 E 82.028339	63.28	5.29 ±1.20	33.90 ±8.64
Plantation average					**60.23**	**5.56**	**32.07**

1.3 Gokavaram range

During 2017–18, a total of two plantation activities were implemented under the CAMPA scheme in Gokavaram range. As part of the monitoring and evaluation process, 50 % of these activities, equivalent to one plantation site, was randomly selected.

Table 97 Details of plantation selected in Gokavaram range

Sl. no.	Plantation	SO no. and year
1	Raising of Teak plantation (3 ha) in P. Patnam Beat	SDSO 3 (2017-18)

The selected 3-hectare plantation site at P. Patnam beat is characterized by red gravel soil, primarily composed of silt sand and gravel.

Survival percentage: P. Patnam plantation site has shown good suitability for *Tectona grandis* with an average survival rate of 46.83 %.

Growth Performance: In P. Patnam plantation, the average tree height ranges from 0.97 to 4.33 m while the average girth ranges from 9.84 to 23.82 cm.

Table 98 Details of plantation enumerated in Gokavaram range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	P. Patnam 3 Ha Teak plantation	1	*Tectona grandis*	N 17.233652 E 81.702395	49.82	0.98 ±0.46	10.30 ±5.49	-
		2	*Tectona grandis*	N 17.233597 E 81.702189	47.65	0.97 ±0.38	9.84 ± 4.23	-
		3	*Tectona grandis*	N 17.228951 E 81.704441	40.23	4.33 ±0.84	-	23.82 ±5.32
		4	*Tectona grandis*	N 17.226688 E 81.706389	49.6	2.70 ±0.32	-	15.66 ±4.96
		5	*Tectona grandis*	N 17.573040 E 81.716669	46.87	1.29 ±0.80	10.03 ± 5.42	-
Plantation average					**46.83**	**2.05**	**10.05**	**19.74**

1.4 Rajavommangi range

During 2017–18, a total of five plantation activities were implemented under the CAMPA scheme in Rajavommangi Range. As part of the monitoring and evaluation process, one plantation activity (20 %) was randomly selected.

Table 99 Details of plantations selected in Rajavommangi range

Sl. no.	Plantation	SO no. and year
1	Raising of 02 Ha Teak plantation in Aminabad RF, Jaddangi beat	SDSO 01 (2017-18)
2	Raising of 06 Ha Teak plantation in V.B.Puram RF, Thimmapuram beat	DSO 26 (2017-18)

The 2-hectare site at Jaddangi beat has black alluvial soil which is rich in nutrients and highly fertile with good moisture retention capacity suitable for teak growth. The 6-hectare teak plantation site at Thimmapuram beat is characterized by sandy soil which though low in nutrient and moisture retention provides good aeration and root penetration.

Survival percentage: Jaddangi beat Teak plantation showed an average survival rate of 65.07%. The Thimmapuram beat teak plantation recorded a moderate survival rate of 57.10%.

Growth Performance: In Jaddangi plantation, average height ranged from 6.99 to 7.06 m with girth ranging from 30.61 to 41.98 cm. In 6-hectare Thimmapuram beat plantation, average height ranged from 0.77 to 7.21 m with girth between 10.06 and 16.86 cm.

Table 100 Details of plantations enumerated in Rajavommangi range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1		1	*Tectona grandis*	N 17.45458 E 82.146324	66.40	6.99 ±0.69	-	30.61 ±3.34

	Jaddangi 2 Ha Teak plantation	2	*Tectona grandis*	N 17.454733 E 82.146681	69.92	7.03 ±0.68	-	37.99 ±5.17
		3	*Tectona grandis*	N 17.453977 E 82.147741	62.50	7.02 ±0.66	-	38.97 ±7.50
		4	*Tectona grandis*	N 17.453561 E 82.147366	66.40	7.06 ±0.67	-	41.98 ±6.96
		5	*Tectona grandis*	N 17.453801 E 82.147001	60.15	7.06 ±0.68	-	41.83 ±6.95
Plantation average					**65.07**	**7.03**	**-**	**38.27**
2	Thimma Puram 6 Ha Teak plantation	1	*Tectona grandis*	N 17.429402 E 82.120383	75.00	7.21 ±0.49	-	27.56 ±5.04
		2	*Tectona grandis*	N 17.429830 E 82.120473	61.71	2.20 ±0.25	-	13.88 ±2.57
		3	*Tectona grandis*	N 17.430105 E 82.120807	58.59	2.21 ±0.24	-	14.26 ±2.53
		4	*Tectona grandis*	N 17.430484 E 82.120671	40.62	-	0.77 ±0.26	10.06 ±2.72
		5	*Tectona grandis*	N 17.431368 E 82.140477	49.60	-	1.41 ±0.39	16.86 ±5.00
Plantation average					**57.10**	**3.87**	**1.09**	**16.52**

Comparative assessment of plantations in Kakinada division during 2017-18

The assessment of Teak and Bamboo plantations across Kakinada, Addatheegala, Gokavaram, and Rajavommangi ranges revealed clear site-based differences. Kakinada (Rekhavanipalem) showed moderate survival (53.9%) but poor growth, indicating stunted Teak development. Addatheegala had mixed results: Chavitidibbalu showed moderate survival (52.18%) with modest growth, while Addatheegala beat performed better (60.23% survival, 4.47–7.65 m height). Bamboo in Chavitidibbalu showed good suitability (60% survival) with moderate growth. Gokavaram (P. Patnam) had low survival (46.83%) with highly variable growth, reflecting inconsistent site suitability. Rajavommangi emerged best for Teak: Jaddangi beat recorded the highest survival (65.07%) and excellent growth (6.99–7.06 m height, 30.61–41.98 cm girth), while Thimmapuram showed moderate survival (57.10%) but uneven growth. Overall, Rajavommangi, particularly Jaddangi, offered the most favorable conditions for Teak, while Kakinada and Gokavaram were least suitable, and Addatheegala showed potential for both Teak and Bamboo depending on site.

Verification of plantation area and boundaries

In Kakinada division during 2017-18, 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 101 Details of plantation area perambulation in Kakinada division

Sl no.	Plantations	Area as per records	Area as per field perambulation
1	Raising of Teak plantation over 2 Ha at Atchutapuram	2 Ha	1.22 Ha
2	Raising of 5.00 Teak Plantation in Chavitidibbalu beat	5 Ha	6.27 Ha
3	Raising of 5.00 Teak Plantation in Addatheegala beat	5 Ha	4.61 Ha

4	Raising of Teak plantation (3 Ha.) in P. Patnam beat	3 Ha	Bit I -1.13 Ha Bit II - 0.87 Ha Bit III - 0.75 Ha Bit IV - 1.37 Ha Total – 4.12 Ha
5	Raising of 02 Ha teak plantation in Aminabad RF, Jaddangi beat	2 Ha	2.28 Ha
6	Raising of 06 Ha teak plantation in V.B. Puram RF, Thimmapuram beat	6 Ha	5.10 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 three plantations 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.

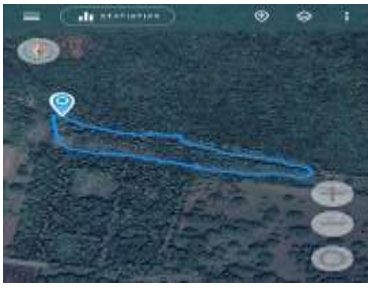
- 2 Ha Teak Atchutapuram plantation (Kakinada)**:** Lesser by 0.78 Ha
- 5 Ha Teak Chavitidibbalu plantation (Addatheegala)**:** Exceeded by 1.27 Ha
- 5 Ha Teak Addatheegala plantation (Addatheegala)**:** Lesser by 0.39 Ha
- 3 Ha Teak P.Patnam plantation (Gokavaram)**:** Exceeded by 1.12 Ha
- 2 Ha Teak Jaddangi plantation (Rajavommangi)**:** Exceeded by 0.28 Ha
- 6 Ha Teak Thimmapuram plantation (Rajavommangi): Lesser by 0.9 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 1.22 Ha

Chavitidibbalu 6.27 Ha

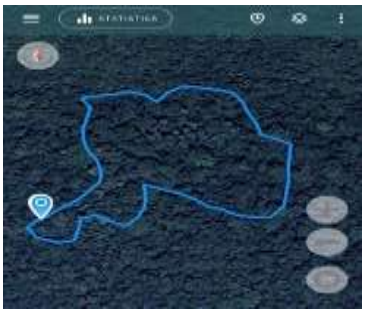
Addatheegala 4.61 Ha



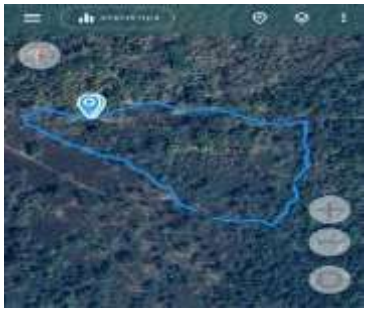
P. Patnam 1.13 Ha bit-I

Bit-II 0.87 Ha

Bit-III 75 Ha



P Patnam bit-IV 1.37 Ha



Jaddangi 2.28 Ha

Thimmapuram 5.10 Ha

Health Status of Plantation: Based on field observations across the six evaluated plantations- Addatheegala, Chavitidibbalu and Jaddangi no signs of insect or pest damage were observed. These plantations were generally found to be in healthy condition exhibiting good survival rates and vigorous growth. However, Atchutapuram, P.Patnam and Thimmapuram plantation showed evidence of damage caused by pests and insects indicating compromised plant health in that area.

Protection of plantation: 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 all six plantations. 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 all six plantations were presented for verification. However, it was observed that plantation boards were missing at the P. Patnam, Atchutapuram, Jadadangi and Thimmapuram 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 evident at all 6 plantation sites 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, Chavitidibbalu, Addatheegala,

P.Patnam, Jaddangi and Thimmapuram plantations to gather insights from community members regarding their roles, contributions and challenges in plantation management.

Atchutapuram plantation

Chavitidibbalu plantation

Addatheegala plantation

P. Patnam plantation

Jaddangi plantation

Thimmapuram plantation

2. Monitoring and Evaluation of Maintenance Activities

In 2017-18, a total of 48 maintenance activities were undertaken across the Kakinada Forest Division, with 11 selected for monitoring and evaluation. Among the ranges, Rajavommangi reported the highest number with 13 activities, of which 4 were sampled. RC Varam and Sudikonda followed with 9 activities each, with 2 and 1 sampled respectively. Yeleswaram implemented 8 activities, of which 2 were evaluated, while Addatheegala carried out 5 activities with 1 sampled. The Kakinada range recorded the lowest with 3 activities, of which 1 was included in the evaluation. Notably, no maintenance activities were reported from the Gokavaram range during the year.

Table 102 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 Nandivompu Bamboo plantation	N 17.419459 E 82.545931	SDSO 02 (2017-18)
Yeleswaram range			
2	First year maintenance of bamboo plantation (5.00 Ha) at Garrangi compartment 561 & 562 at K lingamparthi beat	N 17.434416 E 82.230217	RSO 05 (2017-18)
3	Second year maintenance of safety zone plantation in Girijinapuram RL area 5.5 Ha	N 17.325631 E 82.16889	RSO 03 (2017-18)
Rampachodavaram range			
4	First year maintenance of bamboo plants along the stream in Valamuru beat of Rampachodavaram range	N 17.589649 E 81.676608	RSO 38 (2017-18)
5	Third year maintenance of teak plantation in 2014 (17 Ha) at Devarapalli, Maredumilli south beat	N 17.533374 E 81.720511	DSO 32 (2017-18)
Addatheegala range			
6	First year maintenance of linear bamboo planting in Chavitidibbalu beat	N 17.633001 E 81.917467	RSO 10 (2017-18)
Sudikonda range			
7	First year maintenance of 2.5 Ha bamboo plantation at Bheemavaram VSS	N 17.473614 E 81.829074	RSO 12 (2017-18)
Rajavommangi range			
8	First year maintenance of 13 Ha teak plantation in Jaddangi Spl U RF, Jaddangi beat	N 17.489168 E 82.179556	DSO 27 (2017-18)
9	First year maintenance of 03 Ha teak plantation in Badadanapalli RF, Badadanapalli beat	N 17.582646 E 82.300078	RSO 11 (2017-18)
10	First and second year maintenance of 05 ha teak plantation in V B Puram RF, Thimmapuram beat	N 17.428433 E 82.119417	SDSO 03 (2017-18)
11	First year maintenance of 05 Ha Bamboo plantation in V B Puram RF, Thimmapuram beat	N 17.438603 E 82.135088	RSO 17 (2017-18)

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.

Maredumilli south beat, RC Varam

Bheemavaram beat, Sudhikonda

Jaddangi beat, Rajavommangi

Chavitidibbalu beat, Addatheegala

3. Monitoring and Evaluation of Protection Activities

During the period 2017-18, a total of 9 protection activities were undertaken in Kakinada Forest Division, all of which were implemented in RC Varam range. Out of these, 2 activities were selected for monitoring and evaluation. No protection activities were reported from the Kakinada, Yeleswaram, Addatheegala, Gokavaram, Sudikonda and Rajavommangi ranges during this period.

3.1 Creation of new fire lines in Devarapalli beat

GPS location: N 17.485324 E 81.725702 **SO no and year:** RSO 126 (2017-18)

3.2 Creation of new fire lines in Maredumilli south beat

GPS location: N 17.553678 E 81.727519 **SO no and year:** RSO 131 (2017-18)

The fire lines established in Devarapalli and Maredumilli South beats under the CAMPA-NPV scheme were verified against official records, which specify dimensions of 3 metres in width and lengths of 3400 running metres (rmt) and 3000 rmt, respectively. Field inspection confirmed the presence of these fire lines at both locations; however, their visibility and effectiveness have been significantly reduced due to the profuse growth of grasses, weeds, and

other ground vegetation. This unchecked growth has diminished the intended functionality of the fire lines as barriers for halting or slowing the spread of forest fires.For these structures to serve their purpose effectively, regular upkeep and clearing of vegetation along the fire lines is essential. Periodic maintenance schedules particularly before and during the fire-prone summer season—should be strictly enforced. This includes mechanical or manual removal of weeds, controlled burning where appropriate, and ensuring that the lines remain clear to act as effective firebreaks. Without such timely interventions, the substantial investment made under CAMPA may fail to yield the desired level of forest fire prevention and control.

Fire lines at Devarapalli beat

Fire lines at Maredumilli south beat

4. Monitoring and Evaluation of Soil and Moisture Conservation Activities

During the period 2017-18, a total of 76 Soil and Moisture Conservation (SMC) activities were implemented in Kakinada Forest Division, of which 18 activities were selected for monitoring and verification. The RC Varam range carried out the highest number with 55 SMC activities, of which 12 were sampled for review. Gokavaram range reported 21 activities with 6 sampled. No SMC activities were reported from the Kakinada, Yeleswaram, Addatheegala, Sudikonda and Rajavommangi ranges during this period.

4.1 Digging of staggered trenches in Maredumilli south beat of Maredumilli section

GPS Location: N 17.584306 E 81.714199 **SO no. and year:** RSO 13 (2017-18)

4.2 Digging of staggered trenches in Maredumilli north beat of Maredumilli section

GPS Location: N 17.612326 E 81.690057 **SO no. and year:** RSO 06 (2017-18)

4.3 Digging of staggered trenches in Donkarai beat of Donkarai section

GPS Location: N 17.924272 E 81.815997 **SO no. and year:** RSO 59 (2017-18)

4.4 Digging of staggered trenches in Kutrawada beat

GPS Location: N 17.712355 E 81.68278 **SO no. and year:** RSO 4 (2017-18)

4.5 Digging of staggered trenches in Chintalapudi beat of Chintalapudi section

GPS Location: N 17.633398 E 81.79057 **SO no. and year:** RSO 26 (2017-18)

The staggered trenches constructed in Maredumilli (South and North), Donkarai, Kutrawada, and Chintalapudi beats were subjected to monitoring and evaluation against the specifications recorded in the Measurement Book (MB). As per field verification, the trenches conformed to the design in terms of length (10 meters) and width (0.5 meters), and were broadly consistent with the MB records. However, minor deviations were noted in the depth, with several trenches found to be shallower than the approved design of 0.3 meters. On-site inspection revealed that

the trenches, being located in low-lying plantation areas, had accumulated substantial silt deposits and dried plant residues, which significantly reduced their storage and infiltration capacity. This filling is likely due to natural processes such as surface runoff, soil erosion, and overflow of water during heavy rainfall events, leading to gradual loss of functionality. Although the trenches remain physically visible, their effectiveness as soil and moisture conservation (SMC) structures is compromised. To ensure that these trenches continue to serve their intended purpose of enhancing groundwater recharge, reducing runoff, and supporting plantation survival, it is strongly recommended that regular de-siltation and cleaning be undertaken. Periodic maintenance, particularly prior to the monsoon season, will help restore their full water-holding capacity and improve the long-term efficiency of plantation and watershed management efforts. Additionally, integrating maintenance with community participation through VSS involvement could ensure sustainability and reduce the recurrence of siltation problems.

Staggered trenches in Maredumilli South and North beat

ST in Donkarai beat **Staggered trenches in Chintalapudi beat**

4.6 Digging of percolation tank in Donkarai beat of Donkarai section

GPS Location: N 17.955511 E 81.87558 **SO no. and year:** RSO 17 (2017-18)

4.7 Digging of percolation tank no.4 (Machinery) in Kakuru beat

GPS Location: N 17.702906 E 81.715301 **SO no. and year:** RSO 122 (2017-18)

4.8 Digging of percolation tank no.6 (Machinery) in Kakuru beat

GPS Location: N 17.702672 E 81.716853 **SO no. and year:** RSO 148 (2017-18)

4.9 Digging of percolation tank no.4 (Machinery) in Geddada beat of Rampachodavaram

GPS Location: N 17.486807 E 81.641100 **SO no. and year:** RSO 114 (2017-18)

4.10 Digging of percolation tank no.2 (Machinery) in A M Kota beat

GPS Location: N 17.709609 E 81.745635 **SO no. and year:** RSO 116 (2017-18)

4.11 Digging of percolation tank no.2 (Machinery) in Gurthedu beat

GPS Location: N 17.865022 E 81.960170 **SO no. and year:** RSO 117 (2017-18)

4.12 Digging of percolation tank no.1 (Machinery) in Devarapalli beat

GPS Location: N 17.502417 E 81.70223 **SO no. and year:** RSO 150 (2017-18)

The percolation tanks at Donkarai, Kakuru, Geddada, AM Kota, Gurthedu and Devarapalli beats were monitored and evaluated against the specifications recorded in the measurement book. The tanks at Donkarai, Kakuru, Geddada, AM Kota and Gurthedu were recorded to have dimensions of 10 meters in length, 10 meters in width and 0.60 meters in depth. However, deviations in depth were observed during field verification. Similarly, the Devarapalli tank, with a recorded dimension of 20 meters in length, 20 meters in width and 1 meter in depth, also showed depth deviations. In all cases, silt accumulation has significantly reduced the storage capacity of the tanks. While the tanks are generally well maintained their low-lying locations have contributed to silt build-up and monsoon overflows have resulted in damage to the stone dry packing along the edges. To restore and maintain optimal water retention capacity regular de-silting is strongly recommended.

PT at Donkarai beat

PT at Kakuru beat

PT at Geddada beat

PT at A M Kota beat

PT at Gurthedu beat

PT at Devarapalli beat

4.13 Digging of staggered trenches in Dandangi (N) beat

GPS Location: N 17.309846 E 81.736586 **SO no. and year:** RSO 02 (2017-18)

4.14 Digging of staggered trenches in P. Patnam beat

GPS Location: N 17.233751 E 81.702044 **SO no. and year:** RSO 05 (2017-18)

The staggered trenches constructed at Dandangi and P. Patnam beats were monitored and evaluated against the specifications recorded in the measurement book (MB). Field measurements confirmed the trenches to be 10 meters in length, 0.5 meters in width and 0.3 meters 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 as a result 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 in Dandangi (N) beat

Staggered trenches in P. Patnam beat

4.15 Digging of percolation tanks in Devaram beat

GPS Location: N 17.272208 E 81.743292 **SO no. and year:** RSO 14 (2017-18)

4.16 Digging of percolation tanks in Devaram beat

GPS Location: N 17.271978 E 81.742478 **SO no. and year:** RSO 47 (2017-18)

4.17 Digging of percolation tanks in Dandangi (N) beat

GPS Location: N 17.309494 E 81.736654 **SO no. and year:** RSO 48 (2017-18)

4.18 Digging of percolation tanks in Dandangi (S) beat

GPS Location: N 17.30422 E 81.735127 **SO no. and year:** RSO 45 (2017-18)

The percolation tanks at Devaram and Dandangi (North and South) beats were monitored and evaluated against the specifications recorded in the measurement book. All four tanks were recorded with dimensions of 10 meters in length, 10 meters in width and 0.80 meters in depth. However, deviations in depth were observed during field verification. In all cases, silt accumulation has significantly reduced the storage capacity of the tanks. While the tanks are generally well maintained, their low-lying locations have contributed to silt build-up, and monsoon overflows have caused damage to the stone dry packing along the edges. To restore and maintain optimal water retention capacity, regular de-silting is strongly recommended.

PT at Devaram beat

PT at Dandangi beat

5. Monitoring and Evaluation of Construction Activities

During 2017-18, a total of 7 construction activities were implemented in Kakinada Forest Division, all of which were reported from Yeleswaram range. Out of these, 1 activity was selected for monitoring and verification. No construction works were reported from the other ranges including Kakinada, RC Varam, Addatheegala, Sudikonda, Gokavaram and Rajavommangi during this period.

5.1 Construction of RCC boundary pillars at Lingamparthi RF

GPS Location: N 17.307834 E 82.177149 **SO no. and year:** RSO 75 (2017-18)

The construction of 6 RCC boundary pillars in Lingamparthi RF area was monitored and evaluated against the specifications recorded in the measurement book. The above-ground dimensions of RCC pillars at both locations: 1.20 m in height, 0.30 m top width and 0.45 m bottom width matched the recorded specifications with no deviations noted. Field verification confirmed that all boundary pillars were intact and effectively demarcating the forest boundaries at their respective sites.

RCC boundary pillars in Lingamparthi RF

6. Monitoring and Evaluation of Other Activities

During 2017-18, a total of 58 activities under the "Others" category were implemented across the Kakinada Forest Division, of which 12 were selected for monitoring and evaluation. Range-wise, Kakinada recorded the highest number with 16 activities (3 sampled), followed by RC Varam with 10 activities (3 sampled) and Gokavaram with 9 activities (2 sampled). Sudikonda implemented 8 activities with 1 sampled, while Rajavommangi and Addatheegala carried out 6 activities each, with 1 sampled from each range. Yeleswaram reported 3 activities, of which 1 was 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. It was observed that sanctioned amounts were in alignment with actual expenditures,

all financial records were properly maintained and authenticated by the concerned officials (DFO, SDO, and FRO), and utilization of funds was appropriate and consistent with approved estimates and guidelines. Internal audits by the Conservator of Forests and external audits by the Accountant General's office ensured transparency and compliance with financial and administrative protocols under the CAMPA scheme. However, during the verification process, certain records were unavailable, limiting the assessment of specific activities. In Rampachodavaram, the estimate and work registers for SDSO 32 (2017-18) and DSO 199 (2017-18) were not presented, and the estimate for RSO 134 (2017-18) was also unavailable. Similarly, in Sudikonda range, the estimate and work registers for DSO 149 (2017-18) were not made available. The absence of these essential documents constrained the evaluation of implementation quality, financial compliance, and adherence to guidelines for the respective activities.

Key Findings

- Plantation outcomes were variable: strong survival and growth at Jaddangi and Addatheegala contrasted with poor survival and pest damage at Atchutapuram, P. Patnam, and Thimmapuram.
- Verification revealed both excess and deficit in perambulated plantation areas relative to records.
- Maintenance operations were largely effective but weakened by missing signage and inconsistent record updates.
- Fire lines were created but compromised by dense weed growth.
- SMC structures were dimensionally compliant but degraded by siltation, erosion, and overflow damage.
- RCC boundary pillars were intact and effective for demarcation.
- Financial compliance was ensured, though incomplete documentation hindered full verification of some "other works."

Recommendations

- Consolidate successful models (e.g., teak plantations in *Jaddangi* and *Addatheegala*) and avoid unsuitable sites (e.g., *Atchutapuram*) to prevent resource inefficiencies.
- Ensure regular updating of plantation journals for accurate monitoring and reporting.
- Install standardized signage at all plantation sites for easy identification and transparency.
- Promote systematic replanting, coppice management, and regular pruning for healthy growth and regeneration.
- Clear fire lines proactively *before dry seasons* to minimize fire risks and enhance preparedness.
- Institutionalize regular desilting and structural repairs of percolation tanks and trenches to ensure sustained water availability and soil moisture.
- Replicate RCC boundary pillars at vulnerable forest boundaries to deter encroachment and demarcate clearly.
- Address documentation gaps to improve accountability, monitoring, and transparency in operations and outcomes.
- Sustain and expand the role of Vana Samrakshana Samithis (VSS) to ensure long-term community participation, stewardship, and ownership.

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 103 CAMPA activities were carried out, of which 27 activities (around 21 %) were selected for detailed monitoring and evaluation. In Narsipatnam range, 27 activities were implemented, and 8 were sampled. In K D Peta range, 18 activities were implemented, and 4 were sampled. In Chintapalli range, 22 activities were implemented, with 4 sampled. In Lothugedda range 8 activities were implemented with 3 were sampled. Marripakala 4 activity implemented 2 were sampled. In sileru 21 activities were implemented, with 4 were sampled and in R V nagar 3 were implemented, 2 sampled. Among activity types, others dominated with 55 activities (13 sampled), followed by maintenance (31; 7 sampled), plantation (10; 3 sampled), protection (7; 4 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 1 (1 sampled), KD Peta with 2 (1 sampled), Lothugedda with 2 (1 sampled), Sileru with 3 (1 sampled), Chintapalli with 2 (0 sampled), and none of the plantation activity were implemented in Marripakala and R V nagar.

1.1 K D Peta range

During 2017–18, a total of two plantation activities were carried out under the CAMPA scheme in K D Peta range. As part of the monitoring and evaluation process, 50 % of these activities, equivalent to one plantation site, was randomly selected.

Table 103 Details of plantation selected in K D Peta range

Sl. no.	Plantation	SO no. and year
1	Raising 10ha. NTSH Plantation at B. Kothuru	DSO 44 (2017-18)

The proposed 10-hectare NTSH plantation site at B. Kothuru is characterized by red soil mixed with sandy loam, which provides moderate fertility suitable for plantation activities. The terrain is gently sloping with slight undulations that support good natural drainage and minimize waterlogging. The area is relatively open and receives adequate sunlight, making it favorable for the establishment and growth of plantation species.

Survival percentage: In K.D. Peta Range, the 10-hectare NTSH plantation site at B. Kothuru Beat demonstrated good suitability for *Adina cordifolia*, *Terminalia arjuna*, *Pterocarpus marsupium*, *Pongamia pinnata* and *Syzygium cumini*, with observed average survival rates of 83.97%, 80.32%, 80.16%, 93.33% and 81.96% respectively.

Growth: In the B. Kothuru NTSH plantation, the average tree height ranged from 3.48 to 6.51 meters, while the average girth ranged from 29.78 to 35.31 cm.

Table 104 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 10 Ha NTSH plantation	1	*Adina cardifolia*	N 17.620010 E 82.416162	83.33	3.52 ±0.54	29.94 ±7.82
			Terminalia arjuna		80.32	3.48 ±0.46	32.43 ±7.69
		2	*Adina cardifolia*	N 17.619956 E 82.416180	82.64	4.16 ±0.83	34.45 ±8.08
		3	*Pterocarpus marsupiums*	N 17.619663 E 82.416521	80.16	3.85 ±0.78	29.78 ±5.38
		4	*Adina cardifolia*	N 17.619193 E 82.416274	85.95	5.59 ±0.50	35.31 ±6.44
		5	*Pongamia pinnata*	N 17.618564 E 82.415980	93.33	6.51 ±1.12	40.48 ±8.71
			Syzygium cumini		81.96	6.49 ±1.09	41.26 ±7.34
Plantation average					**83.95**	**4.80**	**34.80**

1.2 Lothugedda range

During 2017–18, a total of two plantation activities were carried out under the CAMPA scheme in Lothugedda range. As part of the monitoring and evaluation process, 50 % of these activities, equivalent to one plantation site, was randomly selected.

Table 105 Details of plantation selected in Lothugedda range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 ha. N.T.S.H. plantation at Kotha Regallu Village	DSO 45 (2017-18)

The selected 10-hectare plantation site at Kotha Regallu Beat is characterized by red ferruginous soil, with loamy and sandy loam textures distributed across the hills and valleys. These soil conditions are fertile and well-drained, providing favourable moisture and nutrient availability that support luxuriant vegetation growth.

Survival percentage: In Lothugedda range, the Kotha Regallu plantation site has shown good suitability for *Adina cordifolia*, *Syzygium cumini*, *Holoptelea integrifolia*, *Terminalia arjuna*, and *Terminalia bellerica*, with average survival rates of 71.34%, 73.77%, 70%, 76.66%, and 71.66% respectively.

Growth: In the Kotha Regallu plantation, the average tree height ranged from 0.72 to 1.10 meters, while the average girth ranged from 11.26 to 18.89 cm.

Table 106 Details of plantation enumerated in Lothugedda range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	Collar Girth (cm)
1	Kotha Regallu 10 Ha NTSH Plantation	1	*Adina cardifolia*	N 17.962256 E 82.414337	65.00	0.72 ±0.25	15.69 ±4.61
			Syzygium cumini		68.85	0.87 ±0.24	16.74 ±5.19
		2	*Holoptelia integrifolia*	N 17.962508 E 82.414523	70.00	0.77 ±0.29	15.02 ±3.61
			Syzygium cumini		70.49	0.88 ±0.35	17.26 ±3.51
		3	*Adina cardifolia*	N 17.962732 E 82.414372	77.68	1.00 ±0.35	18.89 ±4.34
		4	*Terminalia arjuna*	N 17.963090 E 82.414035	76.66	1.03 ±0.28	17.63 ±4.32
			Syzygium cumini		75.40	1.08 ±0.39	18.87 ±5.10
		5	*Terminalia bellerica*	N 17.663232 E 82.413600	71.66	0.94 ±0.22	11.26 ±3.97
			Syzygium cumini		80.37	1.10 ±0.22	17.96 ±4.45
Plantation average					**72.90**	**0.93**	**16.59**

1.3 Sileru range

During 2017–18, a total of three plantation activities were carried out under the CAMPA scheme in Sileru range. As part of the monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected.

Table 107 Details of plantation selected in Sileru range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha NTSH plantation near Gummirevula village	DSO 48 (2017-18)

The proposed 10-hectare site selected for the NTSH plantation at Gummirevula is characterized by diverse topography. The soil profile predominantly consists of red soil interspersed with sandy loam,

ensuring moderate drainage. However, the presence of granite rock formations across the area creates a rugged landscape and limits soil depth in several patches.

Survival percentage: The 10-hectare NTSH plantation site at Gummirevula showed good suitability for *Dalbergia latifolia* (76.67%), *Pterocarpus marsupium* (78.6%), *Toona ciliata* (78.19%), and *Adina cordifolia* (77.17%).

Growth: In the Gummirevula NTSH plantation, the average tree height ranged from 3.71 to 4.93 meters, with girth values ranging from 27.57 to 35.76 cm.

Table 108 Details of plantation enumerated in Sileru range

Sl. no.	Plantation / Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Gummi revula 10 Ha NTSH plantation	1	*Dalbargia latifolia*	N 17.892518 E 82.015129	76.67	4.93 ±0.77	34.13 ±5.72
			Pterocarpus marsupium		77.04	4.83 ±0.81	35.11 ±5.63
		2	*Toona ciliata*	N 17.89227 E 82.015157	80.99	4.54 ±1.11	35.21 ±6.33
		3	*Pterocarpus marsupium*	N 17.892121 E 82.015169	80.16	4.29 ±0.81	32.10 ±5.38
		4	*Adina cardifolia*	N 17.891981 E 82.015097	77.68	4.13 ±0.83	33.66 ±5.77
		5	*Adina cardifolia*	N 17.892037 E 82.015025	76.66	3.71 ±1.11	27.57 ±5.65
			Toona ciliata		75.40	4.13 ±1.18	35.76 ±5.32
Plantation average					**77.8**	**4.36**	**33.36**

Comparative Assessment of Plantations in division during 2017-18

Survival performance: The B. Kothuru NTSH plantation (K.D. Peta Range) recorded the highest survival (80.16–93.33%) with strong growth (3.48–6.51 m height), followed by the Gummirevula NTSH plantation with good survival (76.67–78.6%) and moderate growth (3.71–4.93 m height), while the Kotha Regallu plantation (Lothugedda Range) showed lower survival (70–76.66%) and poor growth (0.72–1.10 m height), indicating site limitations.

Verification of plantation area and boundaries

In Narsipatnam division during 2017-18 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.

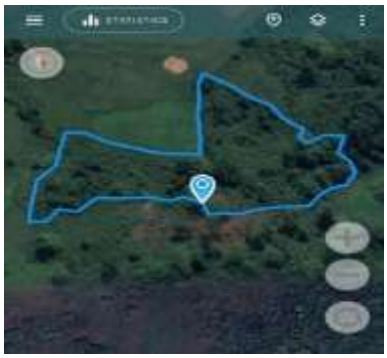
Table 109 Details of plantation area perambulation in Narsipatnam division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising 10ha. NTSH Plantation at B. Kothuru	10 Ha	9.27 Ha
2	Raising of 10 ha. N.T.S.H. plantation at Kotha Regallu village	10 Ha	11.26 Ha
3	Raising of 10 ha. NTSH plantation near Gummirevula village	10 Ha	10.78 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

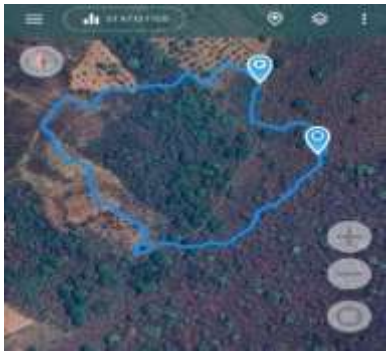
- B. kothuru Plantation (KD Peta range) (10 Ha): 9.27 Ha (lesser by 0.73 Ha)
- Kotha regallu Plantation (Lothugedda range) (10 Ha): 11.26 Ha (Exceeded by 1.26 Ha)
- Gummirevula Plantation (Sileru range) (10 Ha): 10.78 Ha (Exceeded by 0.78 Ha)

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.



9.27 Ha B. Kothuru

11.26 Ha Kotha regallu



10.78 Ha Sileru

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 mechanisms 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. 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 areas. 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, no journal was available for the NTSH plantation at B. Kothuru village. It was also observed that periodic updates particularly regarding survival rates, growth parameters, and maintenance activities are necessary to ensure that the journals accurately reflect current field realities. Additionally, the plantation information board was not found at the Gummirevula plantation, and it is recommended that a board be installed to facilitate easy identification and monitoring.

Vana Samrakshan Samithi (VSS): Among the plantation sites selected in the Sileru range for monitoring and evaluation, no involvement of Vana Samrakshana Samithi (VSS) was observed in the establishment or maintenance of the plantations. Consequently, the Focus Group Discussion (FGD) activity could not be conducted. In K D Peta and Lothugedda ranges involvememt of Vana Samrakshana Samithi (VSS) was observed. Hence the Focus Group Discussion (FGD) activity conducted and accordingly, the Focus Group Discussion (FGD) activity was carried out

B. Kothuru, K.D Peta range

Kotha regallu, Lothugedda

Gummirevula, Sileru

2. Monitoring and Evaluation of Maintenance Activities

A total of 31 maintenance activities were carried out in Narsipatnam division during 2017-18, of which 7 activities were selected for monitoring. Narsipatnam accounted for the maximum with 8 activities (3 sampled), followed by Chintapalli with 8 (1 sampled), K D Peta with 7 (1 sampled), sileru with 6 (1 sampled) and Lothugedda with 2 (1 sampled).

Table 110 Maintenance activities selected for evaluation in Narsipatnam division

Sl no.	Maintenance Activities	GPS Co ordinates	SO no. and year
Narsipatnam range			
1	First year maintenance of 10 Ha NTSH plantation at Krishnapuram.	N 17.637121 E 82.583500	DSO 64 (2017-18)
2	Second year maintenance of 10 Ha NTSH plantation at Banda.	N 17.550835 E 82.783628	DSO 108 (2017-18)
3	Third year maintenance of 10 ha. Teak plantation at G Koduru.	N 17.570390 E 82.753076	DSO 110 (2017-18)
K D Peta range			
4	Second year maintenance of 10 Ha Teak plantation at Chinabalaram village.	N 17.601514 E 82.403168	DSO 151 (2017-18)

Chintapalli range			
5	First year maintenance of 10 Ha NTSH plantation at Chilakalamamidi Village.	N 17.864808 E 82.363159	DSO 68 A (2017-18)
Lothugedda range			
6	First year maintenance of 10 Bamboo & miscellaneous plantation in Meduru village.	N 17.973757 E 82.370631	DSO 74 (2017-18)
Sileru range			
7	First year maintenance of 10 Ha Bamboo and miscellaneous plantation near Kommuluwada village.	N 18.002734 E 82.085085	DSO 69 (2017-18)

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, 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.

Banda, narsipatnam range

Chinabalaram, K D Peta range

Chilakalamamidi, Chintapalli range

Meduru, Lothugedda range

Kommuluwada, Sileru range

3. Monitoring and Evaluation of Protection Activities

During 2017–18 department undertook seven protection activities under the CAMPA scheme in the Sileru range. For monitoring and evaluation, a representative sample of 20 %, comprising four protection activities, was selected for detailed assessment. In Narsipatnam range 3 implemented 1 sampled, chintapalli 1 (1 sampled), Marripakala 1 (1 sampled), R V Nagar 1(1 sampled) K D Peta 1(0 sampled) and in sileru and lothugedda none were implemented nor sampled.

3.1 Creation of new fire tracing operation works in Narsipatnam section and range

GPS location: N 17.688261 E 82.539835 **SO no. and year:** RSO 28 (2017-18)

3.2 Creation of new fire lines in natural forest of Chintapalli range.

GPS location: N 17.901134 E 82.501098 **SO no. and year:** RSO 08 (2017-18)

3.3 Fire tracing operations in old teak plantations of Marripakala range.

GPS location: N 17.656795 E 82.026795 **SO no. and year:** RSO 02 (2017-18)

3.4 Fire tracing along periphery and inspection paths in R V Nagar range.

GPS location: N 17.657607 E 82.029694 **SO no. and year:** RSO 05 (2017-18)

A fire line was created and maintained in Narsipatnam section under the CAMPA-NPV (Forest Fire Management) scheme. It was monitored and evaluated against the specifications recorded in the measurement book. The dimensions of the fire line are 3 meters in width and 1500 running meters in length. The actual field measurements matched the recorded values, 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 throughout the natural forest area.

A fire line was created and maintained in Chintapalli section under the CAMPA-NPV scheme. The recorded dimensions are 3 meters in width and 1000 running meters in length. The field measurements matched those in the measurement book, showing no deviations. However, the visibility of the fire line was not clear due to the presence of dense grass and weed growth. This indicates that regular maintenance is required to keep the fire line functional and to minimize fire risk.

In Marripakala section, a fire line was established and maintained under the CAMPA-NPV scheme. The fire line measures 3 meters in width and 970 running meters in length. Field verification confirmed that the measurements matched the specifications in the measurement book. However, the visibility was poor, with dense grass and weed growth observed along the fire line. This suggests a need for routine maintenance to ensure the fire line remains effective.

A fire line was created in R.V. Nagar section under the CAMPA-NPV scheme, with dimensions of 3 meters in width and 2000 running meters in length. The field measurements were consistent with the entries in the measurement book. However, the visibility of the fire line was very poor. The entire stretch was covered with jungle growth and dense weeds, indicating a complete lack of maintenance. Immediate attention is required to clear the fire line and restore its functionality to mitigate forest fire risks.

Narsipatnam range

Chintapalli range

Marripakala range

R V Nagar range

4. Monitoring and Evaluation of Other activities

Under the "Others" category, 55 activities were carried out during 2016–17, of which 13 were sampled for verification. The highest number of activities was in Narsipatnam (15, with 3 sampled), followed by Sileru (12; 2 sampled), Chintapalli (11; 2 sampled), K.D. Peta (8; 2 sampled), Lothugedda (4; 1 sampled), Marripakala (3; 1 sampled), and R.V. Nagar (2; 1 sampled). Document verification and cross-checking were conducted in the presence of

Division and Range office staff. Records such as sanction orders, estimation sheets, and work registers were reviewed, and sanctioned amounts were found 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, with internal (Conservator of Forests) and external (Accountant General's Office) audits ensuring transparency and compliance with financial and administrative protocols. However, certain records were not made available for verification: in R.V. Nagar Range (DSO 80, 2017–18) work register; Chintapalli Range (DSO 115, 85, 2017–18) estimates; K.D. Peta Range (DSO 106, RSO 5, 2017–18) work registers; Marripakala Range (DSO 8, 2017–18) work register; and Narsipatnam Range (DSO 130, 2016–17) estimate.

Key Findings

- Plantation performance was variable across ranges—notably strong in KD Peta and Sileru, but weak in Lothugedda, reflecting differences in site conditions and maintenance intensity.
- Area verification identified both deficits and excesses between recorded and actual extents, indicating boundary delineation inaccuracies and the need for spatial reconciliation.
- Overall plantation health was satisfactory, with minimal grazing pressure and no observed pest or disease incidence.
- Maintenance activities were undertaken; however, their effectiveness was undermined by damaged signage and incomplete plantation journals.
- Fire lines had been constructed as per records, though many were overgrown, diminishing their fire-prevention effectiveness.
- Financial management systems were largely transparent and audit-compliant, but minor documentation lapses persisted at the field level.
- Community participation through Vana Samrakshana Samithis (VSS) was inconsistent, with active involvement in select ranges but notably absent in Sileru, affecting participatory oversight and local stewardship.

Recommendations

- Strengthen species–site alignment to enhance survival rates, particularly in weak-performing sites like Lothugedda.
- Reconcile plantation records with field reality using GIS/KML mapping to ensure accurate area reporting and boundary delineation.
- Ensure regular updating of plantation journals and installation of signage and boards at all plantation sites for transparency and monitoring.
- Standardize fire line maintenance, including pre-summer clearance, to maintain visibility and effectiveness in fire prevention.
- Promote consistent community engagement by ensuring active VSS participation across all ranges, fostering local stewardship.
- Maintain comprehensive financial documentation, with all estimates, registers, and supporting records available for verification and audit purposes.
- Continue pest surveillance and routine plantation maintenance, including pruning, coppice regulation, and replanting where necessary.

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 2017-18, a total of 212 CAMPA activities were carried out, of which 49 activities (around 23 %) were selected for detailed monitoring and evaluation. In Paderu (T) range, 38 activities were implemented, and 8 were sampled. In Araku (T) range, 41 activities were implemented, and 10 were sampled. In Pedabayalu (T) range, 36 activities were implemented, with 9 sampled. In Paderu FRO-I range, 19 activities were implemented, and 4 were sampled. In Araku FRO-II range, 18 activities were implemented, and 5 were sampled, In Paderu FRO-III range, 16 activities were implemented, and 3 were sampled. In Paderu FRO-IV range, 15 activities were implemented, and 3 were sampled, In Pedabayalu FRO-V range, 17 activities were implemented, and 5 were sampled. In Paderu FRO-VI range, 11 activities were implemented, and 3 were sampled. Among activity types, other works dominated with 123 activities (25 sampled), followed by maintenance (76; 20 sampled), plantations (10; 3 sampled), Protection (3; 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 10 plantation activities were carried out under CAMPA, of which 3 activities (about 30 %) were selected for monitoring and evaluation. Among the ranges in Paderu (T) range, 1 implemented (0 sampled), in Araku (T) range, (1 implemented; 0 sampled), in Pedabayalu (T) range, (2 implemented; 1 sampled), in Paderu FRO-I range, (1 implemented; 0 sampled), in Araku FRO-II range, (1 implemented; 0 sampled), in Paderu FRO-III range, (1 implemented; 1 sampled), in Paderu FRO-IV range, (1 implemented; 0 sampled), in Pedabayalu FRO-V range, (1 implemented; 0 sampled), in Paderu FRO-VI range, (1 implemented; 1 sampled).

1.1 Pedabayalu (T) range

During 2017–18, a total of two plantation activities were carried out under the CAMPA scheme in Pedabayalu (T) range. As part of the monitoring and evaluation process, 50 % of these activities, equivalent to one plantation site, was randomly selected.

Table 111 Details of plantation selected in Pedabayalu (T) range

Sl. no.	Plantation	SO no. and year
1	Raising NTSH plantation 20 Ha at Seekari village of Aradakota beat	DSO 77 (2017-18)

Seekari plantation site is located on sloping terrain with red soil, offering moderately favourable conditions for plantation development.

Survival percentage**:** In Seekari plantation showed good adaptability for *Acrocarpus fraxinifolius* and *Grevillea robusta*, recording survival rates of 79.33% and 76.85%, respectively.

Growth: In Seekari plantation, the average tree height ranged from 1.86 to 10.78 metres, with girth measurements ranging between 15.05 and 32.46 centimetres.

Table 112 Details of plantation enumerated in Pedabayalu range

Sl. no.	Plantation/ Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Seekari 20 Ha NTSH plantation	1	*Acrocarpus fraxinifolius*	N 18.246144 E 82.57102	79.33	10.78 ±2.09	-	32.46 ±7.07
		2	*Acrocarpus fraxinifolius*	N 18.245722 E 82.571259	72.72	8.36 ±1.65	-	29.84 ±4.84
		3	*Acrocarpus fraxinifolius*	N 18.24485 E 82.370975	78.51	9.56 ±0.98	-	29.76 ±4.37
		4	*Grevillea robusta*	N 18.24466 E 82.570824	76.85	3.13 ±0.77	23.57 ±3.78	-
		5	*Acrocarpus fraxinifolius*	N 18.246591 E 82.571001	64.46	1.86 ±0.52	15.05 ±5.85	-
Plantation average					**74.37**	**6.73**	**19.31**	**30.68**

1.2 Paderu FRO-III range

A total of one plantation project was implemented under the CAMPA scheme in Paderu FRO-III range during 2017–18. For evaluation purposes, 100 % of the project equivalent to one plantation site was selected randomly.

Table 113 Details of plantation selected in Paderu FRO-III range

Sl. no.	Plantation	SO no. and year
1	Raising NTSH plantation at Peddapadu village over 20 Ha in range no. III, Paderu	DSO 47 (2017-18)

The selected plantation site at Peddapadu is characterized by sloping terrain with black-red soil.

Survival percentage**:** In Peddapadu plantation shows good suitability for *Acrocarpus fraxinifolius,* with a survival rate of 82.64 %.

Growth: In this plantation, the average tree height ranges from 3.24 meters to 10.43 meters, while the average girth varies between 27.57 cm and 36.47 cm.

Table 114 Details of plantation enumerated in Paderu FRO-III range

Sl. no.	Plantation/ Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Peddapadu 20 Ha NTSH plantation	1	*Acrocarpus fraxinifolius*	N 18.142038 E 82.833821	75.20	3.24 ±0.25	27.57 ±4.28	-
		2	*Acrocarpus fraxinifolius*	N 18.141788 E 82.833297	78.51	10.43 ±1.38	-	28.55 ±3.97
		3	*Acrocarpus fraxinifolius*	N 18.141847 E 82.832673	82.64	9.20 ±1.06	-	28.06 ±3.34
		4	*Acrocarpus fraxinifolius*	N 18.141795 E 82.83223	73.55	6.56 ±0.67	-	36.47 ±4.99
		5	*Acrocarpus fraxinifolius*	N 18.141782 E 82.832172	81.81	8.26 ±0.81	-	29.13 ±4.78
Plantation average					**78.34**	**7.53**	**27.57**	**30.55**

1.3 Pedabayalu FRO-VI range

A total of one plantation project was implemented under the CAMPA scheme in Pedabayalu FRO-VI range during 2017–18. For evaluation purposes, 100 % of the project equivalent to one plantation site was selected randomly.

Table 115 Details of plantation selected in Pedabayalu FRO-VI range

Sl. no.	Plantation	SO no. and year
1	Raising NTSH plantation at over 20 Ha at Thotalagondhi village of G. Madugula beat, G. Madugula section in range no.VI, Paderu.	DSO 59 (2017-18)

The plantation site features favourable conditions for growth, including sloped terrain and red soil, which support healthy plant development.

Survival percentage**:** In Thotlagondhi The survival rate is 62.8 % for *Syzygium cumini* and 90.9% for *Acrocarpus fraxinifolius*, indicating good species-site compatibility.

Growth: The average tree height ranges from 1.94 to 3.89 meters, and the average girth varies from 22.57 to 35.79 cm, reflecting healthy growth in the plantation.

Table 116 Details of plantation enumerated in Paderu FRO-VI range

Sl. no.	Plantation/ Village name	Plot no.	Species Name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1	Thotlagondhi 20 Ha NTSH plantation	1	*Syzygium cumini*	N 18.069987 E 82.519301	62.8	1.99 ±0.45	23.55 ±4.17	-
		2	*Acrocarpus fraxinifolius*	N 18.069569 E 82.519154	88.42	3.89 ±0.46	-	35.79 ±5.37
		3	*Acrocarpus fraxinifolius*	N 18.069786 E 82.518163	90.9	1.94 ±0.46	22.57 ±4.88	-
		4	*Acrocarpus fraxinifolius*	N 18.069196 E 82.518508	78.51	3.57 ±0.43	26.64 ±4.71	-

		5	*Acrocarpus fraxinifolius*	N 18.069245 E 82.519322	73.55	3.61 ±0.36	-	24.08 ±3.95
Plantation average					**78.83**	**3.00**	**24.25**	**29.93**

Comparative assessment of plantations in Paderu division during 2017-18

In Seekari, *Acrocarpus fraxinifolius* (79.33 %) and *Grevillea robusta* (76.85 %) showed good survival with growth of 1.86–10.78 m height and 15.05–32.46 cm girth. Peddapadu plantation recorded higher survival for *Acrocarpus fraxinifolius* (82.64%) with strong growth of 3.24–10.43 m height and 27.57–36.47 cm girth. In Thotlagondhi, survival was 62.8% for *Syzygium cumini* and 90.9% for *Acrocarpus fraxinifolius*, with growth ranging 1.94–3.89 m height and 22.57–35.79 cm girth. Overall, Peddapadu and Thotlagondhi showed higher survival, while Seekari displayed wider growth variation.

The verification of plantation area and boundaries: In Paderu division during 2017-18 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 117 Details of plantation area perambulation in Paderu division

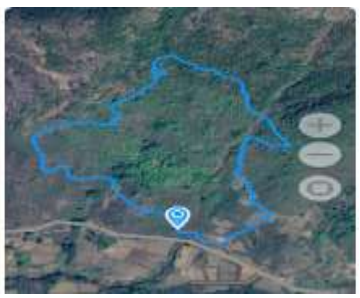
Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising NTSH plantation 20 Ha at Seekari village of Aradakota beat, Pedabayalu section and range.	20 Ha	21.77 Ha
2	Raising of NTSH plantation at Peddapadu village over 20 Ha in range no. III, Paderu.	20 Ha	29.05 Ha
3	Raising NTSH plantation over 20 Ha at Thotalagondhi village of G. Madugula beat, G. Madugula section.	20 Ha	23.24 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. Plantation-wise findings

- Seekari (20 Ha): 21.77 Ha (exceeded by 1.77 Ha)
- Peddapadu (20 Ha): 29.05 Ha (exceeded by 9.05 Ha)
- Thotalagondhi (20 Ha): 23.24 Ha (exceeded by 3.24 Ha)

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

Seekari plantation 21.77 Ha



Peddapadu 29.05 Ha

Thotlagondhi 23.24 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 some sites, aiding in proper identification, whereas in other locations such as Jangamputtu plantation, the absence of a board was noted, and its installation is recommended for clear demarcation. 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 Peddabayalu (T) and Paderu FRO-VI ranges during establishment and maintenance. Their active participation ensured smooth plantation implementation and better protection. VSS mobilized local communities, coordinated labour for planting and aftercare, and supported the Forest Department in preventing fire, grazing, and other pressures. They also created livelihood opportunities through wage employment and collective decision-making. This participatory approach improved transparency, accountability, and long-term sustainability of plantation management. However, in Paderu FRO-III 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.

Seekari, Pedabayalu (T) range

Peddapadu, Pedabayalu FRO-III

Thotlagondhi plantation, Paderu FRO-VI range

1.2 Monitoring and Evaluation of Maintenance Activities

A total of 76 maintenance activities were carried out in Paderu division during 2017-18, of which 20 activities were selected for monitoring. Among the ranges in Paderu (T) range, 9 activities (2 sampled), in Araku (T) range, (10; 3 sampled), in Pedabayalu (T) range, (12; 3 sampled), in Paderu FRO-I range, (7; 2 sampled), in Araku FRO-II range, (9; 3 sampled), in Paderu FRO-III range, (8; 2 sampled), in Paderu FRO-IV range, (7; 1 sampled), in Pedabayalu FRO-V range, (5; 1 sampled), in Paderu FRO-VI range, (5; 1 sampled).

Table 118 Maintenance activities selected for evaluation in Paderu division

Sl. no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Paderu (T) range			
1	Second year maintenance of 2015-16 plantation Over 15.00 Ha in Chinthagondi	N 18.005020 E 82.602328	DSO 155 (2017-18)
2	Third year maintenance of 2014-15 Over 10 Ha plantation at Thotlagondhi bit-II	N 18.097496 E 82.548310	DSO 286 (2017-18)
Araku (T) range			
3	Third year maintenance of 10 Ha NTSH plantation at Sangamvalasa	N 18.252199 E 82.938167	DSO 22 (2017-18)
4	Third year maintenance of 10 Ha NTSH plantation at Irakuput	N 18.212025 E 82.861218	DSO 25 (2017-18)
5	Third year maintenance of 10 Ha NTSH plantation at Kusamaguda	N 18.370286 E 82.806168	DSO 26 (2017-18)
Pedabayalu (T) range			
6	First year maintenance of 2016-17 NTSH plantation at Jangamputtu over 20 Ha in Pedabayalu (T) range	N 18.263542 E 82.546208	DSO 65 (2017-18)
7	Third year maintenance of 2014-15 over 10 Ha NTSH plantation at Baldasindhiputtu village	N 18.350703 E 82.488530	DSO 73 (2017-18)
8	Third year maintenance of 2014-15 over 10 Ha NTSH plantation at Gadelaputtu village	N 18.301031 E 82.482725	DSO 74 (2017-18)
Paderu FRO-I range			
9	Second year maintenance of 2015-16 NTSH plantation work at Marridatu 10 Ha	N 18.120541 E 82.537077	DSO 149 (2017-18)
10	Third year maintenance of 2014-15 NTSH plantation work at Geddarai 20 Ha	N 18.026232 E 82.561033	DSO 291 (2017-18)
Araku FRO-II range			
11	First year maintenance of 20 ha NTSH plantation at Baliyaguda	N 18.331893 E 82.790605	DSO 41 (2017-18)

12	Third year maintenance of 10 Ha NTSH plantation at Koranjiguda.	N 18.419470 E 82.814155	DSO 46 (2017-18)
13	Third year maintenance of 15 Ha NTSH plantation at kodipunjivalasa.	N 18.311832 E 82.850231	DSO 43 (2017-18)
Paderu FRO-III range			
14	Second year maintenance of 2015-16 plantation over 15.00 Ha in Jurrupadu bit- I.	N 18.2274521 E 82.745013	DSO 51 (2017-18)
15	Third year maintenance of 2014-15 over 25 Ha NTSH plantation at Matchupalli village.	N 18.158995 E 82.551093	DSO 182 (2017-18)
Paderu FRO-IV range			
16	Second year maintenance of 2015-16 plantation over 15.00 Ha in Nerduvalasa village.	N 18.252518 E 82.672054	DSO 58 (2017-18)
Pedabayalu FRO-V range			
17	First year maintenance of 2016-17 NTSH plantation over 20.00 Ha near Borrabakuru Village.	N 18.195758 E 82.725102	DSO 80 (2017-18)
18	Third year maintenance of 2014-15 NTSH plantation 15 Ha at Chittigaruvu village.	N 18.186033 E 82.548820	DSO 190 (2017-18)
19	Third year maintenance of 2014-15 NTSH plantation 15 Ha at Palem village.	N 18.185044 E 82.781146	DSO 193 (2017-18)
Paderu FRO-VI range			
20	Third year maintenance of 2014-15 plantation NTSH 15 Ha Ontiveedhi.	N 18.088038 E 82.532723	DSO 63 (2017-18)

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 (DAP @ 20 g/plant), 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 (T) range

Sangamvalasa, Araku (T) range

Baldasindhiputtu, Pedabayalu (T) range

Ontiveedhi, Paderu FRO-VI range

3. Monitoring and Evaluation of Protection Activities

A total of 3 Protection activities were carried out in Paderu division during 2017-18, of which 1 activity was selected for monitoring. In Araku (T) range 1 activity (1 sampled), Pedabayalu (T) range 1 activity (0 sampled). No Protection activities were reported from other ranges.

3.1 Providing for fire tracing operation at Thadda village of Araku (T) range

GPS location: N 18.253757 E 82.680360 **SO no. and year**: RSO 15(2017-18)

A fire line was created and maintained in Tadda village of Araku (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 – 10000 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 tracing operation at Thadda village of Araku (T) range

4. Monitoring and Evaluation of Other activities

Under the "Others" category, 123 activities were carried out during 2017–18, of which 25 were sampled for verification. The range-wise distribution of activities included: Paderu (T) Range – 28 activities (6 sampled), Araku (T) Range – 29 (6 sampled), Pedabayalu (T) Range – 21 (4 sampled), Paderu FRO-I Range – 11 (2 sampled), Araku FRO-II Range – 8 (2 sampled), Paderu FRO-III Range – 7 (1 sampled), Paderu FRO-IV Range – 7 (1 sampled), Pedabayalu FRO-V Range – 7 (2 sampled), and Paderu FRO-VI Range – 5 (1 sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff, and the findings are summarized below: A total of one hundred and twenty-three activities were undertaken during 2017–18, out of which twenty-five were selected and verified through available records. The documents reviewed included sanction orders, estimation sheets, and work registers. The sanctioned amounts were in alignment with the actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). The utilization of funds was appropriate and consistent with approved estimates and CAMPA guidelines. Both internal audit (by the Conservator of Forests) and external audit (by the Accountant General's Office) were conducted, ensuring transparency, accountability, and compliance with financial and administrative protocols under the CAMPA scheme.

Key Findings

- Plantation survival was high across most sites, with *Acrocarpus fraxinifolius* showing particular adaptability.
- Verified plantation areas consistently exceeded records, underlining the need for more precise mapping.
- Plantation health was strong, with no pest or disease issues, and minimal biotic pressure due to negligible grazing or browsing.
- Maintenance was generally effective, though record-keeping and signage require strengthening.
- Fire line protection existed but demanded regular clearance for effectiveness.
- Community participation via VSS/JFMCs was observed in Pedabayalu (T) and Paderu FRO-VI, but absent in Paderu FRO-III, limiting sustainability.

Recommendations

- GIS-based reconciliation: Use GIS mapping to accurately demarcate plantation areas and resolve discrepancies between recorded and actual field boundaries.
- Fire line upkeep: Conduct periodic clearance and inspection of fire lines to minimize fire risk and protect plantations.
- Signage and boundary markers: Improve visibility and standardization of plantation boards and boundary markers for clear site demarcation and monitoring.
- Record-keeping and monitoring: Maintain up-to-date journals and track survival and growth data regularly to ensure accurate monitoring of plantation performance.
- Maintenance activities: Implement regular weeding, fertilizer application, and timely casualty replacement to support healthy growth and maximize survival rates.

- Community engagement: Expand participation of Vana Samrakshana Samithis (VSS) and Joint Forest Management Committees (JFMCs) in all ranges to foster local ownership and ensure sustainable management.
- Financial transparency: Maintain rigorous accounting practices and supplement with periodic third-party verification to ensure compliance, accountability, and audit readiness.

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 2017-18, a total of 147 CAMPA activities were carried out, of which 36 activities (around 24 %) were selected for detailed monitoring and evaluation. In Visakhapatnam range, 55 activities were implemented, and 12 were sampled. In Chodavaram range, 44 activities were implemented, and 11 were sampled. In Ananthagiri range, 26 activities were implemented, with 10 sampled. In Yellamanchili range, 22 activities were implemented, and 3 were sampled. Among activity types, other works dominated with 90 activities (20 sampled), followed by maintenance (40; 9 sampled), plantations (10; 4 sampled), Protection 3; 1 sampled), soil and moisture conservation works (3; 1 sampled) and construction activities (1; 1 sampled) activities were implemented.

1. Monitoring and Evaluation of Plantation Activities

In Visakhapatnam division, a total of 10 plantation activities were carried out under CAMPA, of which 4 activities (about 40 %) were selected for monitoring and evaluation. Among the ranges maximum with 5 plantation projects in Chodavaram range reported with 1 sampled, followed by Ananthagiri range with (2; 2 sampled), Visakhapatnam range with 1 activity (1 sampled). Yellamanchili range with (2; 0 sampled).

1.1 Chodavaram range

During 2017–18, a total of five plantation activities were carried out under the CAMPA scheme in Chodavaram range. As part of the monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was randomly selected.

Table 119 Details of plantation selected in Chodavaram range

Sl. no.	Plantation	SO no. and year
1	Raising works 10 Ha Teak plantation at Rellabanda village	DSO 63A (2017-18)

In Teak plantation site at Rellabanda Beat consists of granite rocky terrain with patches of black soil and loamy texture.

Survival percentage: In Rellabanda teak plantation demonstrated good suitability with an average survival rate of 83.90%.

Growth: In Rellabanda, tree heights ranged from 10.60 to 10.84 metres, with girths between 40.16 and 41.55 cm.

Table 120 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	Rellabanda 10 Ha Teak plantation	1	*Tectona grandis*	N 17.971457 E 82.835355	87.89	10.68 ±1.05	40.34 ±11.42
		2	*Tectona grandis*	N 17.971115 E 82.835258	85.93	10.84 ±1.12	40.53 ±10.11
		3	*Tectona grandis*	N 17.971023 E 82.835114	84.37	10.77 ±0.99	40.16 ±10.51
		4	*Tectona grandis*	N 17.971041 E 82.834806	80.07	10.60 ±0.87	41.41 ±10.19
		5	*Tectona grandis*	N 17.971257 E 82.835207	81.25	10.70 ±0.89	41.55 ±10.99
Plantation average					**83.90**	**10.71**	**40.79**

1.2 Ananthagiri range

A total of two plantation projects were implemented under the CAMPA scheme in the Ananthagiri Range during 2017–18. For evaluation purposes, 50% of these projects, equivalent to one plantation site, was selected randomly.

Table 121 Details of plantations selected in Ananthagiri range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha NTSH plantation at Krishnapuram	DSO 45 (2017-18)
2	Raising of 10 Ha NTSH plantation at Damsarai	DSO 44 (2017-18)

The proposed 10-hectare plantation site at Krishnapuram is characterized by red soil with occasional clay, sand, and rocky content on the surface layer.

Survival percentage: In Ananathagiri Range, the plantation site at Krishnapuram has demonstrated moderate suitability for *Pongamia pinnata, Syzygium cumini, Pterocarpus marsupium, Dalbergia latifolia,* and *Azadirachta indica* with observed average survival rates of 57.81 %, 66.66 %, 59.86 %, 58.84 %, and 62.87 % respectively.

Growth: In Krishnapuram plantation, the average tree height ranges from 2.96 to 5.46 meters, while the average girth ranges from 26.50 to 42.01 cm.

Table 122 Details of plantation enumerated in Ananthagiri range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average growth	
						Height (m)	GBH (cm)
1	Krishnapuram 10 Ha NTSH plantation	1	*Pongamia pinnata*	N 18.198517 E 83.054911	56.25	4.26 ±0.84	31.22 ±5.16
			Syzygium cumini		66.66	4.20 ±0.76	29.92 ±5.90
		2	*Pterocarpus marsupium*	N 18.198439 E 83.054824	61.66	3.91 ±0.94	27.51 ±7.15

			Dalbargia latifolia		59.01	3.96 ±0.79	29.25 ±7.14
		3	*Azadirachta indica*	N 18.198201 E 83.054062	66.10	3.36 ±0.84	23.51 ±5.16
			Pterocarpus marsupium		58.06	3.79 ±0.76	27.61 5.90
		4	*Pongamia pinnata*	N 18.197532 E 83.05765	59.37	3.70 ±1.67	32.66 ±13.1
			Azadirachta indica		59.64	2.96 ±0.56	23.50 ±7.22
		5	*Dalbargia latifolia*	N 18.197333 E 83.054066	58.67	5.46 ±1.07	42.01 ±8.17
Plantation average					**60.36**	**3.85**	**29.68**

The 10-hectare site selected for NTSH plantation at Damsarai Beat is characterized by red soil with a surface layer that contains a mixture of sand and rock. The soil composition suggests moderate drainage capacity, and the presence of rock fragments on the top layer may influence root penetration and plantation establishment.

The 10-hectare plantation site at Damsarai demonstrates less survivability due to the presence of rock fragments on the top layer, which may hinder root penetration and result in poor plantation establishment for *Pongamia pinnata* and *Pterocarpus marsupium*, with average survival rates of 20.66 % and 18.18 % respectively.

In Damsarai plantation, the average tree height ranges from 0.84 to 0.88 meters, with a girth range from 8.14 to 8.60 cm.

Table 123 Details of plantation enumerated in Damsarai Beat

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average growth	
						Height (m)	Collar Girth (cm)
1	Damsarai 10 Ha NTSH plantation	1	*Pongamia pinnata*	N 18.223116 E 83.082975	20.66	0.88 ±0.29	8.60 ±2.38
		2	*Pterocarpus marsupium*	N 18.224091 E 83.082715	18.18	0.84 ±0.32	8.14 ±2.66
Plantation average					**33.06**	**0.86**	**8.37**

1.3 Visakhapatnam range

A total of one plantation project was implemented under the CAMPA scheme in the Visakhapatnam Range during 2017–18. For evaluation purposes, 100 % of the project equivalent to one plantation site was selected randomly.

Table 124 Details of plantation selected in Visakhapatnam range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha NTSH plantation at Nallaregupalem	DSO 73 (2017-18)

The proposed 10-hectare NTSH plantation site at Nallaregupalem is characterized by red soil with a red loamy texture, sandy stones, and a dry deciduous vegetation type.

Survival percentage: In Visakhapatnam Range, the 10-hectare plantation site at Nallaregupalem Beat demonstrated good suitability for *Dalbergia latifolia* (61.98%), *Pterocarpus marsupium* (60.35%), *Azadirachta indica* (60.99%), and *Terminalia arjuna* (63.33%).

Growth: In Nallaregupalem plantation, average tree height ranged from 3.86 to 6.91 metres, with girths between 23.23 and 35.74 cm.

Table 125 Details of plantation enumerated in Visakhapatnam range during 2017-18

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average growth	
						Height (m)	GBH (cm)
1	Nallaregulapalem 10 Ha NTSH plantation	1	*Dalbergia latifolia*	N 17.784716 E 83.066221	60.00	4.33 ±1.42	27.36 ±9.90
			Pterocarpus marsupium		57.37	4.11 ±1.47	28.14 ±8.72
		2	*Azadirachta indica*	N 17.784496 E 83.065845	63.33	6.79± 0.73	31.42 ±6.70
			Dalbergia latifolia		60.65	6.82 ±0.73	33.43 ±4.99
		3	*Pterocarpus marsupium*	N 17.714558 E 83.065958	63.33	6.91 ±0.80	34.89 ±7.82
			Dalbergia latifolia		62.29	6.83 ±0.73	35.74 ±8.21
		4	*Terminalia arjuna*	N 17.783191 E 83.063757	63.33	4.24 ±2.14	23.97 ±12.1
			Azadirachta indica		57.37	4.61 ±2.24	28.06 ±13.39
		5	*Dalbergia latifolia*	N 17.783807 E 83.062349	65.00	3.86 ±1.47	23.23 ±10.95
			Azadirachta indica		62.29	4.89 ±1.68	31.53 ±13.05
Plantation average					**62.05**	**4.88**	**28.50**

Comparative assessment of plantations in Visakhapatnam division during 2017-18

The performance of the plantations across Visakhapatnam division. In Rellabanda teak plantation performed the best with high survival (83.90 %) and excellent growth (10.60–10.84 m height, 40.16–41.55 cm girth). Krishnapuram showed moderate suitability with survival ranging 57.81–66.66 % and growth of 2.96–5.46 m in height and 26.50–42.01 cm girth, while Nallaregupalem recorded slightly better results with survival around 60–63 % and growth of 3.86–6.91 m height and 23.23–35.74 cm girth. In contrast, Damsarai plantation was least suitable due to rocky soil, showing very low survival (*Pongamia* 20.66 %, *Pterocarpus* 18.18 %) and stunted growth below 1 m in height and 9 cm girth. Overall, Rellabanda proved highly suitable, Krishnapuram and Nallaregupalem moderately suitable, and Damsarai unsuitable for plantation establishment.

The verification of plantation area and boundaries

In Visakhapatnam division during 2017-18 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 126 Details of plantation area perambulation in Visakhapatnam division

Sl. no.	Plantation	Area as per records	Area as per field perambulation
1	Raising works 10 Ha Teak plantation at Rellabanda village	10 Ha	14.34 Ha
2	Raising of 10 Ha NTSH Plantation at Krishnapuram	10 Ha	8.48 Ha
3	Raising of 10 Ha NTSH Plantation at Damsarai	10 Ha	11.51 Ha
4	Raising of 2017-18 10 Ha NTSH plantation at Nallaregupalem	10 Ha	15.94 Ha

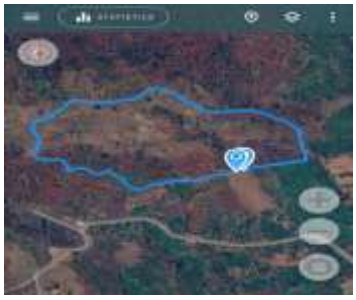
Perambulation of selected NTSH plantations was carried out with the assistance of the local Forest Beat Officer. In all cases, the perambulated area was found to be shortfall and exceed the recorded plantation area due to the presence of rocky terrain, trenches, and barren patches within plantation boundaries. 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

- Rellabanda (10 Ha): 14.34 Ha (exceeded by 4.34 Ha)
- Krishnapuram (10 Ha): 10.54 Ha (exceeded by 0.54 Ha)
- Damsarai (10 Ha): 9.89 Ha (lesser by 0.11 Ha)
- Nallaregupalem (10 Ha): 15.94 Ha (Exceeded by 5.94 Ha)

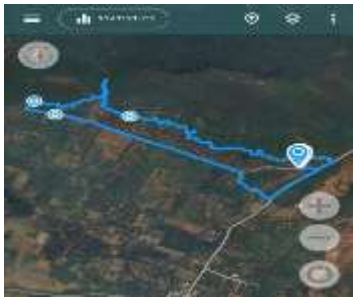
Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.

Sirasavalasa plantation 10.17 Ha

Krishnapuram plantation 8.48 Ha



Damsarai plantation 11.51 Ha



Nallaregupalem plantation 15.94 Ha

Health Status of Plantations: Field inspections conducted across the plantation sites confirmed that no incidence of insect or pest damage was observed. All plants were found to be healthy, showing no visible signs of infestation, stress, or pest-related decline.

Protection Measures: Adequate protection measures were observed across the plantation areas. Fire lines had been established and were well-maintained to serve as barriers against the

spread of accidental forest fires. In addition, the deployment of fire watchers proved vital in safeguarding the plantations, especially during the fire-prone summer season. These concerted efforts reflect a proactive approach to mitigating environmental risks and ensuring the long-term sustainability of the plantations.

Biotic Pressure on plantations: The plantations were observed to be under minimal biotic pressure. Field inspections indicated only limited instances of grazing and browsing by cattle or other herbivores, while human interference was negligible. Such low levels of disturbance serve as a positive indicator, minimizing risks of seedling mortality, soil compaction, and other adverse impacts commonly associated with human and livestock activities.

Maintenance of Plantation Journals and Records: The plantation journals were found to be well maintained, with records of activities and observations documented appropriately. However, periodic updating of key plantation parameters is required. Plantation boards, which serve as important tools for transparency, public awareness, and easy identification of plantation details, were available in all sites except Krishnapuram and Damsarai. Nevertheless, reinstallation and repainting are recommended to enhance their visibility and upkeep.

Vana Samrakshan Samithi (VSS): Among the four plantations evaluated in the Visakhapatnam Division, the involvement of Vana Samrakshana Samithi (VSS) or Joint Forest Management Committees (JFMCs) was recorded only in the Visakhapatnam Range during both establishment and maintenance. In contrast, the plantations in Chodavaram Range, as well as the Krishnapuram and Damsarai plantations of Ananthagiri Range, did not involve VSS in their implementation or maintenance. Consequently, Focus Group Discussion (FGD) activities were not conducted in these locations.

Rellabanda plantation, Chodavaram range

Krishnapuram plantation, Ananthagiri

Damsarai plantation, Ananthagiri range

Nallaregupalem plantation, Visakhapatnam

2. Monitoring and Evaluation of Maintenance Activities

A total of 40 maintenance activities were carried out in Visakhapatnam division during 2017-18, of which 9 activities were selected for monitoring. Chodavaram accounted for the maximum with 17 activities (4 sampled), followed by Ananthagiri with 13 (3 sampled), Visakhapatnam with 6 (1 sampled), Yellamanchili with 4 (1 sampled).

Table 127 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 NTSH plantation at Ch Kondaveedhi village	N 17.947465 E 82.907528	DSO 72 (2017-18)
2	First year maintenance of 10 Ha NTSH plantation at Syrasavalasa village bit-I	N 18.17368 E 82.86581	DSO 57 (2017-18)
3	Third-year maintenance of 10 Ha NTSH plantation at Kandipudi (v)	N 17.779181 E 82.896084	DSO 185 (2017-18)
4	Second year maintenance of 12 Ha Teak plantation at G Gadaburu village	N 17.745147 E 82.78023	DSO 119 (2017-18)
Ananthagiri range			
5	First year maintenance of 10 Ha miscellaneous and bamboo at Gangavaram bit-II	N 18.662930 E 83.296458	DSO 50 (2017-18)
6	First year maintenance of 10 Ha teak plantation at Medaparthy	N 18.190793 E 83.01072	DSO 46 (2017-18)
7	First year maintenance of 10 Ha NTSH (Miscellaneous) plantation at Antiparthi bit-I & bit-II	N 18.353974 E 83.075555	DSO 169 (2018-19)
Visakhapatnam range			
8	Second year maintenance of 10 Ha Teak plantation at Taattabanda in Visakhapatnam range	N 17.709933 E 82.791434	DSO 82 (2017-18)
Yellamanchili range			
9	First year maintenance of 10 Ha teak plantation at Narendrapuram	N 17.577263 E 82.945443	DSO 38 (2017-18)

As per the approved maintenance plan, the nature of maintenance activities varies according to the year of implementation (first, second, or 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.

G Gadaburu, Chodavaram range

Ch Kondaveedhi, Chodavaram range

Gangavaram Bit-1, Ananthagiri range

Taattabanda beat, Visakhapatnam range

3. Monitoring and Evaluation of Protection Activities

A total of 3 Protection activities were carried out in Visakhapatnam division during 2017-18, of which 1 activity was selected for monitoring. In Ananthagiri range 1 activity (I sampled), Visakhapatnam 1 activities (0 sampled), Chodavaram with 1 (0 sampled). No Protection activities were reported from Yellamanchili range.

3.1 Creation of fine lines in Ananthagiri range

GPS location: N 18.194874 E 82.997863 **SO no. and year**: RSO 2 (2017-18)

Fire line was created and maintained in Ananthagiri 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 – 3000 rmt. The field measurements matched those in the measurement book, indicating no deviations. The visibility of the fence was clear, as it was established in the RF of Ananthagiri indicating that periodic maintenance is needed.


Fire tracing operation at Ananthagiri range

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

A total of three were carried out during 2017-18 in Visakhapatnam Division, of which **1 activity** was selected for monitoring. In Visakhapatnam range with **3 activities (1 sampled).** No Soil and moisture conservation activities were reported from other ranges.

4.1 **Digging of mini percolation tank (Pond) near upperclony (v) of pedagantyada (m) parawada beat in Gajuwaka section**

GPS Location: N 17.66094 E 83.228401 **SO no. and year:** DSO 212 (2017-18)

Mini percolation tank was created and maintained at Parawada 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 mini percolation tank are width – 30 m, and length – 30 m and Depth with 0.80 m. The field measurements matched those in the measurement book, indicating no deviations. While the structure remains in intact and well maintained, but it is covered with silt. De-silting is necessary to restore its full storage capacity.


Mini percolation tank in Visakhapatnam range

5. Monitoring and Evaluation of Construction Activities

There was only one construction activity was reported in the Visakhapatnam division during 2017-18, of which one was sampled in Visakhapatnam range 1 activity (1 sampled). No construction activities were recorded in other ranges.

5.1 Renovation/Repairs of existing gravel road in Kambalakonda park nursery

GPS Location: N 17.768561 E 83.342625 **SO no. & year:** DSO 254 (2017-18)

The renovation of the existing gravel road in Kambalakonda Park Nursery was undertaken with a width of 3 meters and a total length of 750 running meters. The road was constructed to facilitate smooth movement of nursery staff, visitors, and transportation within the premises. During the inspection, the gravel road was found to be intact and in good condition, reflecting proper maintenance and upkeep. Regular upkeep of this road will ensure its continued functionality and longevity.

Renovation of existing gravel road in Kambalakonda park nursery

6. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 90 activities were implemented during the year 2017–18, of which 20 were selected for sampling and evaluation. The highest number of activities was reported in the Visakhapatnam Range with 43 activities (8 sampled), followed by Chodavaram with 21 activities (6 sampled), Yellamanchili with 16 activities (2 sampled), and Ananthagiri with 10 activities (4 sampled). Document verification and cross-checking were conducted in the presence of Division and Range Office staff. The evaluation included the review of sanction orders, estimation sheets, and work registers, confirming that sanctioned amounts matched actual expenditures. All financial records were found to be properly maintained and authenticated by the concerned officials (DFO, SDO, and FRO). Fund utilization was observed to be appropriate and consistent with approved estimates and CAMPA guidelines. Additionally, both internal audits (conducted by the Conservator of Forests) and external audits (by the Accountant General's office) had been carried out, ensuring transparency and adherence to financial and administrative protocols under the CAMPA scheme. During the verification process, it was noted that in Visakhapatnam Range, the work registers for DSO 245 (2017–18) and RSO 10 (2017–18) were not made available for review. Similarly, in Ananthagiri Range, the work registers for DSO 23 (2017–18) and DSO 183 (2017–18) were also not presented for verification, indicating gaps in documentation that need to be addressed for full compliance.

Key Findings

- Plantations demonstrated high variability, with outstanding success at Rellabanda, moderate outcomes at Krishnapuram and Nallaregupalem, and complete poor performance at Damsarai.
- Maintenance works were implemented and beneficial, but shortcomings in weeding, pruning, and plantation identification reduced their overall quality.
- Protection measures were limited in scope, offering only symbolic coverage against risks.

- SMC works were technically sound but too few and already impaired by siltation.
- Construction work was minimal and functional, with little ecological bearing.
- Financial management was strong, but documentation gaps persisted, weakening transparency.
- Community participation was sporadic, strong in only one range and absent elsewhere.

Recommendations

- Focus plantation efforts on ecologically suitable sites like Rellabanda and avoid unsuitable rocky terrains such as Damsarai.
- Strengthen maintenance cycles, with emphasis on pruning, weeding, fire line upkeep, and replanting.
- Expand protection to include more fire lines, fencing, and watch systems across the division.
- Scale up SMC activities and institutionalize desilting schedules to preserve functionality.
- Ensure complete availability of work registers and plantation journals, with regular updates of growth and survival data.
- Mandate structured VSS involvement and FGDs across all ranges to foster social ownership.
- Rebalance the portfolio by reducing the overwhelming dominance of “other” works and directing resources toward plantations, SMC, and protection.

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. Soil and moisture conservation are ongoing priorities, especially in scrub-prone or regenerating areas, to bolster forest health and expansion.

In Vizianagaram Division during 2017-18, a total of 154 CAMPA activities were carried out, of which 32 activities (around 20 %) were selected for detailed monitoring and evaluation. In Vizianagaram range, 47 activities were implemented, and 9 were sampled. In Parvathi Puram range, 35 activities were implemented, and 7 were sampled. In Saluru range, 40 activities were implemented, with 8 sampled. In Kurupam range, 25 activities were implemented, and 6 were sampled. In Anantagiri range, 7 activities were implemented, and 2 were sampled. Among activity types, other works dominated with 98 activities (20 sampled), followed by maintenance (33; 8 sampled), plantations (9; 3 sampled), Protection (7; 1 sampled), soil and moisture conservation works (7; 2 sampled) there were no construction activities were implemented.

1. Monitoring and Evaluation of Plantation Activities

In Vizianagaram division, a total of 9 plantation activities were carried out under CAMPA, of which 3 activities (about 33 %) were selected for monitoring and evaluation. Among the ranges equally distributed in Vizianagaram range reported with 2 activities (1 sampled), Saluru range reported with 2 activities (1 sampled), Kurupam range reported with 1 (1 sampled), Parvathi Puram range with (3; 0 sampled). No plantation activities were reported from Anantagiri range.

1.1 Vizianagaram range

During 2017–18, a total of two plantation activities were carried out under the CAMPA scheme in Vizianagaram range. As part of the monitoring and evaluation process, 50 % of these activities, equivalent to one plantation site, was randomly selected.

Table 128 Details of plantation selected in Vizianagaram range

Sl. no.	Plantation	SO no. and year
1	Raising 10 Ha teak plantation at Kumbivalasa	DSO 5 (2017-18)

The plantation site is located on sloping land with sandy loamy soil, within a dry deciduous forest biome. These conditions provide well-drained soils and support native species adapted to dry seasonal climates.

Survival percentage: In Vizianagaram range, the Kumbivalasa plantation has proven highly suitable for *Tectona grandis*, recording a survival rate of 81.25 %. The site's sloping terrain and sandy loamy soil offer optimal growth conditions, supporting species establishment and ensuring long-term sustainability.

Growth: The average growth metrics for this plantation indicate tree heights ranging from 4.64 m to 8.34 m, with girths ranging from 28.70 cm to 32.68 cm. These measurements reflect healthy and consistent growth, suggesting that the plantation is thriving under the prevailing environmental conditions.

Table 129 Details of plantation enumerated in Vizianagaram range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Kumbivalasa 10 Ha Teak plantation	1	*Tectona grandis*	N 18.352071 E 83.181806	78.90	8.25 ±1.05	29.45 ±6.83
		2	*Tectona grandis*	N 18.352920 E 83.182017	79.29	8.34 ±1.25	32.68 ±5.77
		3	*Tectona grandis*	N 18.353633 E 83.191823	78.90	5.69 ±1.12	30.45 ±4.97
		4	*Tectona grandis*	N 18.353833 E 83.181815	81.25	4.64 ±0.96	28.70 ±4.66
		5	*Tectona grandis*	N 18.353229 E 83.181011	78.51	5.41 ±1.08	28.88 ±4.07
Plantation average					**79.37**	**6.46**	**30.03**

1.2 Saluru range

A total of four plantation projects were implemented under the CAMPA scheme in the Saluru range during 2016–17. For evaluation purposes, 20 % of these projects, equivalent to one plantation site, was selected randomly.

Table 130 Details of plantations selected in Saluru range

Sl. no.	Plantation	SO no. and year
1	Raising of 10 Ha NTSH plantation at Narlavalasa.	DSO 20 (2017-18)

The site situated on sloping terrain with sandy loam red soil, within a dry deciduous forest biome, requiring soil and moisture conservation measures for effective plantation establishment.

Survival percentage: In Narlavalasa Plantation, *Gmelina arborea*: 89.25 % – excellent suitability to site. *Pterocarpus marsupium*: 87.60 % – strong adaptation to conditions. *Syzygium cumini*: 88.42 % – good compatibility with site. Overall: All three species exhibit strong survival rates, confirming high site suitability.

Growth: Average height – 6.52 m to 10.16 m; average girth – 39.29 cm to 45.22 cm, reflecting robust growth and favourable site conditions.

Table 131 Details of plantation enumerated in Saluru range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth	
						Height (m)	GBH (cm)
1	Narlavalasa 10 Ha NTSH plantation	1	*Gmelina arborea*	N 18.475397 E 83.206562	89.25	9.91 ±0.52	40.57 ±6.89
		2	*Pterocarpus marsupium*	N 18.475442 E 83.205804	87.60	10.16 ±1.27	45.22 ±8.95
		3	*Syzygium cumini*	N 18.475406 E 83.206107	88.42	6.52 ±0.58	39.29 ±4.68
		4	*Gmelina arborea*	N 18.475706 E 83.207567	87.60	10.00 ±0.78	43.06 ±4.96
		5	*Gmelina arborea*	N 18.475845 E 83.207868	88.42	9.54 ±0.89	39.78 ±5.66
Plantation average					**88.25**	**9.22**	**41.58**

1.3 Kurupam range

A total of one plantation project was implemented under the CAMPA scheme in Kurupam range during 2017–18. For evaluation purposes, 100% of the project equivalent to one plantation site was selected randomly.

Table 132 Details of plantation selected in Kurupam range

Sl. no.	Plantation	SO no. and year
1	Estimate for raising of 10 Ha NTSH plantation at S.K. Padu VSS	DSO 19 (2017-18)

The site features gently sloping land with sandy loam and red soil, also located within a dry deciduous forest biome. The area benefits from good natural drainage, although water management remains important during dry periods.

Survival percentage: In SK Padu site demonstrates strong suitability for *Tectona grandis*, *Syzygium cumini*, and *Terminalia arjuna*, with survival rates of 77.68%, 79.33%, and 84.29%, respectively. This reflects favourable growing conditions and successful establishment of these species.

Growth: Average tree height ranges from 1.78 m to 4.49 m, and average girth ranges from 18.34 cm to 21.94 cm. Variation in growth is likely due to similar factors, including soil fertility, water availability, planting density, and microclimatic variations.

Table 133 Details of plantation enumerated in Kurupam range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Coordinates	Survival (%)	Average Growth		
						Height (m)	Collar Girth (cm)	GBH (cm)
1		1	*Tectona grandis*	N 19.004313 E 85.655542	77.68	4.49 ±0.39	-	19.88 ±1.85

	SK Padu 10 Ha NTSH plantation	2	*Syzygium cumini*	N 19.003939 E 83.65549	76.03	3.64 ±0.54	-	19.78 ±2.65
		3	*Syzygium cumini*	N 19.003703 E 83.655889	79.33	1.78 ±0.43	18.34 ±3.19	-
		4	*Terminalia arjuna*	N 19.00281 E 83.65657	84.29	2.70 ±0.43	19.35 ±2.38	-
		5	*Terminalia arjuna*	N 19.002834 E 83.656112	83.47	3.22 ±0.78	21.94 ±5.80	-
Plantation average					**80.16**	**3.16**	**19.87**	**19.83**

Comparative assessment of plantations in Vizianagaram division during 2017-18

In Vizianagaram Range, Narlavalasa Plantation showed the best performance with excellent survival (87–89 %) of *Gmelina arborea*, *Pterocarpus marsupium*, and *Syzygium cumini* and robust growth. Kumbivalasa Plantation also performed well, with Tectona grandis recording 81.25% survival and healthy growth under favourable sandy loamy soil. SK Padu Plantation showed moderate success, with survival rates of 77–84% for teak, *Syzygium cumini*, and *Terminalia arjuna*, but comparatively modest growth, influenced by site conditions. Overall, Narlavalasa ranked highest, followed by Kumbivalasa, while SK Padu showed moderate establishment.

The verification of plantation area and boundaries

In Vizianagaram division during 2017-18 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.

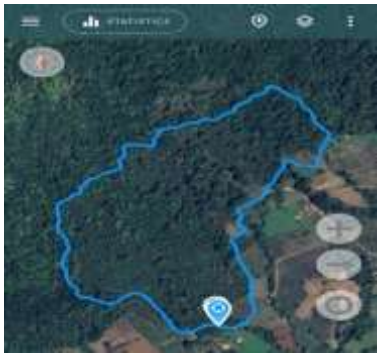
Table 134 Details of plantation area perambulation in Vizianagaram division

Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raising 10 Ha teak plantation at Kumbivalasa	10 Ha	19.38 Ha
2	Raising of 10 Ha NTSH plantation at Narlavalasa.	10 Ha	10.12 Ha
3	Estimate for raising of 10 Ha NTSH plantation at S.K. Padu.	10 Ha	10.01 Ha

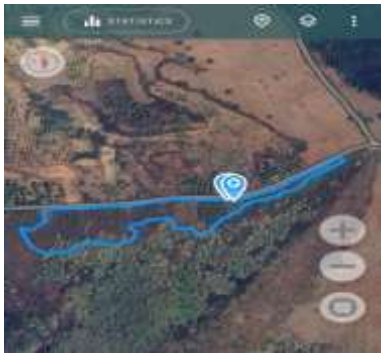
Perambulation of selected plantations was carried out with the Forest Beat Officer, using QGIS software and verified with the Geo Tracker app. All three plantations showed higher perambulated areas than recorded. Because of rocky terrain, trenches, and barren patches, measurements followed the outer boundary instead of the exact plantation line. This resulted in the perambulated areas being larger than the recorded areas.

- Kumbivalasa: Recorded 10.00 Ha → Perambulated 19.38 Ha (+9.38 Ha)
- Narlavalasa: Recorded 10.00 Ha → Perambulated 10.12 Ha (+0.12 Ha)
- S.K. Padu: Recorded 10.00 Ha → Perambulated 10.01 Ha (+0.01 Ha)

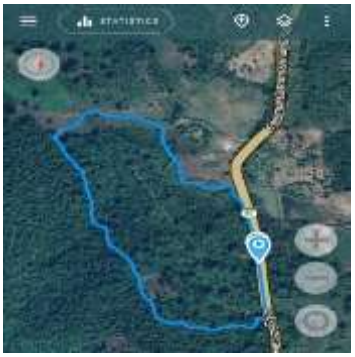
Verification was carried out with the assistance of the local Forest Beat Officer, using QGIS software and further confirmed through Geo Tracker application. Geotagged images were documented as evidence.



19.38 Ha Kumbivalasa



10.12 Ha Narlavalasa



10.01 Ha S K Padu

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: Adequate protection measures were in place across the plantation areas. Fire lines had been created and were being maintained to act as a barrier against the spread of accidental forest fires. Inspection paths were also provided, ensuring ease of access for monitoring and management activities. Furthermore, the deployment of fire watchers played a crucial role in safeguarding the plantations, particularly during the fire-prone summer season. These collective efforts highlight a proactive approach toward minimizing environmental threats and securing the long-term survival of the plantations.

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: The plantation journals were found to be well maintained, with records of activities and observations documented satisfactorily. However, the periodic updating of key plantation parameters including survival percentage, height, girth measurements, and maintenance activities requires further strengthening to ensure accuracy and to support effective monitoring and evaluation. Plantation boards, which serve as important tools for transparency, public awareness, and easy identification of plantation details, were present in all plantations, though repainting is needed for better visibility and up keep. Plantation is inspected by concerned forest official and entered the observations.

Vana Samrakshan Samithi (VSS): Among the four plantations evaluated in the Vizianagaram Division, the involvement of Vana Samrakshana Samithi (VSS) or Joint Forest Management Committees (JFMCs) was recorded across Saluru and Kurupam ranges during establishment and maintenance. Their active participation ensured smooth plantation implementation and better protection. VSS mobilized local communities, coordinated labour for planting and aftercare, and supported the Forest Department in preventing fire, grazing, and other pressures. They also created livelihood opportunities through wage employment and collective decision-making. This participatory approach improved transparency, accountability, and long-term sustainability of plantation management. However, in the Vizianagaram range, there was no

involvement of VSS. Consequently, no Focus Group Discussions (FGDs) were conducted for community feedback or qualitative evaluation.

Kumbivalasa plantation, Vizianagaram range

Narlavalasa plantation, Saluru range

S K Padu plantation, Kurupam range

2. Monitoring and Evaluation of Maintenance Activities

A total of 33 maintenance activities were carried out in Vizianagaram division during 2017-18, of which 8 activities were selected for monitoring. Parvathi Puram accounted for the maximum with 11 activities (3 sampled), followed by Saluru with 9 (2 sampled), Kurupam with 8 (2 sampled), Anantagiri with 4 (1 sampled), Vizianagarm range with least 1 activity (0 sampled).

Table 135 Maintenance activities selected for evaluation in Vizianagaram division

Sl. no.	Maintenance Activities	GPS Co-ordinates	SO no. and year
Parvathi Puram range			
1	First year maintenance 5 Ha Teak plantation at Chandalangi	N 18.827929 E 83.362452	DSO 56 (2017-18)
2	Second year maintenance 5 Ha Teak plantation at Lovavalasa	N 18.819568 E 83.351422	DSO 59 (2017-18)
3	Third year maintenance 5 Ha Teak plantation at Kesavavalasa	N 18.588018 E 83.307198	DSO 63 (2017-18)
Saluru range			
4	First year maintenance. of 5.00 (bamboo) ANR plantation at Kummarivalsa	N 18.460276 E 83.08363	RSO 6 (2017-18)
5	Second year maintenance of 5 Ha Teak plantation at Lovarakandi	N 18.720346 E 83.282143	DSO 32 (2017-18)
Kurupam range			
6	First year maintenance of 5 Ha NTSH plantation at Mantikonda VSS	N 18.923621 E 83.711533	DSO 127 (2017-18)

Anantagiri range			
7	First year maintenance of 10 Ha NTSH plantation at Sangamguddi	N 18.282874 E 83.237975	DSO 111 (2017-18)

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), 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.

Note: First year maintenance of 10 Ha NTSH plantation at Sangamguddi

GPS location: N 18.282874 E 83.237975 **SO no. and year:** DSO 111 (2017-18)

As part of the monitoring and evaluation of first-year maintenance activities in the Anantagiri Range, it was observed that the 10-hectare plantation at Sangamguddi had been allocated to the fringe villagers of Panukuvanivalasa. The allocation was authorized by the District Collector, the Samagra Girijana Abhiruddi Officer, and the Divisional Forest Officer. The plantation journal confirms that planting was carried out in 2016–17, followed by two years of maintenance. However, the handover of the area to villagers was not recorded in the journal. This omission should be rectified to ensure that official records remain accurate, transparent, and complete.

General recommendations for maintenance activities

- Intensify weeding operations, particularly along plantation boundaries, to control Lantana and bushy grasses, reduce competition, and promote healthy plant growth.
- Continue maintaining clear fire lines, ensuring they are regularly cleared before the dry season to improve effectiveness in preventing forest fires.
- Undertake timely replanting with healthy bagged seedlings to maintain proper stocking density, enhance survival rates, and strengthen plantation health.
- Increase the frequency and ensure proper timing of pruning operations to encourage healthy growth and better bole formation.
- Install and maintain plantation boundary stones and boards for accurate demarcation, better monitoring, prevention of encroachments, and reliable record-keeping.
- Maintain accurate and regularly updated plantation journals, markers, and records to support effective monitoring and accountability.

Lovalavalsa beat, Parvathi Puram range

Kummarivalasa beat, Saluru range

Kumbivalsa beat, Kurupam range

Sangamguddi, Anantagiri range

3. Monitoring and Evaluation of Protection Activities

A total of 7 Protection activities were carried out in Vizianagaram division during 2017-18, of which 1 activity was selected for monitoring. Kurupam accounted for the maximum with 6 activities (1 sampled), Vizianagaram with 1 (0 sampled), No Protection activities were reported from other range.

3.1 Creation of new fire lines and wages to fire watcher for maintaining the fire lines and control burning in JK block RF of Kurupam range.

GPS location: N 18.857303 E 83.708722 **SO no. and year:** DSO 131(2017-18)

A fire line was created and maintained in J K block 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 – 2000 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.

Fire lines in JK block RF of Kurupam range

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

. A total of 7 SMC activities were carried out during 2017-18, of which 2 were sampled. All these were taken up in the Saluru range. No SMC activities were recorded in other ranges of Vizianagaram division

4.1 Construction of check dam at Kuntam VSS in Pachipenta beat of Saluru range

GPS location: N 18.471153 E 83.062591 **SO no. and year**: DSO 236 (2017-18)

4.2 Digging of mini percolation tank-I at Kummarivalasa VSS area, Pachipenta beat and section of Saluru range

GPS location: N 18.457691 E 83.081651 **SO no. and year**: DSO 265 (2017-18)

In Pachipoenta beat of Saluru range, the check dam across Kuntam (14 m × 1.20 m × 0.70 m) and three mini percolation tanks across Kummarivalasa (6 m × 5.37 m × 1.17 m each) were evaluated. In both cases, field measurements matched the specifications in the measurement book with no deviations. The structures are well maintained and effective in water storage, though regular de-siltation is recommended to enhance capacity, improve infiltration, and sustain soil moisture. However, regular de-siltation is recommended to enhance its storage capacity, improve water infiltration, and maintain soil moisture levels effectively.

Check dam in Pachipenta beat

Percolation tank in Pachipenta beat

5. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 98 activities were implemented during 2017–18, of which 20 activities were sampled for verification. The highest number of activities was reported in Vizianagaram with 43 activities (9 sampled), followed by Saluru with 22 (4 sampled), Parvathi Puram with 21 (4 sampled), Kurupam with 10 (2 sampled), and Anantagiri with 2 (1 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. It was observed that the sanctioned amounts matched the actual expenditures, and all financial records were properly maintained and duly authenticated by the concerned officials (DFO, SDO, and FRO). The utilization of funds was appropriate and adhered to the approved estimates and CAMPA guidelines. Both internal audits (by the Conservator of Forests) and external audits (by the Accountant General's Office) were carried out, ensuring transparency and compliance with the financial and administrative protocols prescribed under the CAMPA scheme.

Key Findings

- Field verification revealed encouraging results, with plantation survival rates ranging between 77% and 89% across sites. This reflects good site preparation, appropriate species selection, and effective aftercare measures, demonstrating overall success in establishment.
- Despite the positive survival rates, area discrepancies persisted, particularly in locations like Kumbivalasa, where the recorded plantation area did not match the actual field measurements. Such mismatches raise concerns about accuracy of records and highlight the need for GIS-based verification and improved monitoring protocols.

- Soil and Moisture Conservation (SMC) work, such as trenches and bunds, were found to be functionally effective in enhancing water retention and supporting soil stability. Their presence contributed positively to plantation growth by improving micro-climatic conditions and reducing moisture stress.
- The overall quality of plantation maintenance was satisfactory, with evidence of regular weeding, fire line upkeep, and casualty replacement.
- Weaknesses were noted in record-keeping, including incomplete plantation journals and missing registers in certain ranges.
- These lapses undermine transparency and limit the ability to assess long-term sustainability.

Recommendations

- Areas should be reconciled using GIS mapping to correct discrepancies and ensure accurate monitoring of plantation and forest management activities.
- Standardized record-keeping must be enforced to prevent land diversion, supported by timely documentation and proactive oversight mechanisms.
- Fire lines should be cleared seasonally, with regular patrolling and active community support to enhance forest fire protection.
- Soil and moisture conservation (SMC) structures must be de-silted and repaired regularly to maintain water retention capacity and promote soil stabilization.
- Participation of Vana Samrakshana Samithis (VSS) and Joint Forest Management Committees (JFMCs) should be institutionalized to support planning, monitoring, and long-term sustainability of plantations.

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 2017-18, a total of 134 CAMPA activities were carried out, of which 30 activities (around 22 %) were selected for detailed monitoring and evaluation. In Srikakulam range, 30 activities were implemented, and 7 were sampled. In Kasibugga range, 34 activities were implemented, and 8 were sampled. In Palakonda range, 26 activities were implemented, with 6 sampled. In Pathapatnam range, 21 activities were implemented, and 5 were sampled. In Tekkali range, 23 activities were implemented, and 4 were sampled. Among activity types, other works dominated with 87 activities (20 sampled), followed by construction (24; 5 sampled), maintenance (17; 3 sampled), plantation (6; 2 sampled), there were no protection and soil and moisture conservation activities were implemented.

1. Monitoring and Evaluation of Plantation Activities

In Srikakulam division, a total of 6 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 3 activities (1 sampled), Palakonda range with 2 activities (1 sampled) and Pathapatnam 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 three plantation activities were carried out under the CAMPA scheme in Kasibugga range. As part of the monitoring and evaluation process, 20 % of these activities, equivalent to one plantation site, was selected randomly.

Table 136 Details of plantation selected in Kasibugga range

Sl. no.	Plantation	SO no. and year
1	Raisng of 10 Ha Teak plantation at Hunnali	DSO 96 (2017-18)

In Hunnali 10 Ha plantation soil is eroded with gullies, boulders, and rocks. Drainage is moderate to poor, the water table lies around 5 m deep, and groundwater is mostly saline.

Survival percentage: In Hunnali plantation with survival rate of 88.64%, showing good establishment and favorable conditions for teak.

Growth: In Hunnali plantation tree height ranged from 5.00–8.81 m and girth 25.80–34.92 cm, reflecting satisfactory growth.

Table 137 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	Hunnali 10 Ha Teak plantation	1	*Tectona grandis*	N 18.890092 E 84.479537	87.50	7.19 ±0.76	27.60 ±3.81
		2	*Tectona grandis*	N 18.890494 E 84.478975	86.71	8.81 ±1.05	34.92 ±6.23
		3	*Tectona grandis*	N 18.889857 E 84.479404	88.67	5.00 ±1.05	26.70 ±4.28
		4	*Tectona grandis*	N 18.890021 E 84.478803	88.28	6.44 ±1.00	30.41 ±4.00
		5	*Tectona grandis*	N 18.890211 E 84.478184	89.06	5.49 ±1.59	25.80 ±4.01
Plantation average					**88.04**	**5.49**	**29.086**

1.2 Palakonda range

A total of two plantation projects were implemented under the CAMPA scheme in Palakonda range during 2017–18. For evaluation purposes, 50 % of these projects, equivalent to one plantation site, was selected randomly

Table 138 Details of plantation selected in Palakonda range

Sl. no.	Plantation	SO no. and year
1	Raising of 5.00 Ha Teak plantation at Haripuram-Pallapuram of Palakonda section	DSO 54 (2017-18)

In Haripuram-Pallapura 5 Ha plantation with red soil, fertile and well-draining, though the presence of granite rocks created challenges during site preparation and planting.

Survival percentage: In Haripuram-Pallapura plantation *Tectona grandis* with 90.77%, showing high establishment and favorable site conditions.

Growth: In Haripuram-Pallapura plantation tree height ranged 4.33–9.75 m and girth 19.54–26.66 cm, reflecting good growth, though with some variation due to site factors and competition.

Table 139 Details of plantation enumerated in Palakonda range

Sl. no.	Plantation/ Village name	Plot no.	Species name	GPS Co-ordinates	Survival (%)	Average	
						Height (m)	GBH (cm)
1	Haripuram-Pallapura	1	*Tectona grandis*	N 18.599018 E 83.794935	92.18	5.58 ±0.54	26.05 ±2.94

	5 Ha plantation	2	*Tectona grandis*	N 18.599006 E 83.795827	90.62	4.33± 0.35	19.54 ±2.03
		3	*Tectona grandis*	N 18.598727 E 83.795575	88.28	6.86 ±0.73	20.91 ±2.34
		4	*Tectona grandis*	N 18.598760 E 83.795303	90.62	5.74 ±0.58	20.95 ±2.26
		5	*Tectona grandis*	N 18.598061 E 83.794681	92.18	9.75 ±2.14	26.66 ±3.29
Plantation average					**90.77**	**6.45**	**22.82**

Comparative assessment of plantations in Srikakulam division during 2017-18

The survival and growth of *Tectona grandis* varied across sites. In Hunnali plantation, a survival rate of 88.64% was recorded, indicating good establishment, with tree heights ranging from 5.00–8.81 m and girths of 25.80–34.92 cm, reflecting satisfactory growth. In Haripuram-Pallapura plantation, survival was slightly higher at 90.77 %, showing excellent establishment under favorable site conditions. Trees in this plantation exhibited heights of 4.33–9.75 m and girths of 19.54–26.66 cm, indicating generally good growth with some variation due to local site factors and competition.

The verification of plantation area and boundaries In Srikakulam division during 2017-18 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 140 Details of plantation area perambulation in Srikakulam division

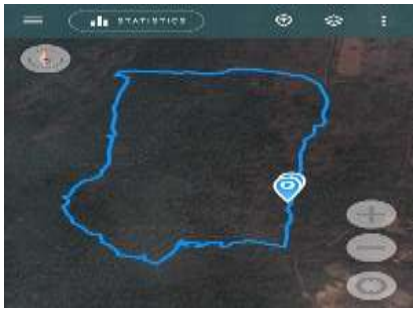
Sl. no.	Plantations	Area as per records	Area as per field perambulation
1	Raisng of 10 Ha Teak plantation at Hunnali	10 Ha	13.02 Ha
2	Raising of 5.00 Ha Teak plantation at Haripuram-Pallapuram	05 Ha	4.71 Ha

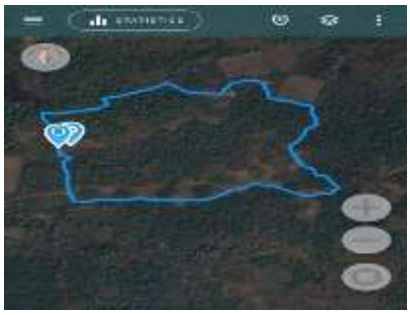
Perambulation of plantations was conducted with the assistance of local Forest Beat Officers, supported by QGIS software and Geo Tracker validation.

Hunnali plantation (10 Ha): The perambulated area measured 13.02 Ha, exceeding the recorded extent by 3.02 Ha. The discrepancy was due to inclusion of rocky terrain, trenches, and barren patches within the outer boundary.

Haripuram-Pallapuram plantation (5 Ha): The actual perambulated area was 4.71 Ha, which is 0.29 Ha less than the recorded extent. The shortfall could not be conclusively explained but was based on demarcation shown by the plantation watcher/guard in the presence of the Beat Officer.

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.





Hunnali plantation 13.02 Ha **Haripuram-Pallapuram plantation 4.71 Ha**

Health Status of Plantations: Field visits indicated that the plantations were in good condition, with no incidences of insect or pest damage and exhibiting healthy growth.

Protection Measure: Fire lines, inspection paths, and deployment of fire watchers ensured effective protection against fires and other environmental threats, minimizing risks to plantation sustainability.

Biotic Pressure on Plantations: Biotic interference was minimal, with only occasional grazing or browsing observed, indicating negligible impact on plantation growth and establishment.

Maintenance of Plantation Journals and Records: Plantation journals were satisfactorily maintained. However, periodic updating of key parameters such as survival rates, growth measurements, and maintenance activities is recommended to ensure accuracy and facilitate effective monitoring. 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 recorded in the Kasibugga and Palakonda ranges for plantation establishment and maintenance. Their active participation not only facilitated smooth implementation of plantation activities but also strengthened community ownership, ensured better protection measures, and created avenues for local livelihoods through collective decision-making and monitoring processes.

Hunnali, Kasibugga range **Haripuram-Pallapuram, palakonda**

2. Monitoring and Evaluation of Maintenance Activities

A total of 17 maintenance activities were carried out in Srikakulam division during 2017-18, of which 3 activities were selected for monitoring. Palakonda accounted for the maximum with 5 activities (1 sampled), Kasibugga followed by with 4 (1 sampled), Pathapatnam with 5 (0

sampled), Tekkali with 3 (1 sampled), there were no maintenance activity recorded in Srikakulam range.

Table 141 Maintenance activities selected for evaluation in Srikakulam division

Sl. no.	Maintenance activities	GPS Co-ordinates	SO no. and year
Palakonda range			
1	First year maintenance of 10 Ha Teak plantation at Vondrujola of Sarubujjili section	N 18.576807 E 83.899140	DSO 49 (2017-18)
Kasibugga range			
2	Second year maintenance of 10 Ha in Hunnali	N 18.892755 E 84.480563	DSO 99 (2017-18)
Tekkali range			
3	First year maintenance of 05 Ha Teak plantation at Chendanagiri village of Narasingaplli beat	N 18.682059 E 84.169074	DSO 11 (2017-18)

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

- 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.
- Pruning: Increase the frequency and ensure proper timing of pruning operations to encourage healthy growth and better bole formation.
- Records Management: Maintain accurate and regularly updated plantation journals, markers, and records to support effective monitoring and accountability.

Vondorujola beat, Palakonda range

Hunnali beat, Kasibugga range

3. Monitoring and Evaluation of Construction Activities

There were twenty-four construction activities in the division during 2017-18, of which five were sampled in Tekkali range11 activities (2 sampled), Kasibugga range 8 activities (2 sampled) and Srikakulam range 5 activities (1 sampled). No construction activities were recorded in other ranges of Srikakulam division.

3.1 Estimate for bamboo shelter at Kovvada (V) of Kandivalasa section

GPS location: N 18.112070 E 83.719420 **SO no & year:** DSO 258 (2017-18)

3.2 Erection of bamboo large size shelter for protection of Turtle eggs at Vonturu

GPS Location: N 18.942650 E 84.658361 **SO no. and year:** DSO 247 (2017-18)

3.3 Erection of bamboo large size shelter for protection of Turtle eggs at Battivanipalam

GPS Location: N 18.982729 E 84.693924 **SO no. and year:** DSO 250 (2017-18)

3.4 Errection of Bamboo Shelter for the Protection of Turtle Eggs at Jogampeta Village of Amplam Beat in DL Puram Section

GPS Location: N 18.403232 E 84.179370 **SO no. and year:** DSO 24 (2017-18)

A bamboo shelter measuring 140 ft × 28 ft was constructed at Kovvada in Srikakulam range, same was constructed in Vonturu and Battivanipalliin Kasibugga range and in Amplam beat of Tekkali range during 2017–18 to protect turtle eggs by providing a safe environment against predators, human disturbance, and environmental hazards. During the recent field visit, the shelter was not found at the site. The Beat Officer explained that it is re-constructed and relocated every nesting season based on turtle activity and site conditions.

3.5 Establishment of children park work at Telineelapuram birds' area of Tekkali section

GPS Location: N 18.573719 E 84.265353 **SO no and year:** DSO 267 (2017-18)

A children's play area has been set up at Telineelapuram Bird Sanctuary, adding recreational value and supporting children's physical activity, skill development, and social interaction. The equipment blends well with the natural surroundings, encouraging family visits. The structures are in good condition, with only minor repairs needed. Regular upkeep will ensure the facility remains useful and attractive to visitors.

Turtle hatching in Kasibugga range

Children's Park in Tekkali range

4. Monitoring and Evaluation of Other activities

Under the "Others" category, a total of 87 activities were carried out during the year 2017–18, out of which 20 were selected for sampling. The highest number of activities was reported in

Srikakulam with 25 activities (6 sampled), followed by Kasibugga and Palakonda with 19 activities each (4 sampled from each), Pathapatnam with 15 activities (5 sampled), and Tekkali with 9 activities (1 sampled). Document verification and cross-checking were conducted in the presence of Division and Range office staff. The documents reviewed during the verification process included sanction orders, estimation sheets, and work registers. It was found that the sanctioned amounts were in alignment with the actual expenditures, and all financial records were properly maintained and 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 appropriate and consistent with the approved estimates and guidelines of the CAMPA scheme. Both internal and external audits were carried out—internally by the Conservator of Forests and externally by the Accountant General's office. This verification process ensured transparency and compliance with the financial and administrative protocols mandated under the CAMPA scheme.

Key Findings

- Plantations showed strong survival rates of 89–91 %, indicating effective maintenance and care.
- Some mismatches in plantation area records were noted, highlighting the need for better documentation and field verification.
- Plantations were found to be healthy with minimal grazing pressure, reflecting good protection measures.
- Construction works like water structures and eco-recreation facilities enhanced both ecological function and community engagement.

Recommendations

- Use GIS mapping and field verification to reconcile discrepancies in recorded and actual plantation areas.
- Introduce modular, reusable turtle shelters to reduce seasonal construction efforts and improve habitat consistency.
- Strengthen documentation related to plantation activities and ensure timely pruning schedules are maintained.
- Implement a system for routine maintenance and repair of play area infrastructure to ensure safety and usability.
- Promote active involvement of Vana Samrakshana Samithis (VSS) to support long-term community ownership and sustainability of interventions.

V. ASSESSMENT OF VANA SAMRAKSHANA SAMITI INVOLVEMENT

The evaluation of CAMPA-funded activities during 2017–18 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 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 VSS involvement across Andhra Pradesh's 24 forest divisions shows that around 75% (18 divisions) had active VSS participation in plantation activities, covering approximately 50 sites statewide. Divisions such as Kakinada, Nellore, Proddattur, and Eluru recorded high engagement, with 3–4 ranges per division actively involved. Moderate participation was noted in Chittoor-West, Narsipatnam, Guntur, and Srikakulam, where VSS contributed to select ranges. Strong community coordination in these areas facilitated better integration of departmental initiatives with local needs, improved plantation maintenance, and enhanced protection, reflecting robust local ownership under Joint Forest Management (JFM) frameworks. Coastal and forest-rich divisions, in particular, demonstrated higher levels of participation due to favorable site conditions and local dependence on forest resources.

Conversely, divisions such as Ananthapuramu, Chittoor-East, Krishna, and Vizianagaram exhibited limited or no VSS involvement, often confined to a single range or absent entirely. These areas faced weaker community mobilization, resulting in reduced local ownership, lower integration of social and environmental goals, and potential risks to plantation sustainability. Strengthening VSS capacity, revitalizing dormant committees, and actively involving communities in site-level planning, monitoring, and benefit-sharing will be critical to enhance long-term success. Divisions with low participation underscore the importance of targeted awareness campaigns and proactive engagement strategies to transform plantations from externally driven efforts into genuinely community-owned initiatives.

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 Udayagiri range, Nellore division

VSS in Porumamilla range, Proddatur division

VSS in Porumamilla range, Proddatur

VSS in Paderu FRO-VI range, Paderu division

VSS in Pedabayalu range, Paderu division

VSS in Chodavaram range, Visakhapatnam

VSS in Kurupam range, Vizianagaram

VSS in Saluru range, Vizianagaram division

VI. DIVISION WISE SUMMARY OF CAMPA ACTIVITIES

The Compensatory Afforestation Fund Management and Planning Authority (CAMPA) scheme plays a pivotal role in strengthening forest conservation, restoration, and management across Andhra Pradesh. During 2017–18, the Andhra Pradesh Forest Department implemented a diverse portfolio of CAMPA activities across all forest divisions, encompassing plantations, maintenance, protection, soil and moisture conservation (SMC), construction, and other administrative and support works. This evaluation was undertaken by the Institute of Wood Science and Technology (ICFRE–IWST), Bengaluru, to assess the ecological, technical, and administrative effectiveness of these interventions. The monitoring exercise covered a representative sample of activities in each division, focusing on parameters such as plantation survival and growth, maintenance efficiency, protection and SMC functionality, and the quality of record-keeping and financial management. The findings reveal a consistent pattern across divisions—while financial and audit compliance was generally strong, ecological interventions such as plantations and SMC works often remained limited in scale compared to routine maintenance and "other" administrative works.

1. Chittoor East Division

During 2017–18, Chittoor East division implemented 185 CAMPA activities, of which 44 (24%) were sampled for evaluation. The portfolio was heavily skewed towards maintenance works (58) and others (85), with a comparatively smaller share of plantations (10), protection measures (21), construction works (10), and only one Soil and Moisture Conservation (SMC) activity. This distribution indicates a persistent imbalance, with limited emphasis on ecological restoration relative to routine or administrative works.

Plantations showed highly uneven outcomes across the division. The Nendragunta (20 ha) *Pterocarpus santalinus* plantation also performed poorly owing to cattle and wild herbivore browsing. In contrast, Ambakam recorded 69 % survival with moderate growth, while Thimmasamudram emerged as the most successful site, achieving 96 % survival with vigorous *P. santalinus* growth (heights >5.5 m, girths >30 cm). At Rayalacheruvu (61 ha), compensatory afforestation poorly performed, with survival below one percent due to rocky terrain and shallow soils; only scattered individuals of *Azadirachta indica*, *Hardwickia binata*, and *Mangifera indica* survived. These results highlight the decisive influence of site conditions and grazing pressures. Technical documentation was weak, with incomplete plantation journals, absent boards, and GPS verification revealing discrepancies between recorded and actual plantation extents deficits at Rayalacheruvu and excess areas at Nendragunta, Ambakam, and Thimmasamudram. This underscores the urgent need for systematic geospatial verification.

Maintenance constituted the largest ecological intervention. Activities such as weeding, coppicing, pruning, soil working, and fertilizer application were generally implemented and contributed to better bole formation and reduced weed competition. However, gaps were observed—fertilizer application was uneven, control of *Lantana camara* inadequate, and plantation journals and boards often absent. Evaluators recommended extending maintenance by at least two years to consolidate vulnerable plantations still facing weed and moisture stress.

Protection works were mostly limited to fire line creation (21 activities, 5 sampled). Fire lines (3–6 m width) were generally well executed. At Talapula, Ambakam, and Anjur, they were well maintained and clearly visible, but at Kasipenta, visibility was compromised by weeds,

reducing effectiveness. The division has yet to institutionalize seasonal clearance of fire lines, which is critical for fire preparedness. Soil and Moisture Conservation (SMC) was restricted to a single activity 347 Continuous Contour Trenches at Kambakam. These were technically well executed but showed siltation in low-lying patches. The negligible scale of SMC remains a serious concern, especially given the division's erosion-prone soils and the need for sustained moisture retention strategies. Construction works (10 activities, 3 sampled) involved RCC boundary pillar erection. Structures were verified to match specifications and were in good condition, though minor plaster deterioration was noted. While effective for boundary demarcation, their ecological contribution was limited. Financial records were consistently maintained and audit-compliant, reflecting strong fiscal management. However, technical documentation remained weak, with incomplete plantation journals, absent boards, and geospatial mismatches that undermine the reliability of reported achievements.

2. Chittoor West Division

During 2017–18, Chittoor West division implemented 209 CAMPA activities, of which 48 (22.9%) were sampled for evaluation. The portfolio was dominated by maintenance (64) and other works, while plantations (19), protection (3), Soil and Moisture Conservation (SMC, 1), and construction (2) were relatively fewer. This distribution indicates a continued focus on routine upkeep and administrative components, with limited investment in ecological restoration and water-conservation measures.

Plantations demonstrated varied but generally encouraging results for hardy native species. At Keenatampalli, *Hardwickia binata* and *Pterocarpus santalinus* showed high survival rates (88.97% and 84.29%, respectively), with robust growth (heights 4.03–5.15 m; girths 25–31 cm). A second block in the same site achieved survival averages above 87%. At Santhapeta, *P. santalinus* survival averaged 85.5%, though growth was modest (2.6–3.6 m). The Thotakanuma plantation (Palamaner), comprising a mixed species block of *Phyllanthus emblica*, *Terminalia arjuna*, *Azadirachta indica*, *Pterocarpus marsupium* and *P. santalinus*, recorded >80% survival for most species, but *P. marsupium* lagged at 67%. At Thettu (Madanapalle), *T. arjuna* and *H. binata* performed strongly (86–90%), while *P. santalinus* was weaker (57.8%). These outcomes show that while Red Sanders (*P. santalinus*) thrives in select sites, its performance is inconsistent, whereas hardy species like *H. binata* and *T. arjuna* adapt reliably across diverse soils. Documentation was partly satisfactory: plantation journals were mostly available but lacked frequent updating, plantation boards were present but often in poor condition, and GPS verification revealed discrepancies between recorded and actual plantation areas (0.7–2.3 ha). These mismatches, caused by surveyors following outer boundaries around trenches and obstacles, underscore the need for precise GIS-based demarcation.

Maintenance was the single largest activity type (64 interventions, 14 sampled). Works such as circular weeding, coppicing, pruning, soil working, and fertilizer application were generally executed to specification, leading to improved vigour and bole formation. However, deficiencies included uneven fertilizer application, poorly cleared fire lines, and damaged or missing plantation boards. Evaluators recommended extending maintenance cycles by at least two years, particularly for Non-Timber Species Hardwoods (NTSH) plantations, to consolidate survival and growth gains.

Protection works were minimal (3 in total, 1 sampled). A solar fencing intervention at Palamaner was not any use after being washed away by heavy monsoon runoff from a dam. Although fire prevention measures such as watchers and inspection paths were observed, the scale of protection remained inadequate for a division vulnerable to fire and grazing pressures. Soil and Moisture Conservation (SMC) was limited to a single earthen bunding work in Madanapalle (20 ha). The bunds were technically sound and retained water for infiltration, but siltation had already reduced their effective volume. Given the sloping and erosion-prone terrain, the negligible scale of SMC activities represented a significant ecological shortfall. Construction was confined to two works in Palamaner, with one sampled. The construction of a seeds and store room at the field nursery was verified, found structurally sound, and was put to effective use as a range office store. However, construction works remained supplementary, with limited ecological significance. Financial management was consistently strong, with sanction orders, estimates, and registers in proper order, and both internal and external audits confirming compliance. Technical documentation, however, remained mixed, with partial plantation records, poor board upkeep, and GPS mismatches limiting transparency and accuracy of reporting.

3. Rajampet Division

During 2017–18, Rajampet division implemented 74 CAMPA activities, of which 18 (25%) were sampled for detailed monitoring and evaluation. The portfolio included plantation development (4), maintenance (30), soil and moisture conservation (11), construction (2), and other works (27). The division, which has extensive moderately dense and open forest cover, presented a mixed record of ecological success and operational challenges.

Plantation Development was limited, with only four works taken up, of which two were evaluated. At S.R. Palem, a mixed plantation of *Hardwickia binata*, *Terminalia arjuna*, *Azadirachta indica*, and *Holoptelea integrifolia* performed exceptionally well, with survival rates of 91–97% and vigorous growth (heights 5.38–5.69 m; girths 29.92–38.61 cm), reflecting strong species-site compatibility and effective upkeep. By contrast, the Shikaripalem plantation (Sanipaya Range, 25 ha) of *H. binata* and *Pterocarpus santalinus* showed moderate survival (54–58%) and stunted growth (0.78–1.05 m height; 8.91–13.29 cm girth), largely due to the site's semi-arid soils and moisture stress. These contrasting outcomes underscored the importance of soil enrichment and water conservation in sustaining plantations. KML-based verification revealed significant discrepancies in plantation extent. At S.R. Palem, the perambulated area was only 10.81 Ha against the recorded 28 Ha, while at Shikaripalem, the perambulated area exceeded the sanctioned extent (84.74 ha vs. 25 ha). Such mismatches highlighted the need for precise geo-referencing and boundary demarcation.

Maintenance was the largest intervention category (30 works, 6 sampled). Activities included casualty replacement, weeding, coppice regulation, pruning, and fire line management. Evaluations confirmed that tending operations were generally satisfactory and crucial for supporting young plantations by reducing weed competition and improving soil health. However, gaps persisted plantation boards were missing or damaged at several sites, fertilizer application was inconsistent, and fire lines lacked regular clearance. Recommendations emphasized systematic replanting, coppice control, intensified pruning, and strengthened fire protection measures.

Soil and Moisture Conservation (SMC) received notable attention with 11 activities, of which 4 were sampled. Structures included check dams (Rajampet Range), percolation tanks (Kodur), and mini percolation tanks (Chitvel). Most were constructed to specification but were affected by siltation, seepage, and vegetative overgrowth, reducing effectiveness. Evaluators stressed the need for periodic desilting, structural repairs (aprons, walls), and weed clearance to restore water storage and recharge functions. Construction works were limited to two interventions, both sampled. These included permanent cairns at S.R. Palem for boundary demarcation and a compound wall at frontline staff quarters (Kodur Range). The cairns were intact but partly submerged, while the compound wall showed minor plaster damage. Both works were functionally useful for boundary security and staff infrastructure, though their ecological role remained limited. Other works comprised 27 activities, of which 5 were sampled. Document verification showed that financial records, sanction orders, and expenditure registers were generally well maintained, and both internal and external audits confirmed transparency. However, in a few cases, sanction estimates were not available for verification, requiring corrective attention to improve documentation practices.

4. Tirupati Division

In 2017–18, Tirupati division implemented 105 CAMPA activities, of which 22 (21 percent) were sampled. No new plantations or construction works were reported during the year. Five maintenance works were taken up, including Red Sanders plantations at Chamala (25 ha, Bhakarapet) and Balapalli (25 ha, Desettipalli), where weeding, pruning, and coppice management were carried out satisfactorily, although display boards were missing. Nine fire line works were implemented, with two sampled in Tirupati Range, where lines of 6–10 m width and 5,000–10,000 m length were well maintained, ensuring clear visibility and reduced fire risk. Six check dams were constructed, two of which were sampled; while structural conformity was observed, issues such as seepage and apron damage requiring repair and de-silting were noted. A large share of activities (99) fell under the "Others" category, with 17 sampled, where expenditure records were largely consistent, though discrepancies such as missing estimates and typographical errors were identified in Balapalli, Chamala, and Tirupati ranges.

5. Nellore Division

In 2017–18, Nellore division implemented 239 CAMPA activities, of which 51 (21%) were sampled for detailed evaluation. Activity distribution across ranges was: Nellore (68 implemented, 15 sampled), Kavali (43, 9), Udayagiri (40, 9), Atmakur (36, 7), Venkatagiri (28, 6), and Rapur (24, 5), with "Other" works forming the largest category (119, 24 sampled), followed by maintenance (85, 18), plantations (22, 6), soil and moisture conservation (8, 2), and protection (5, 1); no construction works were reported.

Twenty-two plantations were undertaken, with one sampled per range. In Nellore, Marupuru (20 ha) recorded high survival of *Sterculia urens* (87.6%) and *Syzygium cumini* (81.8%), with heights up to 7.06 m and girths near 50 cm. Atmakur's Ponugodu (20 ha) *Pterocarpus santalinus* plantation showed 85.9% survival and healthy growth (7.2–9.8 m height, girth 29–32 cm), while Kavali's Chowdavaram (20 ha) plantation had poor survival (40.3 %) though surviving trees were vigorous. Udayagiri's Kaniyamapadu (20 ha) plantation of *Hardwickia*

binata and *Azadirachta indica* exhibited very high survival (96.3 % and 93.6 %), and Venkatagiri's Sreerampalli (20 ha) plantation demonstrated good *Hardwickia binata* survival (90.1 %) and moderate *Sterculia urens* success (71 %). Rapur's Yeturu plantation (20 ha) performed excellently with *Dolichandrone crispa* (93.9 %), *Terminalia arjuna* (87.6 %), and *Sterculia urens* (91.7 %), with heights up to 7.7 m and girths over 50 cm. KML/QGIS verification revealed that actual plantation areas exceeded recorded extents in all sampled sites. Plantations were generally healthy, free from pests, though grazing and browsing were noted; protective measures like trenches and watchers were effective, and plantation journals were maintained, though signage was missing or damaged at some sites. Village Forest Committees participated in five of six plantations, except Sreerampalli.

Eighty-five maintenance activities were undertaken, with 18 sampled. Kavali led with 26 activities (5 sampled), followed by Atmakur (20, 4), Udayagiri and Venkatagiri (14 each, 3 sampled), Nellore (6, 2), and Rapur (5, 1). Field inspections confirmed execution of scheduled operations including casualty replacement, weeding, coppice control, pruning, and fire line maintenance, though missing or damaged plantation boards were noted. Records were generally well maintained. Five protection works were reported, with one sampled in Toderu RF of Marupuru beat where a 2 km × 2 m deep boundary trench was dug; field verification confirmed length and depth, though width was slightly reduced (1 m vs. 1.5 m). Functionality was intact, but periodic de-silting was advised. Eight soil and moisture conservation works, all in Udayagiri, were implemented, with two sampled. At Arlapadia beat, a mini percolation tank (23 × 4 × 0.9 m) was dimensionally correct but silt accumulation reduced capacity and displaced stone packing. A check dam at Peddirlapadu (9 × 1.8 × 1.2 m) also suffered reduced depth due to siltation, requiring minor repairs. One hundred and nineteen "Other" works were implemented, with 24 sampled. Document verification confirmed that sanctioned amounts matched expenditures, records were complete and authenticated, and both internal and external audits ensured transparency and compliance.

6. Kadapa Division

During 2017–18, Kadapa division implemented 110 CAMPA activities, of which 23 (20 percent) were sampled for monitoring and evaluation. Range-wise, Vempalli and Sidhout each executed 30 activities (7 sampled each), Kadapa carried out 26 (4 sampled), and Vontimitta completed 23 (5 sampled). By activity type, "Other works" dominated with 83 activities (17 sampled), followed by maintenance (19, 3 sampled), plantations (4, 1 sampled), protection (2, both sampled), and construction (1, sampled); no soil and moisture conservation works were undertaken.

Of the four plantations, one was sampled in Kadapa range at Kanumalopalli (20 ha) designated for Red Sanders. Field evaluation revealed poor establishment of *Pterocarpus santalinus* (32% survival), while *Azadirachta indica* and *Senegalia chundra* dominated with 52% and 38% survival, respectively. Tree growth was satisfactory, with heights between 5.56–6.94 m and girths of 29.73–38.66 cm. KML/QGIS verification showed the actual plantation area exceeded records (25.09 ha vs. 20 ha sanctioned). Plantations were healthy, pest-free, supported by fire lines and watchers, and experienced minimal biotic pressure. Journals were generally maintained, though Kanumalopalli records were missing during inspection, and Village Forest Committee participation and focus group discussions were noted.

Nineteen maintenance activities were carried out, with four sampled across Vempalli, Kadapa, and Vontimitta ranges. Field checks confirmed execution of routine operations including casualty replacement, weeding, coppice regulation, pruning, soil tilling, and fire line upkeep, though plantation boards were often damaged or missing and journals required more frequent updating. Recommendations included timely replanting with healthy seedlings, improved coppice management, and enhanced pruning for better bole formation.

Two protection works, both sampled, involved creation of fire lines in Vempalli (Idupulapaya beat) and Vontimitta (Chintarajupalli), each measuring 2,000 rmt × 3 m. Structures matched specifications, were clearly visible, and free from grass and weeds, indicating effective maintenance. A single construction activity in Sidhout range involved installation of a gate with pillars at Velugupalli (Maddur beat). Field verification confirmed that dimensions matched specifications, and the structure was intact, well-maintained, and effective in demarcating boundaries. Among the 83 "Other works" (17 sampled), verification confirmed that sanctioned amounts matched expenditures, records were complete and authenticated, and internal and external audits ensured transparency and compliance, though these activities were largely administrative rather than ecological in impact.

7. Proddatur Division

In 2017–18, Proddatur division implemented 196 CAMPA activities, of which 46 (23 %) were sampled for evaluation. Range-wise, Badvel accounted for the largest share (62, 15 sampled), followed by Porumamilla (41 implemented, 10 sampled), Onipenta (38, 8), Proddatur (37, 10), and Muddanur (18 implemented, 4). By activity type, "Other works" dominated (127 implemented, 24 sampled), followed by maintenance (27, 8), plantations (20, 5), protection (8, 5), construction (6, 2), and soil and moisture conservation (8 implemented, 2 sampled).

Plantation performance varied across ranges. In Porumamilla, Itukulapadu (25 ha) supported *Gmelina arborea* (78.5 % survival), *Syzygium cumini* (77.7 %), *Phyllanthus emblica* (77.7 %), and *Sterculia urens* (73.6 %), with heights of 2.7–10.1 m and girths of 19.5–46.6 cm. At Tekurpeta, *Hardwickia binata* exhibited high survival (92.1 %), while *Pterocarpus santalinus* struggled (54.8 %). In Badvel, Ganugapenta plantations—7.8 ha of *Soymida febrifuga* and 20 ha of Red Sanders showed 84.3 % and 77.7 % survival, respectively, with slower growth in Red Sanders. Muddanur's Mallela plantation of *Hardwickia binata*, *Azadirachta indica*, and *Sterculia urens* recorded excellent survival (87.6 – 92.6 %), though localized fodder cutting caused stunted growth. QGIS verification indicated that actual plantation areas consistently exceeded recorded extents. Overall health was satisfactory, pest damage was absent, and VSS participation was strong, though journals were incomplete at a few sites.

Maintenance comprised 27 activities, with 7 sampled. Field inspections confirmed implementation of weeding, casualty replacement, soil working, pruning, and fire line upkeep, although plantation boards were often missing or damaged, and journals were incomplete. Recommendations emphasized weed and lantana control, proper signage, updated record-keeping, and timely replanting with healthy seedlings. Protection works included 8 activities, with 5 sampled. Fire lines in Ganjikunta, Maddivaripalli, Bayanapalli, Thaduku, and Balayapalli were largely effective, though some were partially obscured by weeds and coppice. A 285 m chain-link fence with RCC poles at Jangamarajupalli nursery was well maintained,

effectively preventing cattle entry. All 8 soil and moisture conservation works were in Badvel, with 2 sampled. Check dams and saucer pits largely matched specifications, though siltation and minor apron damage required repair or de-silting. Six construction works, including RCC cairns at Lothuvanka and a residential shed at Reddibhavi, were well executed, functional, and aided protection efforts, though weed growth occasionally obscured visibility. One hundred and twenty-seven "Other works" were implemented, with 25 sampled. Financial records were largely in order, sanctioned amounts matched expenditures, and audits were conducted. Minor discrepancies in DSO and RSO entries were noted in Proddatur, Onipenta, and Porumamilla ranges, attributed to typographical errors in divisional activity lists and acknowledged by respective offices.

8. Ananthapuramu Division

In 2017–18, Ananthapuramu division implemented 175 CAMPA activities, of which 44 (25.1%) were sampled for evaluation. The portfolio included plantations (6), maintenance (116), protection (4), soil and moisture conservation (4), construction (11), and other works (34), with maintenance dominating the programme while plantations and SMC works were limited in scale.

All six plantations were confined to Kalyandurga range, with one site sampled. Performance was strong, with survival rates ranging from 72–89 % across *Azadirachta indica*, *Hardwickia binata*, and *Sterculia urens*, heights of 1.8–3.86 m, and girths of 16–38 cm. Area verification at Belugppa revealed actual extents (25.71 ha) exceeded recorded 20 ha due to inclusion of rocky patches and trenches. While growth was satisfactory, pest incidence, biotic grazing pressure, and uneven protection highlighted the need for fencing and pest management. Vana Samrakshana Samithi (VSS) involvement and Focus Group Discussions were absent, limiting community participation.

Maintenance activities (116) spanned all six ranges, led by Kadiri (42), followed by Kalyandurga (24), Ananthapuramu (19), Bukkapatnam (16), Gooty (8), and Penukonda (7). Sampled sites confirmed that casualty replacement, circular weeding, coppice management, pruning, fertilizer application, and fire line upkeep were generally performed. Positive impacts included reduced weed competition and improved bole formation, though issues such as uneven fertilizer application, incomplete fire line clearance, and missing or damaged display boards were noted. Evaluators recommended extending maintenance cycles and strengthening weed and fire management.

Protection works were limited to four activities, with two sampled. Fire lines in Ananthapuramu (Marutla beat, 10 m × 2,000 m) and Kadiri (Eswaramala RF, 6 m × 3,245 m) were constructed to specifications. The Ananthapuramu line was well aligned and visible, while the Kadiri line had alignment and visibility issues, though both were free of grass regrowth. SMC works included a check dam at Kogira block (Penukonda) and 202 Continuous Contour Trenches in Gooty range, both largely conforming to specifications. Minor siltation was observed, but overall functionality remained intact, though regular de-silting is required to maintain effectiveness. Eleven construction activities involved boundary pillars in Ananthapuramu (Kondapalli RF), Gooty (Muchukota block), and Bukkapatnam (Jonnavulapalli RF). Sampled pillars matched specifications (1.2 m height, 0.3 m top width, 0.45 m bottom width) and

effectively demarcated reserve forest boundaries. Construction quality across the division was therefore satisfactory. Financial and technical records were meticulously maintained, with sanctioned orders, estimates, and work registers aligning with expenditures and duly authenticated. Internal and external audits confirmed compliance. Plantation journals were generally maintained, though periodic updates on survival and growth are needed. Minor documentation lapses, such as a missing revised estimate in Penukonda, were noted but did not materially affect accountability.

9. Giddalur Division

In 2017–18, Giddalur division implemented 45 CAMPA activities, with 10 (22 %) sampled for detailed monitoring. No plantation, maintenance, soil and moisture conservation, or construction activities were reported during the year. Two protection works were carried out, with one sampled; at Bodi beat (Giddalur range), fire lines measuring 3 m × 8,000 m were created, matched records, and were clear, well maintained, and free of dense weeds. The majority of activities (43) fell under "Other works," with 10 sampled, where verification confirmed that expenditures aligned with sanctioned amounts and were properly audited.

10. Kurnool Division

In 2017–18, Kurnool division implemented 49 CAMPA activities, of which 11 (22 %) were sampled. Four plantations were undertaken, with one sampled in Dhone range (Malyala beat, 25 ha), showing strong survival: *Sterculia urens* 76 %, *Azadirachta indica* 75 %, *Hardwickia binata* 74 %, and *Soymida febrifuga* 72 %, with heights of 2.2–4.5 m and girths of 22–30 cm. Area verification revealed a large excess (40.65 ha perambulated vs. 25 ha recorded). Plantations were healthy, pest- and grazing-free, and supported by functional fire lines. Twenty-six maintenance works were implemented, five sampled across Dhone and Adoni ranges, confirming completion of casualty replacement, pruning, coppice control, and fire line upkeep, though damaged boards and weak journal updating were noted. One fire line (Adoni, Tuggali beat, 4,500 m × 3 m) was created, clear and effective. No SMC or construction works were undertaken. Eighteen "Other" activities were carried out, four sampled, with financial records verified, authenticated, and audited.

11. Nandyal division

Nandyal division, covering 1,109.66 km² of forest, is dominated by Moderately Dense Forest (797.10 km²), followed by Open Forest (266.14 km²) and smaller Very Dense Forest patches (46.42 km²), with 442.63 km² of scrubland highlighting the semi-arid and fragile ecosystem. The division has experienced a forest loss of 2.84 km², driven by anthropogenic pressures, grazing, fuelwood extraction, and high fire vulnerability, making community-based protection vital for balancing conservation and livelihoods. In 2017–18, only six CAMPA activities were implemented, all in Banaganapalli range, with one activity (21%) sampled for monitoring. No interventions occurred in Panyam range. All activities were maintenance works, including weeding, soil tilling, inter-ploughing, fire line management, and other contingency measures. Field verification confirmed satisfactory execution of these operations, though plantation boards were damaged or missing, reducing effective site identification and monitoring.

12. Atmakur Division

In 2017–18, Atmakur division, comprising Atmakur, Srisailam, Bairluty, Velgode, and Nagaluty ranges, implemented 133 CAMPA activities, of which 31 (23 %) were sampled for detailed monitoring. No new plantations were undertaken; instead, the focus was on maintenance of existing plantations, fire protection, soil and moisture conservation (SMC), minor construction, and a large number of administrative and support "other" activities.

Maintenance comprised 19 activities, with four sampled, covering casualty replacement, fertilizer application, weeding, soil working, coppice management, and fire line upkeep. Field verification confirmed that operations were generally completed, though damaged plantation boards limited effective identification and monitoring. Site-specific challenges were observed: in Pecheruvu (E) beat of Srisailam Range, first-year bamboo plantations poorly performed due to waterlogging, while *Pongamia pinnata* persisted with stunted growth. Similar mixed outcomes were recorded in Bairluty, Nagaluty, and Velgode, influenced by soil conditions, invasive grasses, and grazing pressures, emphasizing the importance of species-site compatibility, particularly for bamboo.

Two protection works were implemented and sampled, involving fire line creation in Indireswaram West beat (Nagaluty Range) and the Great Indian Bustard Sanctuary, Rollapadu (Velgode Range). Fire lines (5 m width; 149,000 rmt in Nagaluty and 18,210 rmt in Velgode) were properly established, clearly visible, and effective, though long-term utility depends on periodic clearance and patrolling. A single SMC intervention was undertaken, consisting of two mini percolation tanks in Indireswaram West beat, Nagaluty Range (10 × 10 × 1 m), which were well constructed and provided supplementary water storage. The limited SMC coverage was inadequate for the division's ecological needs, given erratic rainfall and shallow soils. One construction activity involved an iron shed for the Animal Orphanage Centre in Sundipenta (Srisailam Range), verified as intact and functional, enhancing conservation and rehabilitation capacity. The "Other" category dominated with 110 activities, 23 sampled. Document verification confirmed that sanction orders, estimates, and work registers were generally in order and expenditures aligned with sanctioned amounts, with internal and external audits endorsing compliance. However, missing or unproduced estimates and work registers in all ranges reduced accountability, though financial management remained sound.

13. Markapur Division

In 2017–18, Markapur division implemented 124 CAMPA activities, of which 29 (23%) were sampled for monitoring and evaluation. Range-wise distribution was relatively uniform: Markapur and Dornala (32 each), GV Palli (29), V.P. South (14), and Y Palem (11). Activity composition was dominated by "Other works" (88, 18 sampled), followed by maintenance (29, 7 sampled), soil and moisture conservation (3, 1 sampled), construction (2, 1 sampled), and protection (1, 1 sampled). Only a single plantation activity was undertaken in the division.

Plantation efforts were minimal, with one 10 ha plantation at Kalanuthala, Gottipadiya beat (Markapur range). Field inspection revealed complete poor performance due to rocky, gravelly red soil. Absence of the plantation board hampered site identification and monitoring. Although the Vana Samrakshana Samithi (VSS) was nominally involved, their role in long-term

maintenance was limited. KML/QGIS verification showed the perambulated area exceeded the recorded extent by 5.54 ha, reflecting survey and documentation challenges.

Maintenance works (29, 7 sampled) included weeding, inter-ploughing, soil working, and fire line upkeep. Despite interventions, survival at several plantations including bamboo at Regumanupenta and Guttalachenu and Palmyra at Gottipadiya remained poor due to fires, drought, grazing, and soil infertility. Plantation boards and boundary stones were often missing, though plantation journals and work registers were generally well maintained.

A single protection activity involved digging peripheral trenches at Kalanuthala, Markapur range. Field verification confirmed functionality, though depth was reduced due to siltation and grass overgrowth, highlighting the need for periodic maintenance. Three SMC activities included a 17 m check dam at Mekalabonda Vagu, Gottipadiya beat, which matched records but required de-silting and repairs due to seepage and side-wall damage. One road formation project in GV Palli range connected Darabailu Base Camp to Bakkacheintala Penta; field inspection confirmed serviceability, though localized distortions and weed growth necessitate regular upkeep. The majority of activities fell under "Other works" (88, 18 sampled), where document verification confirmed strong compliance: sanction orders matched expenditures, registers were well maintained, and internal and external audits were conducted. While financial accountability was high, the ecological output of these activities remained limited.

14. Guntur Division

In 2017–18, Guntur division implemented 89 CAMPA activities, of which 23 (25.8%) were sampled for monitoring and evaluation. Range-wise, Vinukonda led with 48 activities (11 sampled), followed by Guntur (24 implemented, 7 sampled), Macherla (12 implemented, 3 sampled), and Repalli (5 implemented, 2 sampled). By activity type, "Other works" dominated (47, 10 sampled), followed by maintenance (25, 7 sampled), plantations (7, 3 sampled), protection (7, 2 sampled), and construction (3, 1 sampled). No soil and moisture conservation works were undertaken.

Plantations performed well across ranges. In Vinukonda, the 20 ha Badrupalem VSS site recorded excellent survival: *Azadirachta indica* (93.93%), *Terminalia arjuna* (92.56%), and *Holoptelea integrifolia* (92.56%), with heights of 2.90–4.57 m and girths of 24.03–37.10 cm. In Macherla, the 20 ha Jangameswarapadu VSS plantation showed good survival of *Azadirachta indica* (84.70%) and *Sterculia urens* (84.29%), with moderate growth (1.41–3.20 m height, 17.78–32.31 cm girth). In Guntur, the 20 ha Enamandala plantation exhibited strong survival for multiple species (*Azadirachta indica* 90.9%, *Ficus* spp. 84.29%, *Terminalia arjuna* 85.12%, *Tamarindus indica* 80.99%, *Syzygium cumini* 81.81%), with heights of 3.19–4.87 m and girths of 25.93–32.60 cm. KML/QGIS perambulation revealed that actual plantation areas consistently exceeded records (Badrupalem 21.10 ha, Jangameswarapadu 24.26 ha, Enamandala 33.71 ha). Plantations were healthy, with minimal pest or biotic pressures due to functional fire lines and watchers. VSS participation was active at Badrupalem and Jangameswarapadu but absent at Enamandala. Plantation boards were missing at Badrupalem and Enamandala.

Maintenance activities (25, 7 sampled) included casualty replacement, soil working, circular weeding, coppice management, pruning, fertilizer application, and fire line upkeep. Field

verification confirmed operations were carried out, though plantation boards were often missing or damaged, and journals required consistent updating. Recommendations included extending maintenance for two more years, regular weeding, deep soil work, and reinforcement of fire lines and fire watchers.

Seven protection works were undertaken, with two sampled in Vinukonda. Fire lines at Bollapalli (6,000 rmt × 3 m) and Yallamanda (3,000 rmt × 3 m) were clearly visible and to specification, though coppice regrowth during monsoon indicated the need for periodic clearance. Three construction works were reported, one sampled in Vinukonda. R.R. masonry adjacent walls near Kotappakonda statues measured 0.45 m width × 250 rmt length, serving as basement support for chain-link mesh; periodic weeding was required. The majority of activities fell under "Other works" (47, 10 sampled), with sanction orders matching expenditures, well-maintained financial records, and internal and external audits confirming compliance. Minor documentation gaps included missing expenditure records in Vinukonda (DSO 107) and absent estimates in Guntur (RSO 64).

15. Krishna Division

In 2017–18, Krishna division implemented 87 CAMPA activities, with 20 (23%) sampled for monitoring and evaluation. Nine plantations were carried out, with two sampled in Mylavaram (A. Konduru and Kakarla, 20 ha each) and one in Vijayawada (Gandrai, 11.45 ha). Survival at Mylavaram ranged from 60–73% across *Pongamia pinnata*, *Syzygium cumini*, *Azadirachta indica*, and *Albizia odoratissima*, with modest growth (1.2–3.1 m height, 16–28 cm girth). Gandrai plantation showed strong survival (>85%) for *Sterculia urens* and *Albizia odoratissima*, with heights up to 6.2 m and 35 cm girth. Area verification revealed discrepancies: Gandrai 27.07 vs. 11.45 ha (+15.6 ha) and Kakarla 25.56 vs. 20 ha (+5.56 ha).

Forty maintenance works were implemented, ten sampled across ranges, generally completed satisfactorily, though plantation boards were often damaged or missing and journals lacked systematic updates. Six protection works were undertaken, with one sampled at Katrenipadu (Nuzvid); a 3 m × 2,000 m fire line met specifications but had moderate weed growth reducing visibility. Twenty-two soil and moisture conservation works were executed, five sampled; continuous contour trenches and percolation tanks were dimensionally correct but suffered siltation, affecting storage and functionality. No construction activities were implemented. Ten "Other" activities were carried out, two sampled, with records matching sanctions and audits confirming propriety.

16. Eluru Division

In 2017–18, Eluru division implemented 154 CAMPA activities, of which 35 (22%) were sampled for monitoring and evaluation. Range-wise, Eluru carried out 54 activities (11 sampled), J.R. Gudem 23 (5), Kannapuram 30 (8), Polavaram 36 (8), Kukunoor 6 (2), and Amaravaram 5 (1). By activity type, "Other works" dominated (76, 15 sampled), followed by maintenance (35, 7 sampled), soil and moisture conservation (30, 7 sampled), plantations (8, 3 sampled), and protection (5, 3 sampled). No construction works were implemented.

Eight plantations were undertaken, three sampled. In Eluru range, the 20 ha Velagalapalli plantation on red sandy loam showed excellent survival (>90 %) across *Pterocarpus marsupium*, *Dalbergia latifolia*, *Hardwickia binata*, *Sterculia urens*, and *Albizia chinensis*, with

heights of 3.08–5.34 m and girths of 20.86–44.31 cm. J.R. Gudem's Jeelugumilli plantation (20 ha) had *Albizia chinensis* survival at 92.56% and *Terminalia arjuna* at 88.83%, with heights of 3.93–8.91 m and girths of 26.9–66.06 cm. In Kannapuram, Karakapadu plantation (20 ha) recorded 82.64–100% survival across multiple species, with heights 4.20–5.15 m and girths 20.40–45.09 cm. KML/QGIS verification showed perambulated areas exceeded records: Velagalapalli +2.21 ha, Jeelugumilli +1.59 ha, Karakapadu +2.73 ha. Plantations were healthy, pest-free, supported by fire lines and watchers, with active VSS participation. Grazing pressures were noted at some sites, and journals and boards were generally maintained.

Thirty-five maintenance works were conducted, seven sampled. Operations including casualty replacement, weeding, pruning, coppice management, fire line upkeep, and fertilizer application were implemented, though some plantation boards were damaged or missing and records needed updating. Five protection works were undertaken, three sampled. Fire lines at Kovvada (2,100 rmt), Goparajugudem (2,000 rmt), and LND Peta (2,100 rmt) matched specifications, were visible, and free from weeds, indicating proper maintenance. Thirty soil and moisture conservation works were carried out, seven sampled. Structures included check dams, rock fill dams, and percolation tanks. While dimensions matched records, siltation, seepage, and apron/sidewall damage were common, requiring urgent de-silting and repairs to restore storage and functionality. Seventy-six "Other works" were implemented, with 15 sampled. Sanction orders matched expenditures, records were maintained, and audits were conducted, though some documentation gaps existed in Amaravaram (RSO 14), J.R. Gudem (DSO 17), Kannapuram (DSO 3, DSO 18), and Kukunoor (DSO 6).

17. Eluru WLM Division

In 2017–18, Eluru WLM division implemented 85 CAMPA activities, with 19 (22 %) sampled for evaluation. Activity composition was dominated by "Other works" (82, 17 sampled), followed by construction (2, 1 sampled) and maintenance (1, 1 sampled). No plantations, protection, or soil and moisture conservation (SMC) activities were undertaken.

The single maintenance activity involved upkeep of the Atapaka Pelican Paradise plantation in Kaikaluru range, comprising *Pongamia pinnata*, *Azadirachta indica*, and miscellaneous species. Field verification confirmed that weeding, soil tilling, formation of saucers, and fertilizer application were carried out. The plantation was healthy, with good survival and growth. Recommendations included intensified weeding, casualty replanting, mulching, bunding, installation of boundary pillars and boards, and protective measures such as fencing and supplemental watering.

Of the two construction works, one sampled involved installation of new and replacement children's play equipment including swings, rainbow ladder, family self-jula, and seesaw at the Pelican Paradise centre. Field inspection confirmed that the equipment was functional, well-designed, and harmoniously integrated, enhancing recreational and educational value. Regular maintenance and hygiene were advised. Verification of 82 "Other works" confirmed alignment of sanction orders, estimates, and expenditures. Records were properly maintained and authenticated, and both internal and external audits were conducted, ensuring transparency and compliance, although the ecological impact of these works was limited.

18. Chintur Division

In 2017–18, Chintur division implemented 67 CAMPA activities, of which 17 (25%) were sampled for detailed monitoring and evaluation.

Nine plantations were undertaken, with two sampled at V.R. Puram (Mattapally, 25 ha) and Nellipaka (Palamadagu, 25 ha). Both sites largely poorly performed. At Mattapally, negligible survival was observed, with only natural regeneration of native species present. Palamadagu recorded extremely low survival (2–7%), with stunted growth due to unsuitable soils and heavy grazing. Area verification revealed discrepancies: Mattapally exceeded recorded extent (28.88 ha vs. 25 ha) while Palamadagu fell short (21.22 ha vs. 25 ha).

Eleven maintenance works were implemented, three sampled. Bamboo plantations at Darapally (V.R. Puram) performed poorly, whereas Bandirevu (Nellipaka) exhibited better growth. Plantation boards were missing at underperforming sites, reducing monitoring effectiveness. Six protection works were carried out, two sampled (Kunavaram and Lakkavaram). Fire lines were created but were poorly maintained, with visibility reduced due to grass and weed overgrowth. Twenty-two SMC works were undertaken, five sampled. Structures such as percolation tanks and staggered trenches were correctly constructed but suffered from heavy siltation, necessitating de-silting and repairs to restore functionality. Twenty "Other" activities were implemented, four sampled. Records were properly maintained, expenditures matched sanctioned amounts, and internal and external audits confirmed compliance.

19. Kakinada Division

In 2017–18, Kakinada division implemented 221 CAMPA activities, of which 94 (42 %) were sampled for monitoring and evaluation. Range-wise, RC Varam led with 85 activities (19 sampled), followed by Gokavaram (32 implemented, 8 sampled), Rajavommangi (24, 7), Kakinada (23, 5), Yeleswaram (20, 4), Sudikonda (20, 3), and Addatheegala (17, 3).

Twenty-three plantations were undertaken, with six sampled across Kakinada, Addatheegala, Gokavaram, and Rajavommangi ranges. Survival rates varied: Atchutapuram (Kakinada) 53.9%, Chavitidibbalu 52.2%, Addatheegala beat 60.2%, P. Patnam 46.8%, Jaddangi 65.1%, and Thimmapuram 57.1%. Growth ranged widely, with Jaddangi showing strong performance (6.99–7.06 m height, 30.6–42 cm girth) and Thimmapuram exhibiting high variability (0.77–7.21 m height, 10.1–16.9 cm girth). KML/QGIS verification indicated discrepancies: Chavitidibbalu, P. Patnam, and Jaddangi exceeded recorded areas, while Atchutapuram, Addatheegala, and Thimmapuram were lower. Plantations were generally healthy, though pest and insect damage was noted at some sites. Grazing pressures were minimal, mitigated through trenches and watchers. Plantation boards were missing at several locations, but VSS participation was active.

Forty-eight maintenance works were carried out, eleven sampled. Activities covered bamboo and teak plantations across multiple ranges. Operations casualty replacement, soil tilling, weeding, coppice management, pruning, fire line maintenance, and fertilizer application—were implemented as planned. Missing or damaged boards were common, and records required updating. Recommendations included intensified weeding, timely pruning, coppice regulation, casualty replanting, and consistent journal updates.

Nine protection works were undertaken, two sampled in RC Varam. Fire lines at Devarapalli (3,400 rmt) and Maredumilli South (3,000 rmt) matched specifications, but visibility was reduced due to weed growth, indicating a need for regular clearance. Seventy-six SMC works were implemented, seventeen sampled. Structures included staggered trenches and percolation tanks across multiple ranges. While dimensions largely matched records, depth deviations, siltation, overflow damage, and erosion of stone packing reduced effectiveness. Regular desilting and repair were strongly recommended. Seven construction activities were undertaken, all in Yeleswaram, one sampled. Six RCC boundary pillars at Lingamparthi RF were verified and found intact and functional (1.20 m × 0.30 m × 0.45 m). Fifty-eight activities fell under "other works," with twelve sampled. Sanction orders, estimates, and registers largely matched expenditures. Records were properly maintained and audited, ensuring transparency and compliance. However, missing estimates and registers in Rampachodavaram and Sudikonda limited verification of some activities.

20. Narsipatnam Division

In 2017–18, Narsipatnam division implemented a total of 103 CAMPA activities, of which 27 (21 %) were sampled for monitoring and evaluation, with the highest number of activities in Narsipatnam range (27; 8 sampled), followed by KD Peta (18; 4), Chintapalli (22; 4), Lothugedda (8; 3), Marripakala (4; 2), Sileru (21; 4), and RV Nagar (3; 2), and by type, "Other works" dominated (55; 13 sampled), followed by maintenance (31; 7), plantations (10; 3), and protection (7; 4), while no soil and moisture conservation or construction activities were undertaken.

Of the ten plantations, three were sampled and showed variable performance, with KD Peta's B. Kothuru site exhibiting good survival of 80–93 % and satisfactory growth of 3.5–6.5 m height and 29–41 cm girth, Lothugedda's Kotha Regallu site recording good survival of 70–77 % with weak growth below 1.1 m height and 11–19 cm girth, and Sileru's Gummirevula site achieving strong survival above 75 % and growth of 3.7–4.9 m height and 27–36 cm girth, while perambulation revealed minor discrepancies in area due to rocky or degraded patches or misaligned boundaries (B. Kothuru –0.73 ha; Kotha Regallu +1.26 ha; Gummirevula +0.78 ha), plantations were generally healthy and pest-free, grazing pressure was minimal, fire lines were created, VSS involvement was observed in KD Peta and Lothugedda but absent in Sileru, and plantation boards and journals were often missing, limiting monitoring.

Thirty-one maintenance activities, seven sampled, were carried out across ranges including weeding, casualty replacement, coppice management, pruning, saucer formation, and fire line upkeep, which were generally executed as planned, although missing boards and incomplete journals limited effective oversight. Seven protection works, four sampled, primarily involved fire line creation, with Narsipatnam range achieving 1,500 rmt well maintained, Chintapalli 1,000 rmt with poor visibility, Marripakala 970 rmt with poor visibility, and RV Nagar 2,000 rmt overgrown and requiring urgent clearance, highlighting uneven upkeep. Fifty-five "Other" activities, thirteen sampled, were verified for financial compliance, with sanction orders matching expenditures, internal and AG audits conducted, but documentation gaps persisted in work registers and estimates across RV Nagar, Chintapalli, KD Peta, Marripakala, and Narsipatnam. Overall, plantation performance varied, maintenance operations were largely

satisfactory, protection works were uneven, financial compliance was strong, yet record-keeping gaps remained.

21. Paderu Division

In 2017–18, Paderu division implemented a total of 212 CAMPA activities, of which 49 (23 percent) were sampled for detailed monitoring and evaluation. Ten plantations undertaken and three monitored across Pedabayalu (T), Paderu FRO-III, and Pedabayalu FRO-VI ranges, where species planted included *Acrocarpus fraxinifolius*, *Grevillea robusta*, and *Syzygium cumini*, achieving survival rates of 79.33 percent at Seekari and 82.64 percent at Peddapadu for *Acrocarpus fraxinifolius*, 76.85 percent for *Grevillea robusta*, and 62.8 percent for *Syzygium cumini* at Thotalagondhi with *Acrocarpus fraxinifolius* at 90.9 percent, while growth ranged from 1.86 to 10.78 meters in height and 23 to 36 cm in girth, and area verification revealed all three plantations exceeded recorded extents (Seekari 21.77 ha vs. 20 ha, Peddapadu 29.05 ha vs. 20 ha, Thotalagondhi 23.24 ha vs. 20 ha), highlighting the need for GIS-based record reconciliation despite overall healthy plantation conditions with no pest or disease issues observed.

Maintenance accounted for 76 activities with 20 sampled across ranges, involving weeding, soil tilling, inter-ploughing, coppice management, pruning, fire line upkeep, and fertilizer application, which were largely executed satisfactorily, enhancing plantation health and survival, although damaged or missing plantation boards and journals with untimely updates were noted, and recommendations included intensified control of *Lantana camara*, systematic fertilizer application, timely replanting of casualties, and strengthened demarcation. Three protection works were undertaken, with one sampled in Araku (T) range, where a 3-meter wide, 1,734 m long fire line was established in Tadda village matching sanctioned specifications, though moderate weed growth reduced visibility and indicated the need for regular clearance. One hundred and twenty-three "Other" activities were implemented, of which 25 were sampled, and verification confirmed that sanction orders, estimates, and registers were properly maintained and aligned with expenditures, with internal (Conservator of Forests) and external (Accountant General) audits confirming compliance, ensuring transparency and accountability in financial and administrative management despite the limited ecological contribution of these works.

22. Visakhapatnam Division

In 2017–18, the Visakhapatnam division, covering 315.25 km² of predominantly dense forest, implemented a total of 147 CAMPA activities, of which 36 (24 percent) were sampled for monitoring and evaluation, with the majority of works falling under "other activities" (90), while ecological interventions were distributed across plantations (10), maintenance (40), protection (3), soil and moisture conservation (3), and construction (1), reflecting a strong administrative tilt but continued emphasis on ecological resilience and forest sustainability.

Plantations remained a key intervention, with 10 sites established and four evaluated, where performance varied substantially, as the teak plantation at Rellabanda (Chodavaram) demonstrated excellent establishment with survival above 83 percent and trees reaching heights over 10 m and girths exceeding 40 cm, Krishnapuram plantation (Ananthagiri) fared moderately with 58–67 percent survival and growth up to 5.4 m, and Nallaregupalem (Visakhapatnam) achieved 57–65 percent survival with 3.8–6.9 m height, the Damsarai plantation (Ananthagiri) performed poorly with survival below 20 percent and seedlings under 1 m due to shallow, rocky soils, while area

verification revealed discrepancies with Rellabanda and Nallaregupalem exceeding sanctioned extents by 4.34 ha and 5.94 ha respectively, and Krishnapuram and Damsarai showing shortfalls, highlighting the need for precise GIS-based demarcation, though field inspections confirmed trees were generally healthy, pest-free, and resilient, indicating sound silvicultural practices where sites were suitable.

Maintenance accounted for 40 activities, with nine sampled, and standard operations such as casualty replacement, inter-ploughing, soil working, pruning, coppice management, and fire line upkeep were applied, helping reduce competition and improve bole formation, but evaluation revealed inconsistencies in weeding, fertilizer application, and pruning, damaged or missing display boards, and gaps in plantation journals, suggesting the need for extended maintenance cycles, stronger boundary demarcation, and more systematic weed control. Protection was minimal with three activities, one sampled, including a 3 km × 3 m fire line in Ananthagiri that was executed to specification with fire watchers deployed, yet scale remained inadequate given the ecological sensitivity of the forests. SMC works were limited to three activities, one sampled, with a mini percolation tank in Parawada found structurally sound but silted, reducing storage capacity and indicating the need for regular desilting to maximize ecological benefits. Construction was confined to a single activity, renovation of a 750 m gravel road in Kambalakonda Park Nursery, which improved staff movement and visitor access. Financial management was strong, with sanction orders and expenditure statements properly maintained and audited internally by the Conservator of Forests and externally by the Accountant General, although gaps persisted in work register availability, plantation journals were irregularly updated, and several boards required repainting or replacement to improve visibility and monitoring.

23. Vizianagaram Division

In 2017–18, Vizianagaram division implemented 154 CAMPA activities, of which 32 (20 percent) were sampled for detailed monitoring and evaluation. Nine plantations were taken up, with three sampled across Vizianagaram, Saluru, and Kurupam ranges. Survival was high: *Tectona grandis* 81.25 % at Kumbivalasa (Vizianagaram), *Gmelina arborea* 89.25 % at Narlavalasa (Saluru), and mixed species (77–84 %) at S.K. Padu (Kurupam). Growth was healthy, with heights between 4 and 10 m and girths up to 45 cm. Area verification showed consistent overestimation: Kumbivalasa (10 ha vs. 19.38 ha), Narlavalasa (10 ha vs. 10.12 ha), and S.K. Padu (10 ha vs. 10.01 ha). Health was good, with no pest/disease issues and negligible grazing.

Thirty-three maintenance activities were implemented, with eight sampled. Execution was satisfactory, though boards were damaged or missing in some sites. Records required more timely updating, particularly in Sangamguddi (Anantagiri), where plantation land was allocated to villagers. Seven protection works were undertaken, with one sampled (Kurupam). Fire line works (3 m × 2000 m) were functional but obscured by moderate weed growth. Seven SMC works were taken up, with two sampled in Saluru. Check dams and percolation tanks were found intact and functional, though regular de-siltation was recommended. Ninety-eight "Other" activities were implemented, 20 sampled. Verification confirmed financial compliance and transparency.

24. Srikakulam Division

In 2017–18, Srikakulam division implemented 134 CAMPA activities, of which 30 (22 percent) were sampled for detailed monitoring and evaluation. Six plantations were taken up, with two

sampled in Kasibugga and Palakonda ranges. Teak (*Tectona grandis*) survival was high—88.64 % at Hunnali (Kasibugga) and 90.77% at Haripuram–Pallapuram (Palakonda). Heights ranged 4–9 m and girths 20–35 cm. Area verification showed Hunnali (10 ha vs. 13.02 ha, excess) and Haripuram–Pallapuram (5 ha vs. 4.71 ha, shortfall). Overall plantation health was good, with negligible biotic interference.

Seventeen maintenance activities were undertaken, with three sampled. Works were well executed, with boards intact and journals maintained. Recommendations emphasized more frequent pruning and regular updating of records. Twenty-four construction activities were taken up, five sampled. These included bamboo turtle shelters (seasonally relocated) and a children's park at Telineelapuram Bird Sanctuary. While shelters served their purpose, their seasonal relocation requires better documentation. The children's park was functional but needed minor repairs. Eighty-seven "Other" works were taken up, 20 sampled. Financial propriety was confirmed through internal and external audits.

VII. SUMMARY OF FINDINGS

Introduction

The Monitoring and Evaluation of CAMPA activities implemented and sampled across Andhra Pradesh in 2017–18 reads like a quilt of successes and struggles, each division telling its own story of hope, effort, and lessons learned in many shades. In some divisions, plantations thrived where species and site were perfectly matched, painting bright patches of green across the landscape. In others, the same species faltered in rocky soils, on waterlogged patches, or under relentless grazing, leaving behind faded squares in the pattern. Maintenance and protection added their own threads strong and clear in some places, frayed and broken in others. Soil and Moisture Conservation work appeared like small but vital stitches, holding the fabric together where they were well-kept, but loosening quickly when clogged or abandoned. Construction activities provided firm anchors in the design, while "other works" filled gaps with compliance, though not always with ecological richness.

Across this quilt, the role of communities stood out like embroidery: in villages where people were engaged, plantations were guarded, records updated, and sustainability ensured. Where communities were absent, threads came loose plantations weakened, boundaries blurred, and protection faltered. Financial compliance remained one of the stronger panels in the quilt, neat and orderly, but the ecological stitching often showed gaps: mismatches between records and reality, missing boards, and weak documentation.

Together, these lessons do not weave a perfect picture, but they reveal a landscape of learning. They remind us that the strength of CAMPA lies not in numbers alone but in the harmony of species choice, careful maintenance, community participation, and long-term ecological care.

Activity Wise Observations

Plantations were often the most visible symbols of effort, but their survival told a mixed tale. Some species like *Pterocarpus santalinus*, *Terminalia arjuna*, *Hardwickia binata*, *Sterculia urens*, and *Azadirachta indica* stood tall where soils were deep and conditions right. In such places, saplings stretched skyward with confidence. But where they were planted in rocky soils, on waterlogged patches, or in drought-prone sites, many poorly performed, their growth stunted or their survival lost. Red Sanders and bamboo told stories of struggle, reminding everyone that species must be matched to the site.

Maintenance, meant to be the supporting hand for young plantations, was present almost everywhere but faltered in consistency. Boards naming the plantations went missing, weeds crept back into cleared patches. Some fences stood as guardians but quickly broke down without upkeep. Records, too, were kept in ledgers but not always reflected on the ground.

Protection fire lines initially drawn with care were often left unattended, soon overgrown, or incomplete.

Soil and Moisture Conservation (SMC) work appeared unevenly across divisions. In some places, structures held water and stabilized soil, quietly strengthening plantations. But too often, they clogged with silt, eroded, or fell into disrepair, their promise fading without regular desilting or repair.

Construction activities gates, pillars, animal orphanage sheds, eco-tourism facilities—were generally solid and useful.

"**Other works**," which dominated in many divisions, were financially compliant and visible, but they sometimes left behind only paperwork rather than ecological impact. On the financial front, most divisions told a positive story. Audits were clean, and expenditures tracked well. Yet the ground told a different truth: plantations often spread wider or narrower than records suggested, showing persistent mismatches between maps and reality. Without proper GIS verification and timely journal updates, these gaps remained.

Finally, the role of people communities through VSS/JFMC stood out. Where they were present, forests breathed easier: saplings were protected from cattle, weeds were cleared, and boundaries respected. Where they were absent, plantations bore the scars of grazing, encroachment, or neglect.

Division Wise Insights

The CAMPA journey across Andhra Pradesh in 2017–18 reads like a patchwork quilt of successes and struggles, each division telling its own story of hope, effort, and lessons learned.

In **Chittoor East**, two villages Thimmasamudram and Rayalacheruvu stood as stark contrasts. At Thimmasamudram, the red earth cradled *Pterocarpus santalinus* saplings into flourishing stands, while at Rayalacheruvu, the same species withered into near-total collapse. The story here was not about chance, but about how site and soil dictate life or death for plantations. Fire lines were drawn but soon blurred under weeds, while soil and moisture conservation works were almost absent. The financial books looked neat, but maps told a different story: plantation areas on paper rarely matched those on the ground. Without the hands of the community to guard them, many plantations stood vulnerable.

In **Chittoor West**, hardy warriors like *Hardwickia binata* and *Terminalia arjuna* thrived, their resilience shining through. Red Sanders, however, faltered in places, reminding managers that even prized species cannot survive without the right site. Maintenance was better than in the East, but solar fences sagged and SMC works were invisible. Once again, strong accounting masked ecological gaps, and community voices were faint.

Rajampet offered a tale of contrasts within a single division. At S.R. Palem, plantations thrived with exemplary survival, while Shikaripalem told the opposite story of poor growth. Fire lines and cairns stood tall, but soil and moisture structures, though once useful, lay choked with silt. Here too, the ledgers balanced, but journals and signage often went missing, as if the narrative of plantations was left half-written.

The **Tirupati Division** turned its attention away from new plantations and towards care maintenance, fire protection, and soil conservation. Fire lines were impressive in their reach and design, but soil conservation works crumbled under structural weakness. Records continued to diverge from reality, creating shadows over otherwise commendable efforts.

Farther south in **Nellore**, some species *Sterculia urens*, *Syzygium cumini*, *Dolichandrone crispa* rose strong and tall, while Red Sanders once again proved stubborn in unsuitable soils. Maintenance was better, but plantation boards disappeared from sites, leaving visitors unsure

of what had been planted. SMC structures helped but were clogged with silt. The division spent more on "other works," which ticked financial boxes but offered little ecological narrative.

In **Kadapa**, neem and *Senegalia chundra* made modest progress, while Red Sanders languished. Fire lines were functional, but no soil conservation works were attempted. New gates and pillars marked boundaries strongly, and finances held steady, yet technical follow-through was thin.

Proddatur's story was one of mismatches: plantations sometimes thrived, sometimes faltered, but more consistently, the areas on the ground never quite matched the records. Maintenance works were visible, but missing boards and incomplete journals weakened their trace. Fire lines and fences offered some protection, and SMC structures stood but needed care.

In **Ananthapuramu**, the Kalyandurga plantations managed good survival, yet grazing, pest outbreaks, and the absence of community involvement dimmed their prospects. Fire lines and boundaries were there, finances intact, but the soil conservation story was weak and fragmented.

Moving into the **Rayalaseema belt**, **Giddalur** spoke almost solely of fire lines and miscellaneous works; plantations were not attempted, nor soil interventions. Fire lines, though, were neat and functional. **Kurnool** showed resilience, with native deciduous species doing well, but paper records told different stories than the forests revealed.

Nandyal's voice was faint, with only a handful of maintenance works and no plantations, protection, or construction. The absence of boards and signage made it even harder to trace what had been done.

In **Atmakur**, bamboo and *Pongamia* were tended with mixed results. Fire lines cut clear paths and small SMC works proved useful, while construction of an animal orphanage shed added a rare conservation touch. Yet documentation again left the picture incomplete.

Markapur faced outright plantation poor performance, undone by unsuitable soils and poor aftercare. Maintenance was ineffective, protection and SMC were present but not nurtured, and records once more mismatched to the ground.

By contrast, **Guntur**'s plantations of *Azadirachta indica* rose with healthy survival. Fire lines burned clear, gates and pillars stood tall, but behind them records and signage remained sparse.

The **Krishna Division** wove a mixed tale: fertile soils yielded lush plantations, but elsewhere growth was modest. SMC works eroded away, and mismatched maps persisted. Where communities were engaged, success was visible; where they were absent, vulnerability grew.

The **Eluru Division** provided one of the brighter stories, with plantations thriving across the board. Fire lines cut sharp boundaries, SMC works supported soil stability, though silt threatened their strength. Still, record-keeping lagged behind the ecological success. **Eluru WLM**, meanwhile, poured effort into maintenance and recreational infrastructure, ensuring healthy plantations but neglecting ecological restoration.

In **Chintur**, plantations collapsed under the weight of poor site choice, grazing, and lack of protection. Fire lines overgrew, SMC structures poorly performed, but patches of natural regeneration hinted at nature's quiet resilience.

Kakinada lived with mixed outcomes: strong growth in some places, pest-ravaged poor performance in others. Maintenance and protection were visible, but poor documentation weakened confidence in outcomes.

In **Narsipatnam**, survival varied, areas on the ground rarely matched the records, and fire lines were overrun with weeds. Some communities participated with enthusiasm, others not at all, leading to uneven results.

Paderu told a happier story: plantations thrived, grazing and pests were minimal, and fire lines were well-kept. Interestingly, field verification revealed larger plantation areas than those recorded, a rare surplus. Community participation, though, still varied.

The **Visakhapatnam Division** offered perhaps the widest contrasts: some plantations grew strongly, others poorly performed completely. Maintenance was evident but patchy, SMC works clogged, and construction minimal. Financial management was solid, but documentation was not.

Vizianagaram emerged with high survival, bolstered by effective soil and moisture conservation. Yet even here, record-keeping faltered, and maps again did not align with the forests.

Finally, **Srikakulam** crowned the story with plantations boasting survival rates close to 90%. These were healthy, well-protected, and complemented by construction works that added both ecological and recreational value. Yet even here, the old refrain echoed: the numbers on paper and the reality on the ground still differed.

VIII. RECOMMENDATIONS

During 2017–18, CAMPA activities were implemented across 24 forest divisions in Andhra Pradesh, covering a wide spectrum of works such as plantations, maintenance, protection, soil and moisture conservation (SMC), construction, and other related interventions. These initiatives aimed to not only restore ecological balance but also generate local employment, strengthen rural livelihoods, and promote community stewardship through Vana Samrakshana Samithis (VSS) under the Joint Forest Management (JFM) framework. The findings highlight significant achievements in terms of fund utilization, plantation establishment, and community engagement, while also identifying areas requiring improvement particularly in species–site matching, maintenance consistency, and documentation standards. By analyzing both strengths and shortcomings, this report aims to provide actionable insights and recommendations to guide future CAMPA planning and enhance the ecological and social impact of forest restoration initiatives in Andhra Pradesh.

Strategic Recommendations for Strengthening CAMPA Implementation

1. Enhance Species Site Planning: Select species based on soil type, topography, moisture availability, and ecological suitability to maximize survival and growth. Avoid species site mismatches that have repeatedly resulted in poor plantation performance. Develop and enforce standardized species–site matching protocols using soil health data, hydrological maps, and climate projections, emphasizing native and climate-resilient species mixtures over monocultures.

2. Rebalance Activity Portfolios for Ecological Impact: Ensure that each division allocates adequate resources to core ecological activities plantations, soil and moisture conservation (SMC), and protection. Establish minimum thresholds for these activities in annual plans, while capping "Other works" to prioritize interventions that deliver direct ecological benefits.

3. Standardize Maintenance and Protection: Adopt uniform maintenance protocols across all divisions, including timely weeding, pruning, fertilizer application, fire line upkeep, and boundary repairs. Extend maintenance support for a minimum of 3–5 years post-plantation to ensure establishment success. Guarantee that fencing and protective structures are functional, regularly inspected, and integrated with seasonal fire and invasive species management schedules.

4. Expand and Sustain Soil and Moisture Conservation (SMC) Measures: Scale up SMC interventions such as percolation tanks, contour trenches, check dams, and water harvesting ponds, particularly in erosion-prone and drought-affected areas. Institutionalize periodic de-silting, repair, and performance monitoring to maintain long-term hydrological effectiveness.

5. Strengthen Documentation, Transparency, and Geospatial Verification: Mandate GIS-based mapping and GPS-enabled perambulation to verify plantation boundaries and survival status. Digitize plantation journals, maintenance records, and monitoring reports through mobile-based applications. Introduce display boards with QR codes linking to digital records for transparency and real-time tracking.

6. Promote Community Engagement and Local Ownership: Enhance the involvement of Vana Samrakshana Samithis (VSS) and Joint Forest Management Committees (JFMCs) in

plantation establishment, maintenance, and monitoring. Strengthen community awareness through training and livelihood-linked interventions to build ownership and accountability for conservation outcomes.

7. Integrate Monitoring and Adaptive Management; Establish routine ecological monitoring systems to detect pest attacks, grazing pressures, and infrastructure deterioration. Use data-driven feedback loops to adapt management strategies dynamically and ensure responsive intervention planning.

8. Build Capacity and Technical Competence: Conduct structured training programs for field staff and VSS members on silvicultural practices, SMC structure maintenance, pest management, and record-keeping. Encourage technical excellence and innovation in plantation and ecosystem management.

9. Align Construction Works with Ecological Objectives: Prioritize construction activities that directly contribute to ecological restoration such as water conservation structures, nursery infrastructure, and eco-restoration facilities ensuring that all capital investments complement plantation and SMC objectives.

10. Leverage Technology for Monitoring and Public Engagement: Deploy centralized, GIS-enabled dashboards for real-time tracking of CAMPA projects, integrating remote sensing and field data. Explore eco-development initiatives like community-based eco-tourism and NTFP value addition to link conservation with local livelihoods.

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.