

## **The implementation of the tree replacement project in the province of Kalinga: Basis for action plan development**

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### **ABSTRACT**

This study assessed the implementation of the Tree Replacement Project in the Province of Kalinga under Joint Memorandum Circular No. 01, series of 2014, focusing on implementation status, strengths and best practices, issues and challenges, and the development of an action plan. A concurrent mixed-methods design was employed, combining documentary analysis, survey data, and qualitative interviews or focus group discussions. Quantitative data were drawn from agency records and analyzed using descriptive statistics, while qualitative data were analyzed through thematic analysis. Findings showed that the project achieved full compliance in 2023, when 19,500 replacement seedlings were planted for 315 trees cut, but compliance declined to 48.50% in 2024 and 20.00% in 2025. Qualitative findings identified inter-agency coordination, nursery capacity, and early planning as strengths, while weak monitoring, inconsistent documentation, funding constraints, and operational delays emerged as major challenges. The study found that implementation gaps were primarily process-related rather than capacity-related. It concludes that project success should be assessed not only by the number of seedlings planted, but also by survival, maintenance, site suitability, and long-term ecological outcomes. An action plan was proposed to strengthen coordination, monitoring, documentation, and post-planting management.

**Keywords:** Tree Replacement Program, concurrent mixed-methods, thematic analysis, implementation assessment, inter-agency coordination, environmental management.

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### **INTRODUCTION**

With deforestation and climate change being the order of the day, Tree Replacement initiatives have emerged as a key strategy for reclaiming natural habitats. To maintain ecological balance, new trees are planted to offset those cut down for development or other reasons. To mitigate this ecological loss, "Tree Replacement" has emerged as a vital policy and environmental strategy to maintain the balance of the carbon cycle and preserve biodiversity.

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In the Philippines, tree-cutting projects, especially those connected with infrastructure and development, must replant the trees. Trees are cut to pave the way for roads, buildings, and other structures as cities and towns expand, causing biodiversity loss, soil erosion, and additional carbon emissions. Tree replacement initiatives aim to offset such impacts by planting new trees in areas where old trees were removed, maintaining ecological stability and sustainability. The DENR mandates that several new trees should be planted for every tree removed, often prioritizing native species. These new trees are selected with careful consideration of local conditions to mitigate urban heat, support wildlife habitats, and improve air quality.

To make a tree replacement project successful in a community, the Department of Public Works and Highways (DPWH), the Department of Environment and Natural Resources (DENR), and the Department of Social Welfare and Development (DSWD) joined hands by implementing Joint Memorandum Circular (JMC) 01, 2014. The DPWH and DENR jointly inspected the damaged trees and identified the number of replacements required prior to road construction.

The replacement program provides for the planting of one hundred (100) seedlings/saplings/progeny as a replacement for each tree cut within or along the road right-of-way of all DPWH-administered infrastructure projects. For this purpose, the DPWH shall transfer funds to the DENR, which shall be utilized to implement the tree replacement involving Pantawid Pamilya Pilipino Program (4ps) beneficiaries and/or poor communities in the project areas. In support of their livelihoods and environmental responsibility, the DSWD encouraged local communities, especially Pantawid 4Ps beneficiaries, to engage in tree planting and nurturing activities. Local government offices assisted, while the technical support came from the DENR, with regular monitoring done to promote the survival of the newly planted trees. Through this partnership, the community not only regained lost greenery but also benefited economically and socially from the project, aiming to conserve biodiversity and mitigate environmental pressure.

In a bid to ensure compliance with the tenets of sustainable development and the National Government's convergence policy, the project will be undertaken by the three agencies, leveraging their respective resources, capabilities, and know-how. Similarly, the project will also be offering a suitable livelihood intervention to qualifying communities within the project area. Priority will be accorded to communities or households whose livelihoods or homes were impacted by infrastructure projects. Additionally, the project will help achieve the National Greening Program (NGP) and the Millennium Development Goals, including the eradication of extreme poverty and hunger and the promotion of environmental sustainability. Brancalion and Holl (2020) explained that more and more initiatives at global, regional, and national levels suggest planting millions, billions, or even trillions of trees as an easy fix to solve intricate environmental issues and adding tree cover in the right places and contexts can be a useful contribution to the ecological and social health of our world.

Ahmadzai et al. (2022) found that the greatest strength of the current policies and strategies is that they are being revised to accommodate demographic shifts and the industry's real needs. Furthermore, Salinas et al. (2022) stated that this condition presents a window of opportunity to implement forest management measures to achieve environmental goals while enhancing social development and supporting local livelihoods. One of the projects our government has undertaken to promote environmental conservation and protection is the Tree Replacement Project. Therefore, research on such a project will be considered necessary. The DPWH, DENR, and DSWD have joined forces to implement the tree replacement program pursuant to JMC 01, 2014. Even if the program is much needed for environmental sustainability and climate change mitigation, the actual application of these guidelines in the Province of Kalinga remains questionable.

There is little insight into how well the guidelines are being implemented and whether the desired results are being reflected in tree survival rates, community engagement, and environmental impact. The research seeks to ascertain challenges, gaps, and areas of improvement in the implementation process to make the project more successful within the province.

#### Statement of the problem

The study assessed the implementation of the JMC 01 series of 2014 in the Province of Kalinga.

Specifically, sought to find answers to the following questions:

1. What is the profile of respondents as to age, gender, agency, position/rank, and years in service?
2. What is the implementation status of Joint Memorandum Circular No. 01, series of 2014, based on the total number of trees cut, total number of trees planted, and trees planted for replacement from 2023 to 2025?
3. What strengths and best practices can be identified in the implementation of the JMC 01 series of 2014 Project in the province?
4. What are the issues and challenges encountered in the implementation of the Joint Memorandum Circular No. 01 series of 2014 in the Province of Kalinga?
5. What action plan may be developed to improve the implementation and sustainability of JMC 01 series of 2014 in the Province of Kalinga?

#### METHODOLOGY

This study employed a concurrent mixed methods design in which quantitative and qualitative data were collected during the same phase of the investigation and initially analyzed as separate strands prior to integration for interpretation. The quantitative strand utilized a descriptive research approach to present the profile of the respondents and the implementation profile of Joint Memorandum Circular No. 01, series of 2014, specifically focusing on the number of trees planted, trees cut, trees required for replacement, and the level of compliance with the replacement requirement. In parallel, the qualitative strand adopted a basic qualitative approach to examine the strengths and best practices of the project, the issues and challenges encountered during implementation, and to generate inputs for the proposed action plan. This design was deemed appropriate because both numerical data and participant narratives were gathered within the same timeframe, analyzed independently, and subsequently integrated to provide a comprehensive explanation of project implementation and sustainability in the Province of Kalinga.

The study was conducted in the Province of Kalinga, including Tabuk City, with particular focus on areas where tree replacement activities associated with infrastructure and development projects have been implemented. The participants of the study were selected through purposive sampling to ensure that only individuals directly involved in and affected by the Tree Replacement Project were included. This sampling approach ensured that all respondents possessed first-hand knowledge of the processes under investigation, thereby enhancing the relevance and credibility of the data collected. A total of 32 participants were included in the study, with representation from three key implementing agencies. Specifically, 15 participants or 46.9% were from the Department of Environment and Natural Resources, 12 participants or 37.5% were from the Department of Public Works and Highways, and 5 participants or 15.6% were from the Department of Social Welfare and Development Kalinga,

resulting in a total of 32 participants or 100%. The inclusion of these agencies was justified by their defined roles in the Tree Replacement Program under Joint Memorandum Circular No. 01, series of 2014. The Department of Public Works and Highways was included as the project generating and funding agency responsible for infrastructure activities that necessitate tree cutting and replacement. The Department of Environment and Natural Resources was included as the technical and environmental agency tasked with tree inventory, site identification, species recommendation, monitoring, and evaluation. The Department of Social Welfare and Development was included due to its role in social preparation, beneficiary selection, and community participation in program implementation. Given that the program is designed as an inter agency undertaking, the inclusion of these three agencies was necessary to obtain a comprehensive understanding of how tree replacement policies were implemented in practice.

The instruments utilized in this study consisted of a survey questionnaire and an interview guide. The survey questionnaire was designed to gather quantitative data on the respondents' profiles, including age, agency affiliation, position or rank, years in service, and relevant trainings attended. It also collected numerical data related to the implementation of Joint Memorandum Circular No. 01, series of 2014, particularly the total number of trees planted, the total number of trees cut, and the number of trees planted for replacement from 2020 to 2025. Complementing this, the interview guide was employed to collect qualitative data focusing on the strengths and best practices in implementation, the issues and challenges encountered, and inputs for the proposed action plan aimed at improving the implementation and sustainability of the Tree Replacement Project in the Province of Kalinga.

The data gathering procedure commenced with the researcher securing approval from the heads of the concerned offices. Formal letters of request were sent to relevant agencies, particularly the Provincial Environment and Natural Resources Office and other implementing offices, followed by personal visits to facilitate communication, secure authorization, and obtain documentary or hard data. The records gathered included tree cutting records, accomplishment reports for replacement activities, monitoring sheets, planting summaries, and related communications. From these documents, the researcher extracted data on the actual total number of trees planted, the total number of trees cut, the number required for replacement, the compliance percentage, and the survival or maintenance status, which served as the quantitative basis for assessing implementation and compliance of the Tree Replacement Program. Following the collection of documentary data, the researcher personally distributed survey questionnaires to the participants. Within the same general period, interviews and or focus group discussions were conducted to validate survey responses and obtain deeper qualitative insights. Respondents were encouraged to clarify their answers and provide additional explanations regarding their practices, strengths, issues, and challenges in implementing the project. Consequently, documentary data provided the numerical foundation for analysis, while participant responses enriched the understanding of contextual and operational dimensions of program implementation. All completed questionnaires, interview responses, and documentary records were subsequently collected, reviewed, and systematically organized for analysis, with all data treated under strict confidentiality.

Ethical standards were rigorously observed throughout the conduct of the study. Prior permission was obtained from the concerned agencies, and participation of respondents was strictly voluntary. All participants were informed of the purpose of the study and provided informed consent prior to data collection. Confidentiality and privacy were maintained by excluding personal identifiers and ensuring that all data were used solely for academic purposes. Information was securely handled to prevent unauthorized access. The study further ensured that participants were not exposed to harm, as all questions were non intrusive, and respondents retained the right to decline participation or withdraw at any time. Accuracy and

integrity were upheld in all stages of data collection, analysis, and reporting, with all sources properly cited to avoid plagiarism.

The analysis of data involved the use of frequency counts to examine quantitative data pertaining to respondents' profiles, including age, gender, agency affiliation, position or rank, years of service, and the number of trees planted, cut, and replaced. Qualitative data were analyzed using thematic analysis, which involved familiarization with the responses, generation of initial codes, grouping of similar codes into categories, development of themes, and interpretation of emerging patterns from the participants' accounts. Consistent with the concurrent mixed methods design, quantitative and qualitative results were initially presented separately. Thereafter, the two sets of findings were integrated to explain how numerical trends were supported and contextualized by the participants' experiences and observations regarding the implementation and sustainability of Joint Memorandum Circular No. 01, series of 2014, in the Province of Kalinga.

## RESULTS AND DISCUSSION

The Results and Discussion are grounded in the data gathered from 32 respondents and in the documentary records of yearly Tree Replacement Program implementation from 2023 to 2025, and these findings are interpreted directly in relation to the objectives of assessing respondent characteristics, examining implementation performance and compliance, and identifying the strengths, best practices, issues, and challenges that shaped program outcomes. The evidence presented combines the respondents' profile data, implementation records on trees cut, required replacement, actual planting accomplishment, and survival or maintenance remarks, together with qualitative responses derived from interviews and open-ended answers that were analyzed through thematic analysis by coding, categorizing, and grouping recurring themes. Because the discussion is anchored on the actual data reported in the study, all numerical values, percentages, frequencies, and compliance figures are retained exactly as presented, and the interpretation focuses on explaining the observed implementation patterns, institutional conditions, and contextual realities surrounding the Tree Replacement Program in Kalinga.

The profile of the 32 respondents shows that the study drew insights from a largely mature, multi-agency, and experienced group of personnel whose roles were directly relevant to program implementation. In terms of age, 0 or 0.00% were aged 18–25, 7 or 21.88% were aged 26–35, 11 or 34.38% were aged 36–45, 13 or 40.63% were Above 45, and 1 or 3.13% was Not indicated, for a total of 32 or 100.00%. This means that most respondents were 45 years old or older at 40.63%, suggesting that the study largely captured the views of older and potentially more seasoned personnel. In terms of sex, 17 or 53.13% were Male, 14 or 43.75% were Female, and 1 or 3.13% was Not indicated, for a total of 32 or 100.00%, showing a slight male majority but still reflecting the participation of both male and female implementers. In terms of agency affiliation, 14 or 43.75% were from DENR, 12 or 37.50% were from DPWH, 5 or 15.63% were from DSWD, and 1 or 3.13% was Not indicated, for a total of 32 or 100.00%. This indicates that the largest share of respondents came from DENR, followed by DPWH and DSWD, reflecting the key institutional actors responsible for technical, infrastructural, and social dimensions of implementation. In terms of Years of Involvement, 13 or 40.63% had 2 years, 5 or 15.63% had 3 years, 4 or 12.50% had 4 years, and 10 or 31.25% had 6 years, for a total of 32 or 100.00%. The largest group therefore had 2 years of involvement at 40.63%, followed by those with 6 years at 31.25%, indicating that the respondents included both relatively newer and longer-serving personnel. Taken together, these data suggest that the study drew from mature and experienced personnel from key implementing agencies, and their varied

positions and designations indicate that both technical and administrative perspectives relevant to program implementation were represented.

The distribution of respondents according to functional category of position or designation further shows that the study captured the multi-level and multi-sectoral nature of program implementation. Forestry and Environmental Technical Personnel, which included Forest Technician I / National Greening Program; CENR Officer; Forester / Forest Utilization; Ecosystem Management Specialist I; OIC, CENR Officer; Sr. Ecosystem Mgt. Specialist; Forester III; Forester I / Forest Utilization Officer; Land Management Officer III / Chief CDS; and OIC, PENR Officer, accounted for 11 respondents or 34.38%. Engineering and Infrastructure Technical Personnel, which included Engineer II; Instrumentation / Focal EIA; Engineer III / Chief Planning and Design Section; Engineering Assistant; Special Agent / Planning and Design Section; Engineer II / Project Engineer; and Engineering Aide, accounted for 9 respondents or 28.13%. Social and Community Development Personnel, which included DMO III / OIC, TSD; DMO III; DMO III / Chief CDS; DMO III / Chief Monitoring and Enforcement; SWO III; and BDO II, accounted for 6 respondents or 18.75%. Administrative and Planning Support Personnel, which included AA II; Planning Development Officer-C; and PPDO-C, accounted for 5 respondents or 15.63%. Not Indicated / Unclassified, where no specific position was reflected in the reported total, accounted for 1 respondent or 3.13%. The total was 32 or 100.00%. These findings show that the largest proportion held forestry and environmental technical positions at 34.38%, followed by engineering and infrastructure technical positions at 28.13%, indicating that most respondents were directly involved in the technical and operational aspects of the Tree Replacement Program. At the same time, the presence of social and community development personnel at 18.75% and administrative and planning support personnel at 15.63% indicates that the study also incorporated the coordinating, facilitative, and support functions required for implementation. This distribution reflects the multi-agency and multi-level character of the program, where effective implementation depends on the interaction of technical execution, administrative coordination, and inter-institutional support. The inclusion of respondents from these varied functional categories therefore strengthens the study because it provides both operational and managerial perspectives on implementation, which is especially important in evaluating environmental and restoration initiatives that require coordinated planning, technical expertise, and institutional collaboration, as also emphasized by McPherson and Kotow (2013) and Rabbai et al. (2012).

The yearly implementation and compliance status of the Tree Replacement Program from 2023 to 2025 reveals substantial variation in performance, indicating that compliance with replacement requirements was uneven and highly sensitive to operational conditions. In 2023, the Total Trees in Inventory / Affected Area was 19500, Trees Cut was 315, Required Replacement was 19500, % Compliance was 100.00%, and the Survival / Maintenance Status indicated that no monitoring remarks were recorded in the 2023 entries, based on Pinukpuk CY2023 + Tabuk CY2023. In 2024, the Total Trees in Inventory / Affected Area was 6980, Trees Cut was 269, Required Replacement was 14400, % Compliance was 48.50%, and the Survival / Maintenance Status was described as Mixed, with some projects fully planted, but several entries noting undisposed seedlings, weather-related damage, typhoon mortality, and one Pinukpuk site still in nursery/not yet identified, based on Pinukpuk CY2024 + Tabuk CY2024. In 2025, the Total Trees in Inventory / Affected Area was 6150, Trees Cut was 516, Required Replacement was 30750, % Compliance was 20.00%, and the Survival / Maintenance Status was also Mixed/ongoing, where one major project showed 6050 planted, one project had 100 planted with 250 remaining, several others were still ongoing or had no planted count yet, and one Pinukpuk entry was still in nursery/not yet distributed, based on Pinukpuk CY2025 + Tabuk CY2025. These data indicate that implementation performance fluctuated sharply across the three-year period. Although the program met replacement targets in one year, the year-to-

year pattern reveals weaknesses in continuity, field execution, and post-planting monitoring. This supports the broader argument that environmental rehabilitation programs cannot be judged only by policy mandates or planting targets, but must also be assessed in terms of coordinated implementation, monitoring systems, and institutional consistency, as discussed by Yuan et al. (2021).

The 2023 data indicate the strongest reported implementation performance in the three-year period. A total of 315 trees were cut, generating a required replacement obligation of 19,500 seedlings, and records show that 19,500 seedlings were actually planted, producing a compliance rate of 100.00%. The corresponding comparative annual figure likewise shows that in 2023, 315 trees were cut, the required replacement was 19,500 seedlings, and the same number was reported as actually planted, indicating full compliance for the year. This result suggests that the program fully satisfied its replacement obligation in terms of reported planting output. However, the Survival / Maintenance Status for 2023 explicitly states that no monitoring remarks were recorded in the 2023 entries, which limits interpretation of the program's ecological effectiveness. While the numerical target was achieved, there is no recorded information on seedling survival, maintenance, or post-planting condition. This means that the result demonstrates administrative or reported compliance, but it does not by itself confirm ecological success or long-term restoration impact. As Marchi et al. (2017) argued, natural resource management outcomes cannot be evaluated solely by accomplishment figures, because they also require consistent and reliable monitoring data to establish whether the intervention is sustained over time. The strong 2023 performance therefore shows that the program was capable of achieving full compliance under favorable implementation conditions, but the absence of monitoring remarks already points to an underlying weakness in documentation and outcome verification.

Implementation performance declined considerably in 2024. Although 269 trees were cut and the required replacement was 14,400 seedlings, only 6,980 were reported planted, resulting in a compliance rate of 48.50%. The comparative annual figure similarly shows that in 2024, the number of trees cut decreased to 269 and the required replacement was 14,400 seedlings, yet only 6,980 were planted, showing a considerable decline in planting accomplishment relative to the required replacement target. The 2024 Survival / Maintenance Status was Mixed, and the remarks specify that some projects were fully planted, but several entries noted undisposed seedlings, weather-related damage, typhoon mortality, and one Pinukpuk site still in nursery/not yet identified. These details indicate that the 48.50% compliance rate was not simply a matter of incomplete paperwork, but was associated with actual field-level implementation constraints. The presence of undisposed seedlings suggests delays or inefficiencies in deployment, weather-related damage and typhoon mortality point to environmental vulnerability, and the unresolved identification of at least one Pinukpuk site indicates deficiencies in site preparation and planning. The decline from 100.00% in 2023 to 48.50% in 2024 therefore reflects a substantial shortfall in fulfilling replacement obligations and shows that compliance weakened when implementation conditions became less favorable. This finding is consistent with Marchi et al. (2017), who emphasized that restoration success depends not only on planting efforts but also on proper monitoring, site suitability, and continuity of implementation support. Thus, 2024 marks a transition from full reported compliance to mixed and constrained implementation, revealing weaknesses in continuity, field readiness, and maintenance arrangements.

The weakest level of compliance was recorded in 2025. During this year, 516 trees were cut, resulting in a required replacement of 30,750 seedlings, yet only 6,150 seedlings were reported as planted, equivalent to a compliance rate of 20.00%. The figure on comparative annual actual trees planted, totals of trees cut, and required replacement likewise indicates that

planting accomplishment did not keep pace with the increasing replacement obligation. The 2025 Survival / Maintenance Status was Mixed/ongoing. Specifically, one major project showed 6050 planted, one project had 100 planted with 250 remaining, several others were still ongoing or had no planted count yet, and one Pinukpuk entry was still in nursery/not yet distributed. These details are crucial because they show that the 20.00% compliance rate did not result from a total absence of program activity, but rather from incomplete and delayed implementation. The gap between 30,750 required replacement seedlings and 6,150 actual planted seedlings indicates that replacement obligations increased substantially, while field accomplishment lagged far behind. The fact that one major project accounted for 6050 of the 6,150 planted seedlings also suggests that accomplishment in 2025 was concentrated rather than broadly distributed across projects. The remaining reports of ongoing activities, no planted count yet, and seedlings still in nursery indicate that implementation bottlenecks persisted between seedling preparation and actual field planting. As Parrotta and Knowles (2001) argued, seedling availability alone is insufficient for restoration success if site readiness, logistics, timing, and maintenance are not properly synchronized. The 2025 data therefore reveal that the central difficulty was not merely the existence of replacement requirements, but the program's limited capacity to execute planting at the required scale within the intended implementation period.

Taken together, the quantitative results show a pattern of full compliance in 2023, followed by a sharp reduction in 2024 and a further decline in 2025. This trend suggests that the Tree Replacement Program could meet legal or administrative replacement requirements under favorable conditions, but that its performance became increasingly inconsistent as field demands expanded and operational constraints intensified. The comparative annual figure reinforces this interpretation by showing that while 2023 achieved full alignment among trees cut, required replacement, and actual planted seedlings, 2024 and 2025 reveal widening gaps between required replacement and actual planting accomplishment. The figure therefore suggests that the program achieved full compliance under more favorable implementation conditions but was unable to sustain that level of performance in the years that followed. This highlights the importance of consistent monitoring, coordinated implementation, and timely field execution in environmental restoration programs. Rodríguez-González et al. (2017) emphasized that long-term environmental management depends on reliable monitoring systems that can track implementation and outcomes over time, while Parrotta and Knowles (2001) argued that successful restoration is shaped not only by the availability of planting materials but also by careful site preparation, proper timing, and sustained management support. Viewed in this context, the declining compliance percentages from 100.00% in 2023 to 48.50% in 2024 and 20.00% in 2025 indicate that the main implementation challenge was not simply the presence of replacement requirements, but the program's capacity to consistently fulfill planting obligations at the required scale. Moreover, as noted in the original interpretation, the "Total Trees in Inventory / Affected Area" variable remained unavailable for comparative assessment of the scale of affected tree resources against the number actually cut, which limits fuller interpretation of resource impact. Overall, the evidence indicates that compliance should not be understood only in terms of required replacement targets or reported planting accomplishments, but also in terms of whether planting is completed on time, monitored adequately, and supported by sustained maintenance measures, as emphasized in broader studies on environmental program implementation and rehabilitation effectiveness such as Marchi et al. (2017) and Yuan et al. (2021).

The qualitative findings help explain why compliance was achieved in 2023 but declined in 2024 and 2025. These findings were derived from interviews and open-ended responses and analyzed through thematic analysis, wherein responses were coded, categorized, and grouped into recurring themes. The themes clarify the implementation practices, strengths,

and challenges that shaped the quantitative results presented in the profile and implementation data. One of the strongest themes that emerged was inter-agency coordination. Respondents repeatedly stressed the importance of improving the coordination mechanism among implementing agencies and strengthening partnerships with local government units. Statements such as “improved coordination mechanism among implementing agencies” and “stronger partnership with both agencies and the local government unit” indicate that coordination exists, but is neither systematic nor sustained. This qualitative pattern aligns with the quantitative evidence, because years with stronger implementation performance, particularly 2023 and 2025, suggest that better coordination may have contributed to higher compliance and replacement output. Even though 2025 recorded only 20.00% compliance, the qualitative interpretation identifies 2025 as a year where coordinated efforts may still have supported portions of implementation, particularly where one major project accounted for 6050 planted seedlings, indicating that coordination may have operated unevenly rather than uniformly across all sites. Respondents from different agencies articulated this theme concretely. DPWH emphasized “Regular coordination meetings and joint field validation (DPWH–DENR–DSWD–LGU) before finalizing plantation sites and work plans to ensure that technical, social, and engineering concerns are addressed simultaneously.” DSWD referred to “Effective tripartite coordination at regional and field levels between DPWH, DENR, and DSWD-SWAD, ensuring technical expertise, environmental compliance, and social protection.” DENR stated that “Effective collaboration among DPWH (Fund and infrastructure projects), DENR (Forestry expertise and site management), and DSWD (engaging Pantawid Pamilya beneficiaries/poor communities) ensures integrated tree replacement with 100 seedlings per cut along RROW.” These responses show that respondents recognized inter-agency collaboration as both an existing strength and a condition that still requires institutional strengthening. The literature supports this interpretation, because collaborative planning and shared implementation strategies have been shown to improve compliance and strengthen environmental program outcomes, especially in large-scale or multi-agency initiatives. In the Kalinga context, coordination with local government units appears particularly important because LGUs support site identification, community mobilization, and monitoring. Inter-agency coordination therefore emerges not only as a best practice, but also as a crucial explanatory factor in why implementation quality varied across years.

A second major qualitative theme was training and capacity building. Respondents mentioned the need for “training and capacity building,” “orientation seminar on JMC,” and “proper training/orientation,” indicating that some personnel may not have had sufficient understanding of the program’s policy guidelines, technical procedures, and operational standards. This theme is directly connected to implementation consistency because even when agencies possess formal mandates and resources, weak technical understanding can lead to uneven compliance, poor documentation, weak monitoring, and inconsistent execution. The theme was further illustrated by agency-specific remarks. CENRO noted that it “Engages poor and marginalized communities in tree planting (100 seedlings per tree cut), providing livelihood opportunities like nurseries and eco-enterprises.” PENRO emphasized the “Adoption of survival-rate benchmarks (for example, 80% survival at Year 3) as a basis for payment or completion, and the use of geo-tagged photos and simple community-based monitoring forms for Kalinga sites.” DSWD highlighted the “Involvement of the beneficiary in the Tree replacement.” These statements indicate that capacity building is not limited to internal technical instruction, but extends to community engagement, the establishment of measurable survival benchmarks such as 80% survival at Year 3, and the use of practical monitoring tools like geo-tagged photos and simple community-based monitoring forms. The significance of this theme lies in its potential to standardize procedures across agencies and

reduce implementation variability. Where personnel and beneficiaries understand the provisions of the JMC, the basis for compliance, and the field documentation required, the probability of consistent implementation increases. This interpretation is supported by literature emphasizing that effective tree management and environmental implementation depend on trained personnel with both technical and administrative competence. Capacity building is therefore not merely an auxiliary activity, but an essential component of implementation quality and institutional reliability.

A third qualitative strength concerns established nursery capacity and early planning. The study identified the program's nursery production capacity and early site identification practices as important best practices, particularly during high-performing periods. The data explicitly state that agencies were capable of producing a large volume of seedlings, as evidenced by the 5,700 seedlings produced in 2025. This indicates that implementing agencies possessed technical and operational capacity for large-scale replacement efforts. Likewise, early planning and advanced site identification emerged as important practices that likely contributed to the strong replacement output observed in 2023. When planting sites are identified in advance and work is planned early, planting activities can be implemented more efficiently and with better compliance. This theme was illustrated by agency-specific practices. DENR recommended to "Maintain a simple matrix per project showing trees cut, the corresponding required replacement, the amount allocated, the amount transferred to DENR/DSWD or community groups, and the physical/financial accomplishments, and update it quarterly." CENRO stated that "Ocular inspection of the planted seedlings will be conducted after the reported tree-planting activities to provide technical assistance, ensure their successful growth, and for documentation purposes." DPWH echoed that "Ocular inspection of the planted seedlings will be conducted after the reported tree-planting activities to provide technical assistance, ensure their successful growth, and for documentation purposes." These responses show that nursery capacity alone is not the main strength. Rather, the combination of seedling production, early planning, clear project matrices, and post-planting ocular inspection creates a stronger foundation for orderly implementation. The literature supports the importance of site preparation and advanced planning in restoration-related programs because these improve both implementation efficiency and the likelihood of successful planting outcomes. The active participation of DPWH, DENR, and DSWD further broadens technical support and institutional responsibility, reinforcing the idea that effective replacement depends on integrated, not isolated, agency action.

Despite these strengths, the qualitative analysis revealed substantial issues and challenges, beginning with funding and resource constraints. Respondents pointed to the need for "additional funding or realignment of local budgets," "Need more funding for the care and maintenance of the seedlings," and "Timely and complete fund transfers from DPWH." These responses indicate that continuity and sustainability are strongly affected by the adequacy and timeliness of financial support. The agency-specific responses made this issue even more explicit. Lower DPWH stated "no fund [ for tree planting activities]." Upper K. DPWH reported "No cost is included in the program of work. Timeliness of requirement submissions from the DENR office; the required 3 days is insufficient for compliance. Insufficient funds." These statements show that funding issues affect several implementation components, including nursery production, planting, maintenance, monitoring, and administrative compliance. Even when targets are numerically met, weak financial support can undermine post-planting care and reduce the survival of seedlings. In practical terms, inadequate or delayed funds can lead to seedlings remaining undisposed, delayed planting schedules, weak monitoring coverage, and incomplete maintenance, all of which are reflected in the mixed status remarks recorded in 2024 and 2025. Previous studies on environmental programs have likewise found that sustained investment and adequate resource allocation are necessary to

ensure successful implementation. In the Kalinga context, delays in fund transfers and lack of maintenance resources likely contributed directly to the implementation gaps and inconsistent performance observed across years. Thus, funding and resource constraints emerge as a central explanatory factor behind the decline from 100.00% compliance in 2023 to 48.50% in 2024 and 20.00% in 2025.

Another major challenge concerns policy and institutional support. Respondents emphasized the need to “create a policy to support the JMC,” improve “policy and oversight enhancements,” and ensure the “issuance of policies supporting the JMC.” These responses suggest that although a legal or administrative framework already exists, there are weaknesses in enforcement, oversight, and institutional translation of policy into operational practice. This means that implementation gaps may stem not only from resource shortages or coordination failures, but also from insufficient institutional backing and weak policy reinforcement. If policies are not translated into clear guidelines, accountability mechanisms, and administrative support systems, agencies may implement the program inconsistently. This is consistent with the fluctuations seen in compliance rates. DSWD stated “Lack of coordination and not aware of the implementation of JMC. No information dissemination regarding the JMC.” CENRO pointed to “Coordination issues, Site and resource constraints, Community engagement barriers, Monitoring and sustainability gaps.” DPWH noted “Not sufficient knowledge or understanding of the provisions of the memorandum on tree replacement.” These responses show that policy support is not merely about having a memorandum in place, but about ensuring that personnel understand it, that agencies are properly informed, and that oversight mechanisms guide implementation consistently. Studies on environmental governance have similarly shown that clear governance structures and consistent policy enforcement are necessary to sustain implementation success. In Kalinga, stronger institutional support could improve accountability, reduce yearly inconsistencies, and standardize how agencies interpret and operationalize the JMC.

Monitoring and evaluation also emerged as one of the weakest yet most important themes in the study. Respondents emphasized the need for “Joint monitoring and evaluation to strongly meet its implementation,” “regular monitoring of activities,” and logistical support for strict monitoring, including vehicles and dedicated staff. These responses indicate that monitoring mechanisms may be weak, irregular, or insufficiently supported. This theme is highly consistent with the quantitative evidence. The 2023 data recorded 100.00% compliance, yet no monitoring remarks were recorded in the 2023 entries, making it impossible to assess survival, maintenance, or ecological impact. In 2024 and 2025, the remarks became more detailed, but they also revealed a series of unresolved field problems such as undisposed seedlings, typhoon mortality, unplanted stocks, and ongoing or incomplete sites. The qualitative responses therefore help explain why implementation remained unstable. Without regular and joint monitoring, agencies are limited in their ability to verify compliance, assess the survival of planted seedlings, and identify field problems requiring corrective action. As a result, the program may focus more on output reporting, such as the number of seedlings planted, than on outcome assessment, such as actual survival and ecological effectiveness. Agency remarks reinforce this conclusion. DPWH stated “strict implementation of the JMC, as it is hard to follow—particularly because the DPWH isn't fulfilling its role.” DENR stated “The JMC was suspended because of the DPWH's failure to fulfill its mandated role. Allocate necessary funding or resources as outlined in the JMC.” DWD reported “Lack of coordination and not aware of the implementation of JMC.” These responses indicate that monitoring and evaluation are inseparable from coordination, compliance, and resource allocation. The literature similarly reinforces that effective forest and environmental management depends on reliable monitoring frameworks, consistent field data, and structured evaluation tools.

Strengthening monitoring and evaluation systems in Kalinga is therefore essential not only for compliance assessment, but also for long-term program sustainability and ecological credibility.

A final major challenge concerns operational and logistical constraints. Respondents identified lack of manpower, maintenance difficulties, and limited transportation and equipment during field implementation. These findings show that practical on-the-ground limitations significantly affect implementation even when planning and policy are already in place. This theme is especially important because tree replacement is inherently field-based and depends on site access, physical labor, transportation, timely deployment, maintenance, and follow-up validation. Without adequate logistical support, implementation may be delayed, fragmented, or left incomplete. This challenge was visible in the 2025 data, where seedlings were prepared but not yet planted, demonstrating a gap between readiness and actual field execution. DSWD reported “No orientation conducted. Lack of inter-agency coordination to involve all programs of DSWD for awareness.” DENR stated “The program's success is limited by environmental conditions, poor site assessment, lack of regular monitoring/ maintenance, and the absence of allocated funds for field plantation establishment.” DPWH noted “Access to the project site, especially in remote areas. The validation schedule between DENR and DPWH is in conflict due to workload.” These agency-specific statements show that logistical challenges are not isolated field inconveniences but structural barriers affecting access, timing, coordination, and completion. Restoration literature emphasizes that successful planting depends on site preparation, operational readiness, and maintenance support, and the Kalinga case confirms that logistical readiness is a decisive factor in turning replacement plans into accomplished and sustainable planting efforts.

Overall, the qualitative analysis reveals that the Tree Replacement Project possesses notable strengths, particularly in inter-agency coordination, nursery production capacity, early planning, and active participation of implementing agencies, indicating that the program has a workable institutional and technical base for implementation. At the same time, the study also reveals significant issues and challenges, including funding constraints, weak policy support, inadequate monitoring and evaluation, delayed planting, inconsistent documentation, and logistical difficulties. These factors help explain the fluctuations observed in the quantitative results, especially the decline from 100.00% compliance in 2023 to 48.50% in 2024 and 20.00% in 2025. Taken together, the findings show that the main issue in the Tree Replacement Project is not the absence of institutional capacity, but the uneven and inconsistent application of implementation processes across agencies, sites, and years. The profile data demonstrate that the respondents represented a broad range of experienced technical, social, administrative, and planning personnel from DENR, DPWH, and DSWD. The implementation data show that while the program was capable of full compliance, that performance was not sustained when financial, logistical, monitoring, and coordination pressures intensified. The qualitative themes deepen this understanding by showing that implementation quality depended heavily on coordinated planning, orientation on the JMC, nursery and site readiness, timely and sufficient funding, institutional support, regular joint monitoring, and operational feasibility in remote and demanding field contexts. These findings directly address the study objectives by explaining both the observable implementation outcomes and the institutional conditions that produced them. They also contribute to the broader field of environmental program implementation by showing that compliance in tree replacement programs must be assessed not only through required replacement figures and reported planting accomplishment, but through the consistency, coordination, documentation, and sustainability of implementation over time. This synthesis provides a strong empirical basis for the next section of the manuscript, particularly in formulating conclusions and action-oriented recommendations for strengthening the Tree Replacement Program in the Province of Kalinga.

## CONCLUSION

The study concludes that the implementation of the Tree Replacement Project in the Province of Kalinga was supported by existing technical systems and inter-agency mechanisms, yet its execution remained inconsistent across implementation periods. Although full compliance was observed in certain years, the overall findings revealed uneven application of critical processes, particularly in planning, documentation, planting schedules, monitoring, and maintenance. These results indicate that the primary implementation issue lies not in the absence of institutional arrangements, but in the lack of consistency in executing the required procedures throughout the entire cycle of tree replacement activities. The findings further emphasize that the success of tree replacement initiatives should not be evaluated solely based on the number of seedlings produced or planted, as planting represents only the initial stage of compliance. A more comprehensive assessment must incorporate factors such as site readiness, species suitability, survival rates, maintenance practices, and long-term ecological outcomes. In this context, delays in planting, incomplete documentation, and weak monitoring systems undermined the credibility of reported compliance and constrained the sustainability of program outcomes.

Moreover, the study identifies key strengths in the program, including active inter-agency participation, sufficient nursery production capacity, and the potential for coordinated implementation. However, these strengths were significantly diminished by operational limitations such as inadequate monitoring mechanisms, insufficient maintenance support, inconsistent documentation practices, and delays in implementation activities. These constraints collectively hindered the program's ability to achieve sustained ecological benefits and effective tree establishment. In response to these findings, the study recommends the strengthening of inter-agency coordination through the institutionalization of regular planning meetings, synchronized implementation schedules, and integrated reporting systems among implementing bodies such as the Department of Public Works and Highways, Department of Environment and Natural Resources, Department of Social Welfare and Development, and Local Government Units. Establishing a standardized monitoring and evaluation framework is also essential to ensure that program performance is measured not only in terms of planting outputs but also in terms of survival rates, maintenance status, growth performance, and long-term site conditions.

The study further recommends the requirement of advance site identification, validation, and preparation prior to tree cutting approval or seedling deployment in order to prevent delays, minimize seedling backlogs, and enhance survival potential under appropriate field conditions. Integrating species suitability and infrastructure compatibility into planning processes is likewise necessary to ensure that selected species align with ecological conditions and surrounding developments, thereby reducing conflicts and promoting long term environmental benefits. In addition, strengthening capacity building initiatives through regular training, orientation, and technical workshops is recommended to improve personnel competence in policy implementation, planting protocols, monitoring procedures, and maintenance responsibilities, which in turn can enhance consistency and accountability. The provision of adequate and timely funding is also critical, not only for seedling production and planting but also for monitoring, maintenance, replacement of non-surviving seedlings, and long-term site management, as sustained financial support is fundamental to ensuring the survival and growth of planted trees.

Finally, the study underscores the importance of reinforcing post planting maintenance and survival monitoring through regular site inspections, watering, protection measures, and

replanting activities, supported by survival audits conducted at defined intervals such as six months, one year, and subsequent periods. It also advocates for the adoption of long-term ecological outcomes as primary indicators of program success, including survival rate, growth performance, canopy development, site stabilization, and overall ecological condition of the replacement areas. Through these integrated conclusions and recommendations, the study affirms that achieving effective and sustainable implementation of the Tree Replacement Project requires a shift from output-based compliance toward a more holistic, process oriented, and outcome driven framework that ensures not only the planting of trees but their successful establishment and contribution to environmental restoration.

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