JURNAL JUKIM Vol 5 No. 04 Juli 2026 | P-ISSN: 2829-0488 E-ISSN: 2829-0518, page. 34-39

Monitoring and Evaluation of Tree Seedling Planting as an Effort to Improve Food Security

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Article History
Received : 15 June 2025
Revised : 30 June 2025
Accepted : 6 July 2025
Published : 7 July 2025

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Cite This Article:
Suprapti, E., Suroto, S., & Susanti, N. (2026). Monitoring and Evaluation of Tree Seedling Planting as an Effort to Improve Food Security. *Jurnal Ilmiah Multidisiplin*, *5*(04), 34–39.

DOI:
https://doi.org/10.56127/jukim.v5i04.2928

Abstract: Climate change and environmental degradation have become significant challenges affecting environmental sustainability and long-term food security. Tree planting programs have been widely implemented as an environmental conservation strategy; however, empirical evaluations of their implementation and effectiveness remain limited. This study aims to evaluate the implementation of a tree seedling planting program conducted through collaboration between the Ministry of Environment and Forestry and three higher education institutions in Indonesia. A Convergent Parallel Mixed Methods approach was employed by integrating quantitative and qualitative data collected through field observations, interviews, documentation, and administrative records. Quantitative analysis assessed planting performance based on the number of seedlings distributed, planted, and surviving, while qualitative analysis explored program implementation and monitoring processes. The findings indicate that all administrative requirements and planting procedures were successfully fulfilled. A total of 12,000 tree seedlings were distributed and planted across three locations, with a 100% survival rate recorded during the monitoring period. Field observations confirmed that geotagging documentation, monitoring activities, and institutional collaboration contributed significantly to program accountability and implementation success. The study concludes that systematic monitoring and evaluation strengthen environmental conservation programs by ensuring planting compliance and supporting environmental sustainability and food security. The findings provide practical implications for improving monitoring mechanisms in future community-based environmental conservation initiatives.
Keywords: Environmental Conservation; Food Security; Monitoring And Evaluation; Mixed Methods; Tree Seedling Planting.

INTRODUCTION

limate change has become one of the most serious global challenges affecting environmental sustainability and food security. Rising global temperatures, prolonged droughts, and increasing environmental degradation have reduced the capacity of ecosystems to support agricultural productivity and human well-being. In Indonesia, these challenges have encouraged the government, educational institutions, and communities to implement various environmental conservation programs, particularly tree planting initiatives, as a strategy to improve ecological resilience and strengthen long-term food security.

Food security is not merely associated with agricultural production but also with environmental sustainability. Law Number 18 of 2012 concerning Food defines food security as a condition in which food is available in sufficient quantity and quality, is safe, nutritious, affordable, and accessible to all members of society in a sustainable manner. Meanwhile, Government Regulation Number 22 of 2021 concerning Environmental Protection and Management emphasizes that environmental conservation, monitoring, and sustainable resource management are essential components in maintaining environmental quality and supporting human welfare. Therefore, environmental conservation through tree planting contributes not only to ecosystem restoration but also to the long-term sustainability of food resources.

Tree planting has become one of the most widely implemented environmental conservation programs in Indonesia. The One Million Trees Movement, initiated by the Indonesian government and continuously promoted by various public institutions, aims to increase forest cover, reduce carbon emissions, improve watershed functions, and mitigate the impacts of climate change. Higher education institutions have increasingly participated in this movement through community engagement activities that involve students, academics, government agencies, and local communities. These collaborative efforts

demonstrate the strategic role of universities in supporting sustainable development goals through environmental action.

Several previous studies have reported positive outcomes of community-based tree planting programs. Ibrahim and Huda (2022) found that tree planting activities involving youth organizations contributed to environmental preservation while increasing community awareness of ecological sustainability. Similarly, Latumahina et al. (2023) reported that the distribution of tree seedlings successfully encouraged community participation in maintaining green environments and improving environmental quality. Hanifah Ikhsani (2021) also demonstrated that tree planting activities represented an effective form of environmental awareness capable of improving ecological conditions within residential areas. These studies consistently indicate that community participation is an important determinant of successful environmental conservation programs.

Despite these findings, previous studies have primarily focused on describing the implementation of tree planting activities or reporting community participation. Limited attention has been given to evaluating whether distributed seedlings were actually planted, whether the designated planting locations complied with program requirements, and whether post-planting monitoring successfully ensured seedling survival. Consequently, empirical evidence regarding the effectiveness of monitoring and evaluation systems in large-scale tree planting programs remains limited.

To address this gap, this study evaluates the implementation of a tree seedling planting program involving three higher education institutions in Indonesia in collaboration with the Ministry of Environment and Forestry. The evaluation focuses on documenting planting locations through geotagging, assessing compliance with planting procedures, monitoring the survival of planted seedlings, and evaluating the overall success of the program in supporting environmental sustainability and food security. By integrating quantitative monitoring data with qualitative field observations using a convergent parallel mixed-methods approach, this study provides empirical evidence regarding the effectiveness of monitoring and evaluation mechanisms for large-scale environmental conservation programs.

The findings are expected to contribute to the development of evidence-based environmental management policies while providing practical recommendations for universities, government institutions, and communities in implementing sustainable tree planting programs that support environmental conservation and national food security.

RESEARCHMETHOD

Research Design

This study employed a program evaluation research design using a Convergent Parallel Mixed Methods approach. This design was selected because it enables quantitative and qualitative data to be collected simultaneously, analyzed independently, and integrated to provide a comprehensive evaluation of the tree seedling planting program. The quantitative approach was used to assess measurable indicators of program implementation, including the number of seedlings distributed, planted, and surviving after planting. Meanwhile, the qualitative approach was applied to examine the implementation process, stakeholder participation, compliance with planting procedures, and field conditions through interviews and direct observations. The integration of both approaches provided a comprehensive assessment of the effectiveness of the tree planting program in supporting environmental sustainability and food security.

Research Setting

The study was conducted in three institutions participating in the national tree planting program in collaboration with the Ministry of Environment and Forestry of the Republic of Indonesia. The research locations consisted of:

1. The National Resilience Institute of the Republic of Indonesia (Lemhanas RI), where tree seedlings were planted in Cidahu, Sukabumi Regency, West Java;
2. Universitas Nusa Putra, where tree seedlings were planted in post-disaster recovery areas in Cianjur and Sukabumi Regencies;
3. Universitas Islam Negeri (UIN) Syarif Hidayatullah Jakarta, where tree seedlings were planted on campus areas in Jakarta and Depok as part of the One Million Trees Campaign.

These locations were selected because they received tree seedlings from the Citarum–Ciliwung Watershed and Protected Forest Management Agency (BPDASHL) and implemented monitoring and evaluation procedures required by the Ministry of Environment and Forestry.

Participants and Unit of Analysis

The unit of analysis comprised institutions and stakeholders directly involved in implementing and monitoring the tree planting program. Key informants were selected purposively based on their involvement in program implementation and monitoring. The participants included:

1. Representatives From Lemhanas RI;
2. Representatives From Universitas Nusa Putra;
3. Representatives From UIN Syarif Hidayatullah Jakarta;
4. Village Officials And Community Leaders Responsible For Planting Locations;
5. Members Of Youth Organizations (Karang Taruna);
6. Students Participating In Tree Planting Activities.

A total of five key informants participated in in-depth interviews to provide qualitative information regarding program implementation and monitoring activities.

Data Collection

Data were collected between the implementation and monitoring stages of the tree planting program using multiple techniques.

Quantitative Data

Quantitative data consisted of administrative records obtained from each participating institution, including:

1. Number Of Seedlings Received;
2. Number Of Seedlings Planted;
3. Number Of Surviving Seedlings;
4. Number Of Dead Seedlings;
5. Planting Completion Records.

These data were used to measure the effectiveness of program implementation.

Qualitative Data

Qualitative data were collected through:

1. Direct Field Observations;
2. Semi-Structured Interviews;
3. Documentation;
4. Geotagged Photographs;
5. GPS Coordinates And Shared Planting Locations.

The qualitative data were intended to verify planting implementation, evaluate planting conditions, and understand stakeholder experiences during the monitoring process.

Research Instruments

The primary research instrument for qualitative data collection was a semi-structured interview guide developed to explore stakeholder perceptions regarding program implementation, monitoring activities, and post-planting maintenance.

Observation sheets were used to verify:

1. Planting Locations;
2. Planting Procedures;
3. Geotagging Documentation;
4. Physical Condition Of Seedlings;
5. Compliance With Ministry Of Environment And Forestry Requirements.

Secondary documents, including administrative reports, planting reports, photographs, and geotagged documentation, were also utilized to validate field findings.

Data Analysis

Quantitative and qualitative data were analyzed separately before being integrated using the Convergent Parallel Mixed Methods procedure. Quantitative data were analyzed using descriptive statistics, including frequencies and percentages, to evaluate the achievement of program implementation indicators such as seedling survival rates and planting completion rates.

Qualitative data obtained from interviews, observations, and documentation were analyzed through data reduction, data organization, thematic interpretation, and conclusion drawing. The findings from both analyses were subsequently compared and integrated to determine the overall effectiveness of the tree planting program and to verify consistency between numerical outcomes and field observations.

Research Framework

The evaluation focused on three principal stages of the program:

1. Pre-planting evaluation, including verification of planting locations, coordinates, and administrative requirements;
2. Planting implementation, including monitoring of seedling distribution and planting activities;
3. Post-planting evaluation, including assessment of seedling survival, maintenance activities, compliance with planting procedures, and documentation using geotagging.

The effectiveness of the program was assessed by integrating quantitative indicators with qualitative evidence obtained during field monitoring.

RESULT AND DISCUSSION

Program Preparation and Planting Site Verification

The first stage of the evaluation focused on verifying administrative requirements and confirming planting locations before the distribution of tree seedlings. The three participating institutions—Lemhanas RI, Universitas Nusa Putra, and UIN Syarif Hidayatullah Jakarta—completed all administrative requirements established by the Citarum–Ciliwung Watershed and Protected Forest Management Agency (BPDASHL). These requirements included submitting official application letters, identifying planting locations through geotagging and geographic coordinates, agreeing not to sell the distributed seedlings, and committing to periodic monitoring and reporting.

Field observations indicated that all designated planting sites had been verified before seedling distribution. The planting locations consisted of conservation land in Cidahu, Sukabumi Regency for Lemhanas RI, post-disaster rehabilitation areas in Cianjur and Sukabumi for Universitas Nusa Putra, and campus green spaces in Jakarta and Depok for UIN Syarif Hidayatullah Jakarta. These locations fulfilled the environmental requirements established by the Ministry of Environment and Forestry.

Monitoring of Tree Seedling Planting

Monitoring activities were conducted to verify whether distributed seedlings had been planted according to the approved planting plan. Documentation using photographs, geotagging, and field observations confirmed that planting activities were successfully implemented at all three research locations. The monitoring process also verified that stakeholders complied with the planting procedures required by BPDASHL, including geotagged documentation and reporting through the official Google Drive system.
The observation results demonstrate that institutional collaboration played an important role in ensuring the successful implementation of the planting program. Coordination among universities, government institutions, and local communities facilitated the distribution, planting, and monitoring processes, thereby improving accountability throughout the program implementation.

Quantitative Evaluation of Planting Success

Table 1 presents the quantitative evaluation of tree seedling planting at the three participating institutions.

Table 1. Evaluation of Tree Seedling Planting

INSTITUTION	SEEDLINGS RECEIVED	SEEDLINGS PLANTED	DEAD	ALIVE
Lemhanas RI	4,000	4,000	0	4,000
Universitas Nusa Putra	4,000	4,000	0	4,000
UIN Syarif Hidayatullah Jakarta	4,000	4,000	0	4,000
Total	12,000	12,000	0	12,000

Source: Research Data (2025).

The quantitative findings indicate that all 12,000 distributed tree seedlings were successfully planted. No seedling mortality was reported during the monitoring period, resulting in a survival rate of 100%. These findings demonstrate a high level of compliance with planting procedures and effective post-planting maintenance conducted by participating institutions and local communities.

Qualitative Findings

The qualitative findings were obtained through interviews with institutional representatives and supported by field observations. The interviews revealed that the participating institutions regarded tree planting as part of their commitment to environmental conservation and climate change mitigation. Stakeholders emphasized that collaboration between universities, government agencies, and local communities

strengthened program implementation and increased public awareness regarding environmental sustainability.

Field observations further confirmed that all planting locations corresponded to the approved geotagged coordinates submitted before seedling distribution. Monitoring activities also demonstrated that participating institutions continuously maintained the planted seedlings after implementation, thereby contributing to the reported survival rate.

In addition, documentation collected during monitoring verified that all required reports had been submitted to the Ministry of Environment and Forestry through the designated reporting system, indicating full compliance with institutional monitoring requirements.

Discussion

The findings demonstrate that systematic monitoring and evaluation play an essential role in ensuring the effectiveness of large-scale environmental conservation programs. The combination of administrative verification, geotagging, field observation, and institutional reporting enabled the researchers to verify that all distributed seedlings were planted at the intended locations and maintained appropriately after planting. These findings support the argument that monitoring should not merely serve as an administrative requirement but should function as an accountability mechanism that ensures program sustainability.

The study also highlights the importance of institutional collaboration in environmental conservation initiatives. The successful implementation of the planting program was facilitated by cooperation among the Ministry of Environment and Forestry, higher education institutions, local communities, and environmental stakeholders. Such collaboration strengthens environmental governance by integrating planning, implementation, monitoring, and reporting into a comprehensive management system.

Furthermore, the 100% planting and survival rates indicate that post-distribution monitoring contributed to maintaining planting quality and institutional responsibility. Unlike many environmental programs that focus primarily on distributing seedlings, this program incorporated systematic monitoring through geotagging, photographic documentation, and periodic reporting, enabling verification of actual planting outcomes. These findings suggest that monitoring and evaluation should become integral components of future tree planting programs designed to support environmental sustainability and food security.

CONCLUSION

This study evaluated the implementation of a tree seedling planting program conducted through collaboration between the Ministry of Environment and Forestry and three higher education institutions in Indonesia using a Convergent Parallel Mixed Methods approach. The findings demonstrate that the program was implemented successfully, as evidenced by complete compliance with administrative requirements, verification of planting locations through geotagging, and systematic monitoring of planting activities. Field observations and documentation confirmed that all designated planting sites corresponded to the approved locations and fulfilled the technical requirements established by the Ministry of Environment and Forestry.

The quantitative evaluation revealed that all 12,000 distributed tree seedlings were successfully planted across the three participating institutions, with no seedling mortality reported during the monitoring period. This indicates a planting success rate of 100%, reflecting effective coordination among government agencies, universities, and local communities in implementing environmental conservation initiatives. The qualitative findings further suggest that stakeholder commitment, institutional collaboration, and continuous monitoring contributed significantly to the successful implementation and maintenance of the tree planting program.

The study also highlights the importance of integrating monitoring and evaluation into environmental conservation programs. Beyond documenting the distribution of tree seedlings, systematic monitoring through field observations, geotagging, and reporting mechanisms provides accountability and enables verification that conservation activities have been implemented as planned. Such an approach strengthens environmental governance while supporting broader efforts to enhance environmental sustainability and food security.

Although the study demonstrates positive implementation outcomes, it is limited to evaluating the initial success of tree planting activities. Future research should examine the long-term survival, growth performance, and ecological impacts of planted trees, as well as their contribution to environmental quality and community-based food security over time. Expanding the study to additional regions and involving larger numbers of participating institutions would also provide more comprehensive evidence regarding the effectiveness of national tree planting programs.

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