



Community Service Collaboration in Edelweiss Conservation at the Bromo Tourism Area

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<p><u>Info Artikel</u> Diajukan : Diperbaiki : Disetujui : <u>Kata kunci:</u> Penanaman Edelweiss; Konservasi Keanekaragaman; Hayati; Kolaborasi Pengabdian Masyarakat</p>	<p><u>Abstrak</u> Bromo merupakan salah satu destinasi wisata terkemuka di Indonesia yang memiliki keanekaragaman hayati unik, termasuk Edelweiss (<i>Anaphalis javanica</i>), bunga yang menjadi simbol ekosistem pegunungan. Namun, peningkatan aktivitas wisata dan gangguan manusia telah mengancam kelestarian habitat Edelweiss. Untuk mengatasi tantangan ini, dosen Fakultas Teknik dan Sains Universitas Pembangunan Nasional "Veteran" Jawa Timur, bekerja sama dengan masyarakat lokal Bromo serta universitas internasional, melaksanakan program penanaman Edelweiss pada 26 September 2024. Program ini merupakan bagian dari kegiatan Adjunct Professor dan International Conference on Science and Technology (ICST) 2024. Hasil program menunjukkan tingkat keberhasilan adaptasi tanaman sebesar 85%, dengan peningkatan stabilitas tanah di area yang ditanami. Selain dampak ekologis, program ini juga berhasil meningkatkan kesadaran lingkungan dan keterlibatan aktif masyarakat lokal dalam konservasi. Kolaborasi antara akademisi, komunitas lokal, dan mitra internasional menunjukkan pentingnya pendekatan multi-pemangku kepentingan untuk pelestarian lingkungan. Namun, program ini menghadapi tantangan, termasuk kondisi cuaca yang tidak menentu dan kebutuhan pemantauan jangka panjang. Program ini menjadi model untuk inisiatif konservasi berbasis komunitas di kawasan ekosistem sensitif lainnya.</p>
<p><u>Keywords:</u> <i>Edelweiss Planting;</i> <i>Biodiversity Conservation;</i> <i>Community Service Collaboration;</i></p>	<p><u>Abstract</u> <i>Bromo is one of Indonesia's premier tourist destinations, renowned for its unique biodiversity, including Edelweiss (<i>Anaphalis javanica</i>), a symbolic flower of mountainous ecosystems. However, increasing tourism activities and human interference have threatened the conservation of Edelweiss habitats. To address this challenge, faculty members from the Faculty of Engineering and Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, in collaboration with the local community of Bromo and international universities, conducted an Edelweiss planting program on September 26, 2024. This initiative was part of the Adjunct Professor program and the International Conference on Science and Technology (ICST) 2024. The program achieved a seedling adaptation success rate of 85%, contributing to improved soil stability in the planting areas. Beyond ecological impacts, the initiative successfully raised environmental awareness and fostered active local community participation in conservation. The collaboration among academics, the local community, and international partners highlighted the importance of multi-stakeholder approaches in environmental preservation. Despite challenges such as unpredictable weather and the need for long-term monitoring, the program serves as a model for community-based conservation initiatives in other sensitive ecosystems.</i></p>

1. Introduction

The preservation of natural ecosystems in popular tourist destinations is essential for maintaining ecological balance and ensuring sustainable tourism practices. Bromo, a prominent tourism destination in Indonesia, showcases extraordinary landscapes and biodiversity. However, its unique ecosystem is increasingly threatened by the pressures of over-tourism and human activities, necessitating immediate conservation efforts (Prayitno et al., 2022).

Edelweiss (*Anaphalis javanica*), known as the "eternal flower," holds cultural and ecological significance in Indonesia's mountainous regions. This plant contributes to soil stabilization and serves as a symbol of natural beauty and resilience. Despite its importance, Edelweiss has faced a decline in its natural habitat due to unsustainable harvesting and environmental disturbances (Suryadi et al., 2020). Conservation efforts focused on Edelweiss restoration are therefore critical to preserving the biodiversity and ecological integrity of mountainous areas like Bromo.

In response to these challenges, the Faculty of Engineering and Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, spearheaded a community service initiative aimed at reintroducing Edelweiss in degraded areas around the Bromo tourism zone. This project, conducted on September 26, 2024, formed part of the Adjunct Professor program and the International Conference on Science and Technology (ICST) 2024. The event was a collaborative endeavor involving international academic partners, including the University of Auckland, Universiti Teknologi Malaysia, and Western Michigan University, alongside the local Bromo community.

This paper discusses the collaborative framework and implementation of the Edelweiss planting program in Bromo. It aims to analyze the environmental and social impacts of the initiative, while also highlighting the importance of multi-stakeholder participation in sustainable conservation practices (Ramadhani & Hakim, 2021).

2. Methods

The Edelweiss planting program in Bromo was conducted using a structured and participatory approach to ensure its effectiveness and sustainability. The methodology involved three key stages: planning, implementation, and monitoring. Each stage integrated the collaboration of academic

institutions, local communities, and international partners.

Planning Stage

This initial phase focused on preparing the groundwork for the program:

- **Site Selection:** Degraded areas around the Bromo tourism zone were identified as suitable planting sites based on ecological assessments. These areas were chosen for their potential to support Edelweiss growth while mitigating soil erosion.
- **Stakeholder Coordination:** Meetings were held with stakeholders, including the Faculty of Engineering and Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, University of Auckland, Universiti Teknologi Malaysia, Western Michigan University, and the local community. These discussions ensured a shared understanding of the program's goals and responsibilities.
- **Training Sessions:** Local community members were trained on sustainable planting techniques for Edelweiss and the ecological importance of the species. Experts from participating institutions facilitated the sessions to enhance community knowledge and skills.

Implementation Stage

The main activities were carried out on September 26, 2024, and involved the following steps:

- **Soil Preparation:** The planting sites were prepared by clearing invasive plants and enriching the soil with organic compost.
- **Seedling Distribution:** Edelweiss seedlings, cultivated in a controlled environment to ensure viability, were distributed to participants.
- **Planting Process:** Community members and volunteers planted the seedlings under the supervision of ecological experts to ensure proper techniques were followed.
- **Community Engagement Activities:** Educational programs and discussions were held alongside the planting activities to raise awareness among tourists and residents about Edelweiss conservation.

Monitoring and Evaluation Stage

To ensure the program's long-term success, a monitoring and evaluation system was established:

- **Growth Monitoring:** Regular visits to the planting sites were scheduled to assess the growth and health of the Edelweiss plants.
- **Community Involvement:** Local residents were encouraged to take an active role in maintaining the plants and protecting them from human disturbances.
- **Impact Assessment:** Feedback was gathered from stakeholders, including community members, to evaluate the program's ecological and social impact. This stage also involved identifying challenges and formulating strategies for improvement in future programs.

The integration of local knowledge with scientific expertise ensured a holistic approach to conservation. This collaborative methodology not only restored Edelweiss habitats but also strengthened community participation in sustainable environmental practices.

3. Results and Discussions

The Edelweiss planting program conducted on September 26, 2024, showcased tangible progress in both ecological restoration and community engagement within the Bromo tourism area. From an ecological perspective, the program succeeded in introducing approximately 500 Edelweiss seedlings into degraded areas. Early observations indicated a high survival rate of around 85%, suggesting that the carefully selected planting sites provided favorable conditions for the growth of this iconic species. The restoration effort also contributed to soil stabilization in the planting zones, as initial assessments revealed a decrease in erosion and improved soil quality. These findings align with prior research emphasizing the role of Edelweiss in maintaining soil integrity and supporting biodiversity in mountainous ecosystems (Suryadi et al., 2020).



Fig 1. Collaboration with local community in Bromo

Beyond ecological benefits, the program had a significant impact on the local community by fostering environmental awareness and empowering residents to participate in conservation activities. Over 100 participants, including members of the Bromo community, students, and international collaborators, actively engaged in the planting and accompanying educational activities. Training sessions conducted by experts enhanced the participants' understanding of Edelweiss conservation, with many expressing newfound appreciation for the importance of preserving this endangered species. The integration of scientific knowledge and traditional practices created a collaborative atmosphere that strengthened the community's role as stewards of their natural environment. This aligns with findings by Ramadhani and Hakim (2021), who highlight the importance of community engagement in ensuring the sustainability of conservation programs.

The collaboration among UPN "Veteran" Jawa Timur, the University of Auckland, Universiti Teknologi Malaysia, Western Michigan University, and the local community further underscored the power of multi-stakeholder initiatives in addressing environmental challenges. By leveraging the expertise of academic institutions and the local knowledge of the Bromo community, the program demonstrated a holistic approach to conservation. This approach mirrors the success of other collaborative projects in similar ecological contexts (Prayitno et al., 2022). Moreover, the program contributed to increasing awareness among tourists, who showed greater interest in learning about Edelweiss and its ecological significance, thereby promoting the concept of eco-tourism in Bromo.



Fig 2. Planting Edelweiss Progress

However, the program was not without challenges. Unpredictable weather conditions occasionally hindered the planting process, while the need for consistent monitoring to ensure the survival and growth of the seedlings posed additional logistical challenges. Addressing these issues requires the establishment of a robust monitoring system and the involvement of local residents in long-term maintenance efforts. Future initiatives could benefit from expanding community training programs and developing adaptive strategies to mitigate environmental uncertainties.

In conclusion, the Edelweiss planting program successfully demonstrated how ecological restoration can be integrated with community participation and international collaboration. By combining scientific expertise with local involvement, the program not only contributed to the preservation of Bromo's unique biodiversity

4. Conclusions and Suggestions

The Edelweiss planting program in Bromo successfully combined ecological restoration with community empowerment. By planting 500 Edelweiss seedlings in degraded areas, the program contributed to soil stabilization and biodiversity preservation. It also fostered environmental awareness and active participation among local residents, supported by collaborative efforts with international partners.

This initiative demonstrated the importance of integrating science-based conservation with local engagement to address environmental challenges. While the program faced challenges such as weather unpredictability and the need for ongoing monitoring, it provided a solid foundation for sustainable conservation practices and highlighted the potential of eco-tourism to promote environmental stewardship. To ensure the sustainability and scalability of the Edelweiss

conservation initiative, the following recommendations are proposed:

- 1. Establish a Long-Term Monitoring System:** Regular monitoring of planted Edelweiss should be conducted to evaluate growth performance and address emerging challenges. This can involve community-based monitoring programs to foster local ownership and ensure consistent care.
- 2. Expand Community Training Programs:** Increasing the scope and depth of training sessions can further empower local residents with the knowledge and skills necessary for effective environmental stewardship. Topics can include advanced planting techniques, pest management, and eco-tourism development.
- 3. Enhance Collaborative Networks:** Strengthening partnerships with academic institutions, government agencies, and environmental organizations can provide additional resources and expertise to support conservation efforts.
- 4. Promote Eco-Tourism:** Building on the increased awareness among tourists, the program can incorporate educational tours and workshops focused on Edelweiss conservation. This not only supports conservation goals but also contributes to the local economy.
- 5. Adapt to Environmental Uncertainties:** Future programs should incorporate adaptive strategies, such as selecting alternative planting seasons or utilizing climate-resilient seedlings, to mitigate the impact of weather variability.

By implementing these strategies, the Edelweiss planting program can serve as a sustainable model for conservation and community development in other ecologically sensitive areas, ensuring that the unique biodiversity of regions like Bromo is preserved for future generations.

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