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## Institutional Capacity Improvement Training Supports the Management of GLNP in Climate Change Mitigation

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### ABSTRACT

Gunung Leuser National Park (GLNP) is one of Indonesia's most important conservation areas. Around GLNP, there are a group manages bamboo forests in Pamah Simelir Hamlet. This activity aims to carry out outreach activities to increase the institutional capacity of sustainable bamboo communities to support the management of GLNP buffer areas in mitigating climate change. The activity methods include lecture methods, group discussions, brainstorming, role-playing, collective problem-solving, questionnaires and interviews with groups, and Focus Group Discussions (FGD). The results of the training activities showed that the group's technical skills had improved, especially in managing bamboo forests as part of conservation and climate change mitigation efforts. They can apply the techniques taught, such as planting and maintaining bamboo in a sustainable manner, as well as using bamboo as a raw material with economic value. Increasing these skills can reduce pressure on forest areas and improve the welfare of local communities. The training carried out has succeeded in positively boosting the institutional capacity of the Bambu Lestari Community, both in technical, managerial, and collaboration aspects. This activity can become a reference for local governments and stakeholders in adopting an inclusive and sustainability-oriented approach while involving local communities as partners in preserving the environment and facing the challenges of climate change.

**Keyword:** Environment, Interviews, Climate Change, Local Community

## 1. Introduction

Climate change is one of the world's biggest challenges today, including in North Sumatra [1]. The impacts of climate change are extensive and have the potential to threaten ecosystem balance, biodiversity, and the survival of humans and animals. Gunung Leuser National Park (GLNP), one of the most important

conservation areas in Indonesia and the world, has a strategic role in climate change mitigation efforts. GLNP, which covers an extensive area of tropical rainforest, is a habitat for various rare flora and fauna and contributes significantly to carbon storage. The research results of [2] [3] show that in GLNP, there are many types of medicinal plants.

Efforts to preserve the GLNP area face various challenges, including forest encroachment, land conversion, and unsustainable economic activities. Research by [4] shows that changes in land cover have occurred due to forest fires in GLNP. On the other hand, local communities living around the GLNP area, even though they have great potential to support conservation, still need to be fully involved in the conservation management of the area. Active community involvement in climate change mitigation efforts is vital to preserve the GLNP ecosystem.

One initiative that can support conservation and climate change mitigation efforts in GLNP is empowering local communities, such as the Lestari Bamboo Community. Bamboo is a plant with a high potential for absorbing carbon and maintaining ecosystem balance. In addition, the use of bamboo can provide sustainable economic benefits for local communities, giving them an environmentally friendly alternative livelihood. However, increasing institutional capacity for the communities involved is needed to achieve this success.

Institutional capacity-building training for the Lestari Bambu Community aims to strengthen local communities' role in supporting sustainable GLNP management. Through this training, it is hoped that community members can develop the skills, knowledge, and institutional capacity needed to be actively involved in conservation and climate change mitigation activities. With more organized and trained involvement, the Bambu Lestari community can strategically maintain environmental balance and support climate change mitigation efforts in the GLNP area.

Training to increase the institutional capacity of the Lestari Bamboo Community in supporting the management of the GLNP is necessary for various reasons related to the environmental, social, and economic challenges faced by this conservation area. Several reasons underlying the urgency of implementing this activity include: environmental degradation and the GLNP ecosystem, the importance of the role of local communities in conservation, climate change mitigation through bamboo management, the need for sustainable economic empowerment, strengthening institutional capacity as the key to sustainability, strengthening collaboration between parties.

The GLNP area faces various environmental threats, such as deforestation, forest encroachment, and land conversion, which impact biodiversity loss and ecosystem degradation. Brooks stated that habitat destruction is one of the main factors causing biodiversity loss [5]. Therefore, increasing the institutional capacity of local communities around GLNP is essential to overcome this problem and support conservation efforts through active participation. The success of conservation area management is highly dependent on the involvement of local communities. Agrawal and Gibson emphasize that community participation in natural resource management is essential to ensure long-term sustainability [6]. With their involvement, conservation programs can succeed because they consider the needs and interests of local communities. The Bambu Lestari Community has great potential to support GLNP conservation, but institutional capacity is needed to carry out its role effectively.

Climate change is a global challenge that requires local solutions. Bamboo is one of the plants recognized as having a high ability to absorb carbon to support climate change mitigation. McClure stated that bamboo has a faster carbon sequestration rate than most tree species, making it an ideal choice for land restoration and climate change mitigation activities [7]. Therefore, this training is essential to equip communities with knowledge and skills related to sustainable bamboo cultivation and management to contribute to climate change mitigation efforts in GLNP.

Communities living around GLNP often depend on natural resources for their livelihoods. Janssen explained that community empowerment through sustainable economic development is one way to reduce pressure on conservation areas [8]. Bamboo management training can provide an alternative economic solution for the Sustainable Bamboo Community, allowing them to gain economic benefits without damaging the GLNP ecosystem. By using sustainable bamboo, communities can improve their welfare and contribute to the preservation of conservation areas.

Strong institutions are critical to the sustainability of community-based initiatives. Zimmerman in his theory of community empowerment, emphasizes that strengthening institutional capacity plays a vital role in supporting community organizations to achieve long-term goals [9]. Withties often have difficulty manacn managec programs without proper training. Thus, this training is needed to provide the managerial, administrative, and strategic skills needed by the Lestari Bambu Community to function optimally as an institution that supports GLNP management.

This training is also needed to strengthen collaboration between the Lestari Bamboo Community and GLNP managers, the central government, regional governments, and related non-governmental organizations (NGOs). This collaboration is important to ensure continued support in climate change mitigation and conservation efforts in GLNP. Pretty notes that strong partnerships between various stakeholders can increase effectiveness in natural resource management and achieve better results in conservation efforts [10]. The aim of this activity is to increase the institutional capacity of the Lestari Bambu Community, to strengthen the organization's ability to manage resources, make decisions, and design and implement sustainable programs. Better institutional capacity will help communities face environmental and social challenges related to the management of the GLNP area. Apart from that, to encourage the active involvement of local communities in the management of GLNP. Through training, it is hoped that the Sustainable Bamboo Community can play a more significant role in supporting conservation efforts, ecosystem restoration and climate change mitigation in the GLNP area, so that the community is not only the beneficiary but also the leading actor in protecting the environment. Another aim is to develop technical skills related to sustainable bamboo management.

This training provides knowledge and skills about cultivation, processing and sustainable use of bamboo, so that communities can utilize bamboo resources as an environmentally friendly economic solution. This activity is also an effort to mitigate climate change through the conservation and use of bamboo. By increasing the community's ability to manage bamboo, it is hoped that bamboo can be used as a way to absorb carbon, maintain environmental balance, and reduce the impact of climate change in the GLNP area. This training provides long-term benefits in terms of increasing the capacity of members of the Bambu Lestari Community, so that they are better able to manage natural resources independently and sustainably. With the involvement of the Lestari Bamboo Community, GLNP management will be more inclusive and sustainable because local communities will play an active role in maintaining and preserving the area. The sustainable use of bamboo can be an alternative source of livelihood for local communities, reducing pressure on the GLNP ecosystem and supporting their economic welfare. Bamboo can absorb high carbon, so by preserving and using bamboo sustainably, communities can make a real contribution to climate change mitigation efforts. This training will build better partnerships between the community, GLNP managers, and other parties involved in environmental conservation, thereby creating synergy in managing conservation areas and mitigating climate change.

## 2. Methods

### 2.1 Time and location of activities

This activity will be carried out from April to August 2024 in Pamah Simelir Hamlet, Telagah Village, Sei Bingei Sub-district, Langkat Regency, North Sumatera (Figure 1).



**Figure 1.** Location of training activities in Pamah Simelir Hamlet

## 2.2 Training activities to increase group institutional capacity

The activity method used in this training consists of several approaches designed to actively involve participants and provide in-depth understanding through various learning methods, including:

- a. **Lecture Method**  
The lecture method conveys information directly from the facilitator or resource person to the training participants. Lectures function as a medium to provide explanations of theories, concepts, and essential information related to bamboo forest management, conservation, and climate change mitigation. In this method, the resource person will give a clear and systematic presentation to ensure that participants understand the primary material before proceeding to other interactive methods.
- b. **Group Discussion**  
Group discussions aim to increase participant interaction and further explore the topics discussed. In this method, participants are divided into small groups and given tasks to discuss specific issues, such as challenges in sustainable bamboo management or how communities can play a role in conservation. This discussion allows participants to exchange views, experiences, and ideas to learn from each other.
- c. **Brainstorming**  
Brainstorming stimulates participants' creativity in generating ideas or solutions for bamboo management problems or strengthening community institutions. The facilitator guides participants in this process by raising questions that stimulate critical thinking. The ideas generated are then discussed and evaluated to choose the most relevant and practical solutions.
- d. **Role-playing**  
The role-playing method is designed to simulate real situations that communities may face in managing bamboo forests or running institutional organizations. In this method, participants play certain roles, such as community leaders, government members, or other stakeholders. Through role-playing, participants can develop communication, negotiation, and problem-solving skills relevant to their daily tasks.
- e. **Collective Problem Solving**  
Collective problem-solving is a method in which participants work together in groups to solve problems the community faces, such as technical challenges in bamboo management or difficulties in maintaining forest sustainability. The facilitator provides a real problem for the group to analyze, and participants are trained to use a systematic approach to find effective solutions, taking into account multiple perspectives and available resources.
- f. **Questionnaire Distribution**  
The questionnaire collects data or information from training participants regarding their initial knowledge, understanding, and views before and after the training. The results can help measure the impact of the training and identify areas that need further improvement. The questionnaire also serves as a tool to evaluate the effectiveness of the training in increasing community capacity.
- g. **Group Interviews**  
Group interviews involve direct discussions between the facilitator and participants, where the facilitator asks about participants' experiences, challenges, and opinions regarding bamboo forest management and institutions. These interviews can provide in-depth insights into the internal dynamics of the group as well as the roles of individuals in implementing community programs. This method also helps identify specific needs of each group that may not be revealed through other methods.
- h. **Focus Group Discussion (FGD)**  
Focus Group Discussion (FGD) is a method that involves a directed discussion among a group of participants to discuss a specific topic in depth. FGD is used to identify critical issues relevant to bamboo forest management and community institutional strengthening. In FGD, the facilitator acts as a guide, asking questions that focus on specific issues and encouraging participants to interact with each other, share experiences, and express their views. This method is often used to generate a collective understanding of complex issues.

All of these methods aim to create an interactive and comprehensive learning environment where participants receive information passively and actively participate in the learning process, share experiences, and apply the knowledge gained directly. Combining these methods allows participants to develop technical and managerial skills in greater depth and increase their capacity to support the management of GLNP and climate change mitigation.

### 3. Result and Discussion

The training results showed a significant increase in the group's technical skills, especially in managing bamboo forests as part of a climate change conservation and mitigation program. This group could apply the techniques taught, such as sustainable bamboo planting and maintenance methods and using bamboo as a raw material with economic value. Increasing these skills can potentially reduce pressure on forests while improving community welfare. The training provided also had a positive impact on strengthening the institutional capacity of the Lestari Bambu Community, both from the technical side, management, and the ability to collaborate with other parties.



**Figure 2.** Socialization participants are listening to a lecture



**Figure 3.** Photo with resource persons and training participants

Training to increase the institutional capacity of the Lestari Bamboo Community in supporting the management of GLNP (GLNP) and climate change mitigation showed several significant results, such as Increased Community Institutional Capacity, Sustainable Economic Benefits, Understanding of Sustainable Bamboo Management, Increased Participation in GLNP Management. After the training, the institutional capabilities of the Lestari Bambu Community experienced a significant increase in organizational management. The community succeeded in developing a neater organizational structure, improving administrative skills, and formulating a long-term strategic plan to support conservation efforts in GLNP. The ability to make collective decisions and transparency in resource management also increases.

Training participants demonstrated a better understanding of sustainable bamboo cultivation and management techniques. They successfully implemented techniques for planting, maintaining, and harvesting bamboo with better efficiency, which contributed to reducing environmental damage and increasing bamboo yields. In addition, communities are starting to understand the importance of bamboo as a plant with a high potential to absorb carbon, thus supporting climate change mitigation.

The Bambu Lestari Community shows increased participation in GLNP management. They are actively involved in the degraded land restoration program around the GLNP area using bamboo as part of the ecosystem solution. Collaboration with GLNP managers and local governments is also getting more robust, with an agreement to support climate change mitigation efforts through bamboo.

Besides the ecological impact, bamboo also provides sustainable economic benefits for the community. Through training, the community succeeded in increasing its ability to process bamboo into value-added products such as handicrafts in the form of boat souvenirs (Figure 4). This provides an alternative source of income for the community, reducing dependence on forest destruction activities such as illegal logging or land conversion.



**Figure 4.** Souvenirs produced by the Sustainable Bamboo Community Group

The results of this training align with previous theories and research, emphasizing the importance of empowering local communities to engage in conservation and climate change mitigation efforts. Zimmerman explains that increasing institutional capacity is vital in supporting communities' active participation in conservation [9]. This is proven in the case of the Lestari Bambu Community, which strengthened its organizational capacity after training. Better institutional management allows them to run bamboo conservation and sustainable use programs more effectively.

From an ecological perspective, research by McClure shows that bamboo has a high capacity to absorb carbon, which can contribute significantly to climate change mitigation [7]. This training proves that using bamboo as part of climate change mitigation efforts in GLNP has a real impact. With increasing community knowledge about bamboo's potential as a carbon sink, they are becoming more aware of the importance of planting and caring for bamboo to maintain the balance of the GLNP ecosystem.

In addition, Agrawal and Gibson and Rahmawaty emphasize the importance of community participation in managing conservation areas [3,6]. This training succeeded in increasing the Lestari Bambu Community's active participation in the management of GLNP. They are no longer passive observers but are the main actors in preserving the ecosystem, especially in restoration activities of degraded land with bamboo.

From an economic perspective, Janssen revealed that sustainable use of natural resources, such as bamboo, can provide economic benefits while maintaining environmental balance [8]. The results of this training show that the use of bamboo by the Sustainable Bamboo Community has provided a sustainable alternative source of income, thereby reducing the economic pressure that previously caused environmental degradation in GLNP.

Thus, the results of this training show that increasing the institutional capacity of local communities, sustainable use of natural resources, and active community participation can be effective strategies in supporting conservation area management and climate change mitigation. This experience also underscores the importance of continued support from government, conservation institutions, and the wider community to achieve long-term sustainability. The results of publications in online media are presented in Table 1.

**Table 1.** Results of activities that have been published in online media

No.	Publikasi	Link/publikasi
1.	DAAI TV	<a href="https://youtu.be/u7ufflJFqpU?si=JGibFsNGWm7vv8j8">https://youtu.be/u7ufflJFqpU?si=JGibFsNGWm7vv8j8</a> <a href="https://youtu.be/czp2L3SEDwU?si=c94Sa0DeVyzeNQ">https://youtu.be/czp2L3SEDwU?si=c94Sa0DeVyzeNQ</a> <a href="https://youtu.be/czp2L3SEDwU?si=c94Sa0DeVyzeNQ">Mv</a>
2.	Media massa/online Borneo News	<a href="https://www.borneonews.co.id/berita/341301-dosen-universitas-sumatera-utara-adakan-pengabdian-internasional-di-pamah-simelir">https://www.borneonews.co.id/berita/341301-dosen-universitas-sumatera-utara-adakan-pengabdian-internasional-di-pamah-simelir</a> <a href="https://www.borneonews.co.id/berita/341008-akademisi-universitas-sumatera-utara-usahakan-lestarikan-kembali-hutan-bambu">https://www.borneonews.co.id/berita/341008-akademisi-universitas-sumatera-utara-usahakan-lestarikan-kembali-hutan-bambu</a> <a href="https://www.borneonews.co.id/berita/341301-dosen-universitas-sumatera-utara-adakan-pengabdian-internasional-di-pamah-simelir">https://www.borneonews.co.id/berita/341301-dosen-universitas-sumatera-utara-adakan-pengabdian-internasional-di-pamah-simelir</a> <a href="https://www.borneonews.co.id/berita/340915-pengabdian-kemitraan-internasional-menyasar-warga-di-dusun-pamah-semelir">https://www.borneonews.co.id/berita/340915-pengabdian-kemitraan-internasional-menyasar-warga-di-dusun-pamah-semelir</a>
3.	YouTube	<a href="https://youtu.be/FEPiQ-FZIRs">https://youtu.be/FEPiQ-FZIRs</a> <a href="https://youtu.be/FEPiQ-FZIRs?si=W7A_zPs80ZfoOHw5">https://youtu.be/FEPiQ-FZIRs?si=W7A_zPs80ZfoOHw5</a> <a href="https://youtu.be/Kw6YUD0j1QA">https://youtu.be/Kw6YUD0j1QA</a> <a href="https://youtu.be/_9HeiiC50QA">https://youtu.be/_9HeiiC50QA</a> <a href="https://youtu.be/YNsCgp5Knh8">https://youtu.be/YNsCgp5Knh8</a> <a href="https://youtu.be/-JvmgquSy18">https://youtu.be/-JvmgquSy18</a>

#### 4. Conclusion

This training has provided significant results and positive contributions to climate change mitigation efforts and GLNP management. This activity can improve the community's technical and managerial skills in sustainable bamboo forest management. Through this training, group members can apply bamboo cultivation techniques that support conservation while providing economic benefits. Additionally, increasing institutional capacity is vital in strengthening collaboration between communities, GLNP managers, and other stakeholders.

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