Australian Government

Australian Centre for International Agricultural Research

Final report

Contents

1 Acknowledgments

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2 Executive Summary

Bamboo is an integral part of many Indonesia communities, and the increased global demand for bamboo products is being viewed by the Indonesia government as an opportunity to enhance rural livelihoods. Current government initiatives and programs do not have the evidence-based data to exploit that opportunity. Building on work and partnerships developedthrough FST 2016 141, further research is needed to ensure that the selection, appraisal,and development of bamboo agroforestry landscapes is commercially viable, equitable, and sustainable.

A small research activity (SRA) was designed to develop a better understanding of this situation. The intent is to reach the point where a standardized process for selecting, appraising, and developing potential agroforestry landscapes for the "bamboo villages" can be applied and adapted throughout the Government's program and in the broader bamboo villages movement.

The overall aim of this project is to test and refine bamboo agroforestry approaches that can be adopted and scaled out for greater effectiveness within the national-Government supported Sustainable Bamboo Forestry and 1000 Bamboo Villages programs. The steppingstone for this research is to provide research needed to further develop commercially viable, evidence-based, sustainable bamboo agroforestry options for Indonesian smallholders; and to contribute to the formulation of a standardized process for selecting, appraising, and developing potential bamboo agroforestry landscapes for relevant government initiatives.

A broad literature review was conducted in sites that has already been intervened by EBF and sites that has the potentials for bamboo village establishment. Different village appraisal methods, data collection for geospatial analysis, existing EBF nurseries specifically plant growth and survival rate of the plantlets, and past reports review on EBF's existing activities on business implementation and social-governance partnership on site-level and broader-level were gathered and summarized for identifying current conditions and lesson learned from past activities. This provided insights for establishing a robust and proved methodology for appraisals and cultivation procedures, also provided basis for implementing social-governance infrastructure under bamboo village mechanism.

The SRA concludes that most of the methodologies were applicable to be scaled up nationally within the partnership of the government, local organizations, and local communities. However, there were some issues that must be taken to perspective, as the methods should be tailored with the variety of village conditions, the generalization of the scale must be determined, each biogeochemical condition should have different cultivation treatments, and there were no fit-for-all methodologies. This research needs to be diagnostic, well-targeted, and nuanced to be able to respond to the opportunities and constraints of the various systems that are emerging, and to go beyond the common practices that has already been implemented in the communities. The main priorities are:

1. Report on evaluation and recommendations for modification to existing appraisal methodology
2. Four new bamboo agroforestry landscapes appraised under revised appraisal methodology
3. Develop criteria and requirements for the location of bamboo nurseries, and accompanying guidelines and Standard Operating Procedures for production
4. Recommendations for: 1) deed for the establishment of bamboo agroforestry farmer groups, 2) code of conduct for benefit-sharing calculation, 3) working agreement and work plan of a different type of agroforestry mixes
5. Recommendation report for integration with existing government initiatives

3 Background

Bamboo has been used for centuries to build homes and produce myriad household items. In 2005, Ministry of Environment and Forestry (MoEF) estimated that Indonesia's bamboo forest totalled 2.1 million hectares, with 0.69 million hectares on state forest lands and 1.41 million hectares on private/community lands. Global and Indonesian trade in bamboo is increasing (INBAR, 2019) while Indonesian production area is decreasing rapidly due to land use changes and loss of traditional knowledge around utilisation. In recent decades, bamboo has found new applications in textiles and laminate flooring and modernized, industrial uses in paper and construction.

The Indonesian government views the increased demand for bamboo products in Europe, North America, and Australia as an opportunity to enhance the rural livelihoods through production and utilisation of bamboo. Indonesia seeks to realise this potential through a national movement of "1000 Bamboo Villages" producing and processing bamboo, resulting in globally competitive enterprises. The government identified eight major bamboo-producing areas across the country in which it would promote bamboo villages.

One of these production areas is the locale for this Small Research and Development Activity (SRA), East Nusa Tenggara (ENT), where recently completed ACIAR project FST 2016 141 Developing and promoting market-based agroforestry options and integrated landscape management for smallholder forestry researched sustainable bamboo management in Ngada Regency, ENT. The team and its linkages to the government and the private sector that underpins this SRA was formed through FST 2016 141. FOERDIA added bamboo as an objective to FST 2016 141 specifically to support the movement of 1000 Bamboo Villages. A foundation was laid, but additional research is needed.

The Government's implementing agency is the Environmental Bamboo Foundation (EBF), also the proposed Commissioned Organisation for this SRA. EBF was legally established as a non-profit in 1993 but began promoting bamboo as a sustainable alternative to timber in the 1980s. It further developed the use of bamboo in land rehabilitation and conceived the 1000 Bamboo Villages movement to connect bamboo production to sustainable livelihoods through equitable value chains and markets a bamboo-based agroforestry system, and empowering rural women as "Champions" in bamboo production (Rabik & Ekawati, 2016). The Indonesian Government began supporting the movement of 1000 Bamboo Villages in 2015. EBF developed Hutan Bambu Lestari (Sustainable Bamboo Forests System), community-based bamboo forestry, to foster an Indonesian sustainable bamboo industry (Prasetyo, et al., 2020).

The purpose of this SRA is to provide research needed to further develop commercially viable, evidence-based, sustainable bamboo agroforestry options for Indonesian smallholders. The intent is to reach the point where a standardised process for selecting, appraising, and developing potential agroforestry landscapes for the "bamboo villages" can be applied and adapted throughout the Government's program (Environmental Bamboo Foundation, 2021) and in the broader bamboo villages movement.

Australian Government priorities for our relationship with Indonesia emphasise economic development, poverty reduction, and women's empowerment (DFAT, 2020). This SRA will continue the building of women's leadership as Bamboo Champions begun to good effect under FST 2016 141. ACIAR's Indonesia geographic priorities include ENT because rural poverty is high. Improving livelihoods is a central focus. This project is wholly consistent with livelihood enhancement through one of the ACIAR's key thrusts, developing infrastructure and agroindustry in Indonesia villages. Recent program guidance (2021 Concept Notes Dialogues) has been to work with existing partners while Indonesia's national research structure is revised. This SRA is built on a robust partnership developed within FST 2016 141.

4 Objectives

The aim of this project is to test and refine bamboo agroforestry approaches that can be adopted and scaled out for greater effectiveness within the national-Government supported Sustainable Bamboo Forestry and 1000 Bamboo Villages programs. These management approaches will be community-based and seek to mainstream gender equity and social inclusion.

Objectives are:

1: Robust and proven methodology of village appraisal for bamboo agroforestry adopted by provincial and national governments

2: Efficient bamboo propagation methods appropriate for community-based production identified and adopted with standardized processes

3: Appropriate social and governance infrastructure to support successful bamboo agroforestry villages identified.

The theory of change for this project is:

IF the community appraisal, propagation, and governance mechanisms of bamboo agroforestry are rigorously tested and refined;

THEN effective and efficient bamboo agroforestry approaches and instruments will be identified, standardised, adopted and scaled out by key decision makers to improve the welfare and livelihoods of communities;

BECAUSE the SRA will work from village-level administration to the national level to ensure issues and interests of all stakeholders are identified and considered and will provide recommendations that are research-based
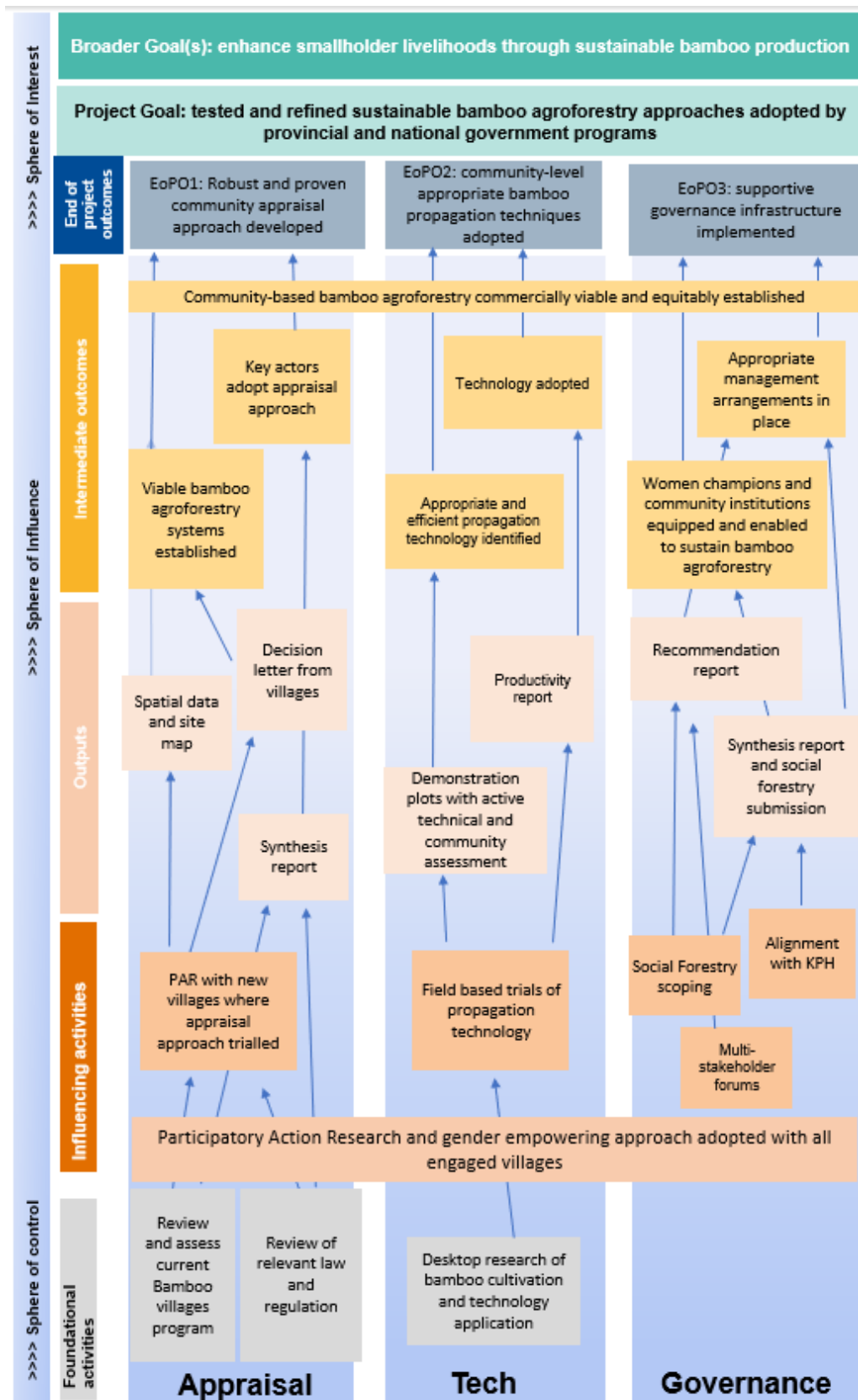
Figure 1 Theory of changes and pathways to impact

5 Methodology

The SRA began with a broad literature review of different methods of village appraisal, data collection for geospatial analysis, existing EBF nurseries specifically plant growth and survival rate of the plantlets, and review on past reports on EBF's existing activities on business implementation and social-governance partnership on site-level and broader-level. The review was utilized to build conceptual framework in building standardised process of developing potential agroforestry landscape for bamboo villages. To test the hypothesis identified through the conceptual framework and to refine it further, a methodology was developed and summarised here. Detailed methodology is explained in each activity report which can be found in the References.

1. Site selection using site identification and geospatial analysis in all SRA activities

The identification of sites involved the following steps:

   a. Identification of sites that is already being intervened by EBF, which are: the Sustainable Bamboo Forest system, bamboo nurseries, village-level bamboo enterprise, or regional/village support on regulation and other social-governance infrastructures.
   b. Identification of sites that has a potential to be intervened by EBF using geospatial analysis, which is a part of the 7-layer village appraisal methodology explained in detail in 7-layer village appraisal analysis.
   c. A total of twelve sites were selected in two different criteria mentioned above. Intervened villages were: Inegena Village, Genamere Village, and Watukapu Village in North Bajawa; Mengeruda Village in Soa Subdistrict; Nginamanu Village in Wolomeze Subdistrict; Radabata Village, Were Village, and Ratogesa Village in Golewa Subdistrict. Potential villages were: Turekisa Village and Sobo Village in West Golewa Subdistrict; and Beja Village and Bajawa Village in Bajawa Subdistrict. **Figure 2** below shows the locations of all 12 sites distributed around the Ngada Regency.
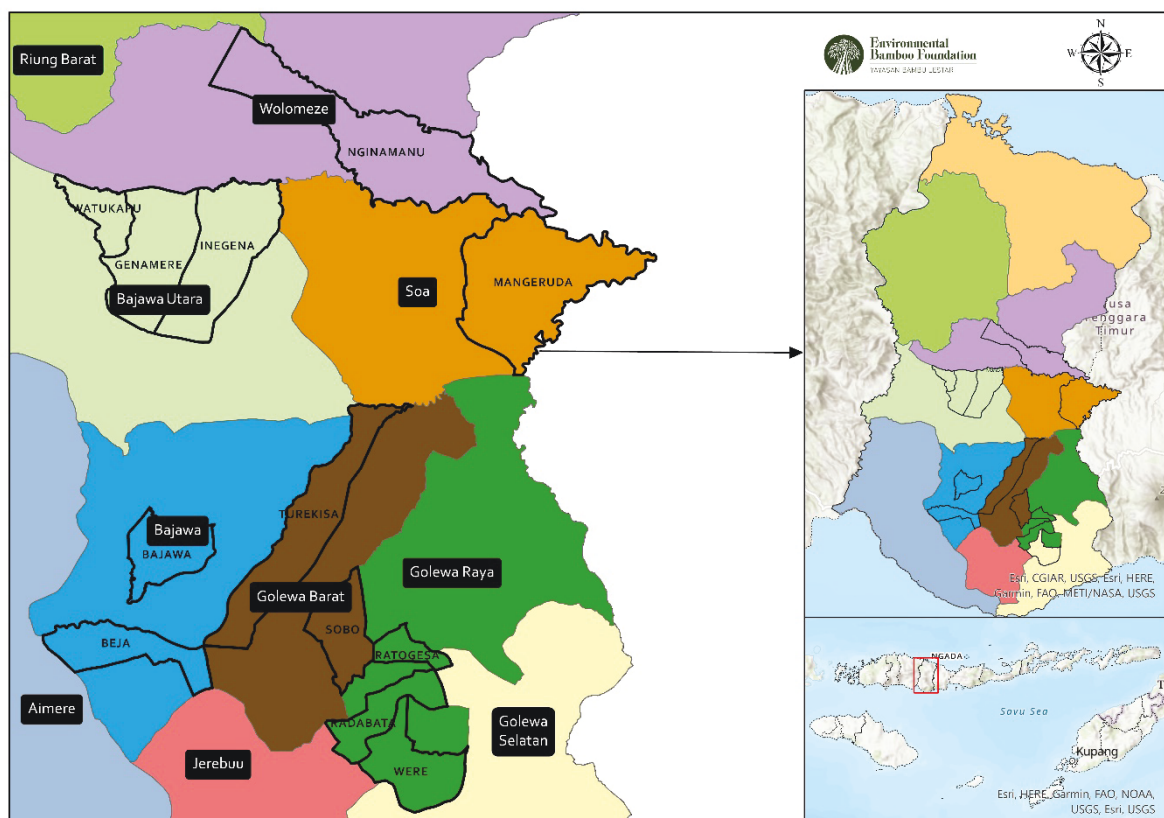

Figure 2 Location of 12 sites (villages) in six different subdistricts of Ngada Regency

2. Selection of stakeholders and subjects for survey interviews and focus group discussions in all SRA activities

Variety of stakeholders and subjects were selected and identified by purposive sampling method to ensure every perspective related to village potential for bamboo village establishment is collected, which include: village administrative, farmers, bamboo owners, village-level women and youth institution, farmers' institution who manages bamboo commodities and bamboo nurseries, village-level financial institution/enterprises, and forest management unit administrative in related locations. Interviews and focus group discussions was carried out once in twelve sites, both intervened and not intervened village therefore a total of 12 FGDs were conducted in this SRA for 7-layer village appraisal activity. For bamboo cultivation procedures establishment, a 4-day workshop was conducted to finalize with experts and a minimum of one interview per field implementors was taken.

3. Data collection instruments in all SRA activities

Instruments for data collecting was designed based on the information needed for bamboo villages. There were two kinds of data collecting methods, which were semi-structured interview and focus group discussion. Semi-structured interview was done for personal subjects using self-assessment questionnaire for 7-layer village appraisal, nursery-assessment questionnaire for thorough nursery information, business feasibility assessment for farmer's enterprise and benefit sharing analysis. Focus group discussion was done for group subjects to collect and validate information more effectively. In every activity of the SRA, focus group discussions were separated by subjects to avoid conflict. The discussions were conducted at the beginning to introduce the purpose of the activity and at the end to summarise and conclude findings. The instrument for focus group discussion was key questions and documents related to the purpose of the activities.

4. Seven-layer village appraisal analysis for Activity 1: Test and refine village appraisal approach

Seven-layer village appraisal analysis consisted of geospatial analysis and multi-criteria analysis using Analytical Hierarchy Process (AHP) based on self-assessment information, each layer described as below:

1) Physical site resources for successful bamboo production specifically existing bamboo resources
2) Village readiness and existing governance/institutional structures/initiatives and capacity to support successful bamboo production at the village level
3) Government support at local, provincial, and national levels
4) Ease of doing business, existing roads, electricity supply, water sources, supporting development policy and culture, and potential for financial investment
5) Social and physical barriers to successful implementation, including factors such as land conflicts and potential threats like forest fires
6) Potential for cash and food crops within bamboo agroforestry
7) Gender-mainstreaming, equity and social inclusion aspects

OBIA (Object Bases Image Analysis) was used to define bamboo more accurately using remote sensing, while the purpose of AHP was to convert qualitative information to quantitative information by weighing the criteria within each layer and scoring the answers to the questions from each criterion. The information later stored and visualised in spatial information and analysed with geospatial analysis to select the most suitable village for bamboo village intervention. Each analysis described in the following:

a. Spatial analysis – OBIA and overlay analysis

Information needed for geospatial analysis were differentiated into three maps, such as: 1) bamboo resources estimation and distribution map using OBIA, 2) land availability, and 3) land suitability for bamboo. Each map had different information to analyse and will be further explained in Activity 1 Technical Report. The maps were overlaid with village administrative,

and the most suitable sites based on spatial information were selected. Ground truthing is later conducted parallel to the self-assessment.

b. Multi-criteria analysis – Analytical Hierarchy Process

The analysis started with weighing 7 layers using hierarchy framework, then compared using pairwise comparison to set the priority in each layer. Then the consistency test was done in the prioritised (weighed) criteria. The mechanism of weighing the criteria, comparing, and consistency test will be further explained in Activity 1 Technical Report.

5. Standard Operating Procedures for bamboo cultivation for Activity 2: Develop locally appropriate bamboo propagation procedures and enterprise arrangements for degraded landscapes in ENT

In the development of bamboo village, one of the enabler conditions is bamboo cultivation, which consists of propagation, rhizome enlargement, plantation, clump treatment, and sustainable harvesting methods. Although the culture of bamboo utilization was occurred in the community, bamboo cultivation was not commonly implemented. Thus, a comprehensive best practices of bamboo cultivation was established as a guideline for the implementors, in this case communities. The series of the established standards were determined by action research done by EBF and the implementors, which in this case study were female farmers' group supervised by the internal experts. Nursery practices done by the "Bamboo Mamas" – the name of the female farmers' group – were evaluated and discussed with the experts as baseline to formulate the standard operating procedures while also revise the occurring practices.

Standard Operating Procedures (SOP) for bamboo cultivation were established in the bamboo nursery intervened villages only using the questionnaires as a baseline for bamboo nursery conditions. The analysis consisted of plant growth and survival rate in different biogeochemical conditions, lesson learned from the existing methods of propagation in different locations and species. After initial analysis of field practices and experiences, workshop was conducted to consult and validate the collected data by internal experts from EBF and BRIN, and furthermore be reviewed to finalize the procedures.

6. Benefit-sharing and business model analysis for Activity 2: Develop locally appropriate bamboo propagation procedures and enterprise arrangements for degraded landscapes in ENT

EBF's report review on the specific intervened location which were Inegena Village, Genamere Village, Watukapu Village under Social Forestry scheme and Radabata Village under community-owned land tenure. Semi-structured interviews and focus group discussions were the main baseline of benefit-sharing and business model analysis because the model heavily relied on the existing conditions of the village. The baseline information was analysed by classifying the issues related to bamboo village activities and identifying the potential implications of the issues to the people and the village in general. The model was formulated based on the village conditions, potential risks, and threats of making the small-scale bamboo industries, and mitigation attempt to avoid the risks. The approach on the model was People, Public, Private Partnership to ensure the role for the stakeholders addressed clearly and effectively.

7. Policy-making process for Activity 3: Identify necessary social and governance infrastructure for bamboo agroforestry

Two activities were done in parallel for policymaking, village preparation for establishing a bamboo regulation and drafting the regulation draft to become the village's regulation template. Focus group discussions conducted for policy-making process was done in village preparation to identify the needs and resources in the village related to bamboo commodities, and to determine the responsibilities, prohibitions, and form of sanctions to implement bamboo village ecosystem in the village.

Regional policies were established and conducted in regency-scale and provincial-scale. Regency policies were initiated in Ngada Regency for bamboo utilization and conservation,

whereas governor regulation was established in East Nusa Tenggara Province as per 15th June 2022 to regulate Bamboo Agroforestry Village. Before the establishment of the governor regulation, empirical study was implemented by analysing the substantial object from bamboo agroforestry village practices in local communities facilitated by EBF and partners. The key findings of the study were reviewed and consulted by EBF's internal experts on regulatory and governance issues, social and community development, and bamboo utilization experts.

The reviewed key findings were then formulated to regional policies, especially the governor regulation. The regulation draft was then aligned and synchronized with current government regulations in Indonesia by normative studies provided by the experts. The draft was tested and adjusted with Indonesia's legal system before handed over to the Village Community Empowerment Office as the leading sector. The government office handed over the draft to the government legal office for legislation process before the regulation draft approved and issued by East Nusa Tenggara Governor.

6 Achievements against activities and outputs/milestones

6.1 Achievements to date

6.1.1 *Objective 1: Robust and proven methodology of village appraisal for bamboo agroforestry adopted by provincial and national governments*

Table 1. Activity 1: Test and refine village appraisal approach

No.	Sub-activity	Outputs/ milestones	Completion date	Comments

1.1	Evaluate the results of the FST 2016 141 appraisal method. The research will be conducted in: Radabata, Wogo, Ratugesa (Golewa Sub-district) Genamere, Inegene, Watukapu (Bajawa Utara Sub-district)	Revised appraisal methodology: 1. Key findings on former appraisal methods 2. Revised self-assessment questionnaire in Activity 1 Module 3. 7-layer draft modules in Activity 1 Module 4. Revised spatial methodology explained in detail in Activity 1 Technical Report 5. Data conversion methodology establishment from qualitative data to spatial information explained in detail in Activity 1 Technical Report	**30 June 2022**	During the evaluation on the methodology, a site selection process for existing/intervened villages are done in parallel, resulting in the following: **6 intervened villages become 8 villages with some adjustments**
				
				Adjustment on the village names: Wogo change to Were II new village become existing/intervened:
				  a. Kec. Wolomeze: Nginamanu
				  b. Kec. Soa: Mengeruda
				Because it has been intervened by EBF with bamboo cocoon nursery program.
				
				Revised 8 existing village
				Outside SF area/private-owned land
				Golewa Sub-district: Radabata, Were, Ratogesa
				Wolomeze Sub-district: Nginamanu
				Soa Sub-district: Mengeruda
				
				Inside SF area/state-owned land
				Bajawa Utara: Inegena, Genamere, Watukapu

1.2	Assess spatial imagery and data adequacy for identifying bamboo resources and site suitability of new bamboo agroforestry areas.			Self-assessment questionnaires are refined to capture more accurate information and easier implementation. Spatial analysis procedures are refined for better information quality. Establishment of methodologies on transforming questionnaire results into geospatial data layers and combining the layers with qualitative information from questionnaires.

No.	Sub-activity	Outputs/ milestones	Completion date	Comments
1.3	Test revised appraisal methodology within four new bamboo agroforestry landscapes in Ngada Regency	1. Four new bamboo agroforestry landscape appraised under revised appraisal procedure explained in Activity 1 Technical Report 2. Two villages recommendation for further bamboo village development		Result analysis: There are four new potential bamboo villages which are Turekisa Village and Sobo Village in West Golewa Subdistrict, Bajawa Village and Beja Village in Bajawa Subdistrict. There are two potential villages to develop a more robust bamboo village mechanism, which are Inegena Village in North Bajawa Subdistrict and Ratogesa Village in Golewa Subdistrict. Those two villages are already intervened by EBF; and based on the village appraisal they have the potential for more development.

PC = partner country, A = Australia

6.1.2 *Objective 2: Efficient bamboo propagation methods appropriate for community-based production identified and adopted with standardized processes*

Table 2. Activity 2: Develop locally appropriate bamboo propagation procedures andenterprise arrangements for degraded landscapes in ENT

No.	Sub-activity	Outputs/ milestones	Completion date	Comments
2.1	Develop bamboo cocoon nurseries in various landscapes to understand the seedling growth in different soils/ biogeochemical materials using standardised propagation procedures.	1. SOP of bamboo propagation procedures in Activity 2 Technical Guideline 2. SOP of bamboo cocoon nursery in Activity 2 Technical Guideline 3. SOP of bamboo plantation in degraded lands in Activity 2 Technical Guideline	27 May 2022	The baseline of the procedures was based on EBF's bamboo nursery experiences in different biogeochemical locations formulated by the monitoring, evaluation, and learning division (MEL). Initial procedures of nursery (by EBF) then enhanced based on the baseline and visual information such as photos and illustrations were added to deliver the information more clearly. The procedures were then refined by peer-reviewing with internal experts of bamboo (Prof. Elizabeth Widjaja, Jajang Sonjaya, Arief Rabik) and the peer-reviewed drafts were discussed and finalized in ACIAR Workshop conducted by EBF. The procedures are accepted as living documents; therefore, the enhancements will be done regularly hand in hand with collecting the lessons learned in site-specific bamboo nurseries.

No.	Sub-activity	Outputs/ milestones	Completion date	Comments
2.2	Develop a mechanism for the establishment of bamboo agroforestry farmers groups and village-level institutions to initiate a bamboo agroforestry enterprise	Business model establishment report which: 1) includes the recommendation on the village-level bamboo agroforestry enterprise, and 2) ensures that resulting benefit are shared equitably	30 June 2022	The SRA took place in the villages that had been intervened by bamboo financing schemes, which were Inegena Village, Genamere Village, and Watukapu Village in North Bajawa Subdistrict (the government-owned land); and Radabata Village (private-owned land). The business model was analysed with the assistance of internal expert on bamboo enterprise (Jajang Sonjaya). Baselines were formulated from EBF's experiences and reports on village appraisal. The result analysis stated that there were major differences between private-owned and government-owned land tenure in terms of financial institution establishment behaviour. Private-owned land tends to have traditional groupings while government-owned land tends to be more modern due to the already established farmers' cooperatives and farmer groups. The approach of bamboo agroforestry enterprise arrangements was then differentiated by the occurred behaviour.

PC = partner country, A = Australia

6.1.3   *Objective 3: Appropriate social and governance infrastructure to support successful bamboo agroforestry villages identified.*

Table 3. Activity 3: Identify necessary social and governance infrastructure for bamboo agroforestry

No.	Sub-activity	Outputs/ milestones	Completion date	Comments
3.1	Determine alignment with existing initiatives, and current village regulations (*peraturan desa*), and conduct a further gap analysis of the social infrastructure	1. Baseline assessment for social-governance infrastructure 2. Regional governance procedures (module and draft templates of the regulation) under bamboo agroforestry mechanisms 3. Provincial regulation of bamboo agroforestry village mechanisms	15 June 2022	The baseline was assessed and formulated in villages intervened by sustainable bamboo forest schemes. The villages didn't have any regulation related to bamboo commodities but some of them had cultural rules and local wisdom for bamboo management. The main finding of the focus group discussion revealed the villages enthusiasm about creating a local governance to regulate their bamboo commodities. Therefore, the main focus of the discussions was deep diving the villages' perspectives on responsibilities and rights, prohibitions, and sanctions under bamboo village mechanisms. The results of the discussions become the baseline for drafting the manuscript of procedures and regulations.

No.	Sub-activity	Outputs/ milestones	Completion date	Comments
3.2	Define the scope of works and procedures for integration of bamboo agroforestry village into Social Forestry program and Forest Management Unit (KPH).	Revised version of business plan to indicate the alignment of bamboo, along with other agroforestry commodities, to be utilized by farmers' group under Social Forestry scheme		A workshop is conducted to revise and finalise the final draft of the regulation drafts and the procedures assisted by policy and government regulation expert (Yance Arizona) and rural development experts from BRIN. The results of the workshop are the finalized version of regulation establishment procedures and templates for village's references, and the next step is to assist the village's administrative to arrange the regulation with regional government. During the village-level arrangements, EBF established the provincial-level regulation in order to support the process. The provincial-level regulation had established and signed by the East Nusa Tenggara governor and was ready to be implemented in regions under the regulation. Parallel to regulation establishment, an alignment to forest management unit was conducted to make sure bamboo commodities under Social Forestry schemes can be utilized by the farmers.

PC = partner country, A = Australia

7 Key results and discussion

A summary of the key results and discussions of the SRA are provided below. More detailed discussions can be found in each activity report in the References. The sections are divided into three activities, highlighting important details related to the main findings of each activity. This is followed by discussing the potential of scaling out the methodologies to assess potential agroforestry landscape for bamboo villages movement within the national-government and broader scale.

7.1 Activity 1: Test and refine village appraisal approach

Previously the tool in analysing bamboo village potentials in an area has only 5 layers of information. It was noticed that there were missing elements in the information, which were gender mainstreaming parameters and agroforestry parameters, that needed to be acknowledged for a thorough analysis of implementing bamboo village mechanism. Therefore, two more parameters were added along with the related key indicators resulting in the change of the 5-layer methodology into 7-layer village appraisal. The new layers were 1) potential for cash and food crops within bamboo agroforestry and 2) mainstream gender equity and social inclusion aspects. The 7-layer village appraisal aims to determine the most potential villages to implement bamboo village mechanisms and visualise the information in a comprehensive set of maps.

The remote sensing analysis were refined to identify bamboo more accurately using Object-Based Image Analysis (OBIA) combined with the overlaid information of land suitability and land availability. The accuracy was enhanced using this new analysis, as the results prior to past research discovered that the former remote sensing methodology only covered 16% standard error for bamboo in monoculture area and 35% standard error for bamboo in mix vegetation area, with the overall bamboo distribution accuracy using remote sensing was 70% (Daemeter, 2021).

The information provided by the refined methodology were to represent spatial information of the first layer (physical site resources including bamboo distribution, land suitability and availability for bamboo development) and the fourth layer (ease of doing business in terms of infrastructure support such as different kinds of roads, water sources/springs, and waterways) of the 7-layer village appraisal. The newly added layers were not impacting the methodology of this analysis as the needed data was not occurred in the spatial information. This analysis provided selected potential sites for bamboo village establishments, thus required further data collection and analysis. The whole revised methodology was tested to determine new potential villages and resulting in the four new potential bamboo village under bamboo village mechanisms, which are: 1) Turekisa Village, 2) Sobo Village in Golewa Barat Subdistrict; 3) Bajawa Village, and 4) Beja Village in Bajawa Subdistrict.

Data collection through ground truthing was conducted to gather non-spatial information needed in the 7-layer village appraisal. The instrument for the ground truthing was the self-assessment questionnaire, but it was enhanced to elaborate the new two layers of information. During the analysis, the instrument had been given feedbacks by the enumerator for its drawbacks, such as the lack of information gathered, inefficient questions that led to longer interview duration, and ambiguous questions. The instruments then refined for shorter yet more effective questions to precise answers. The aim was for easier implementation for layman users even when they were not expertise in bamboo and for easier conversion from qualitative to quantitative data. The revised version of the questionnaire was attached in the Appendix; and it was tested in twelve selected case study sites differentiated by the bamboo village interventions (intervened and not intervened) and different kinds of land tenure (government-owned and private-owned land).

Another finding from the reviews was that the qualitative information gathered from the self-assessment could not be analysed using spatial analysis. In the past appraisal, qualitative

information only served as supporting data. The attempt to weigh and score the qualitative information was present in past report, only to be served as bar graph of villages from highest to lowest score with brief explanation on the key findings (Daemeter, 2021). The information was not analysed with spatial data by remote sensing analysis nor presented in a map. Thus, based on the latest self-assessment, a methodology for data integration was formulated and established using parameter scoring and Analytical Hierarchy Process (AHP). The formulated questions in self-assessment questionnaires represented as parameters and scored to quantify the qualitative information gathered. The 7 layers of information were weighed to determine the priority of each layer and later was combined with the scores generated from the self-assessment, resulting in scores of each village in each layer. The layers then visualised in a comprehensive set of maps and the priority was stratified into three (high, middle, and low). Highest priority (green) indicated the most potential village for bamboo village mechanism, whereas lowest priority (red) indicated the least potential village. The framework was explained further in the Activity 1 Technical Report and workflow can be found in Figure 3.
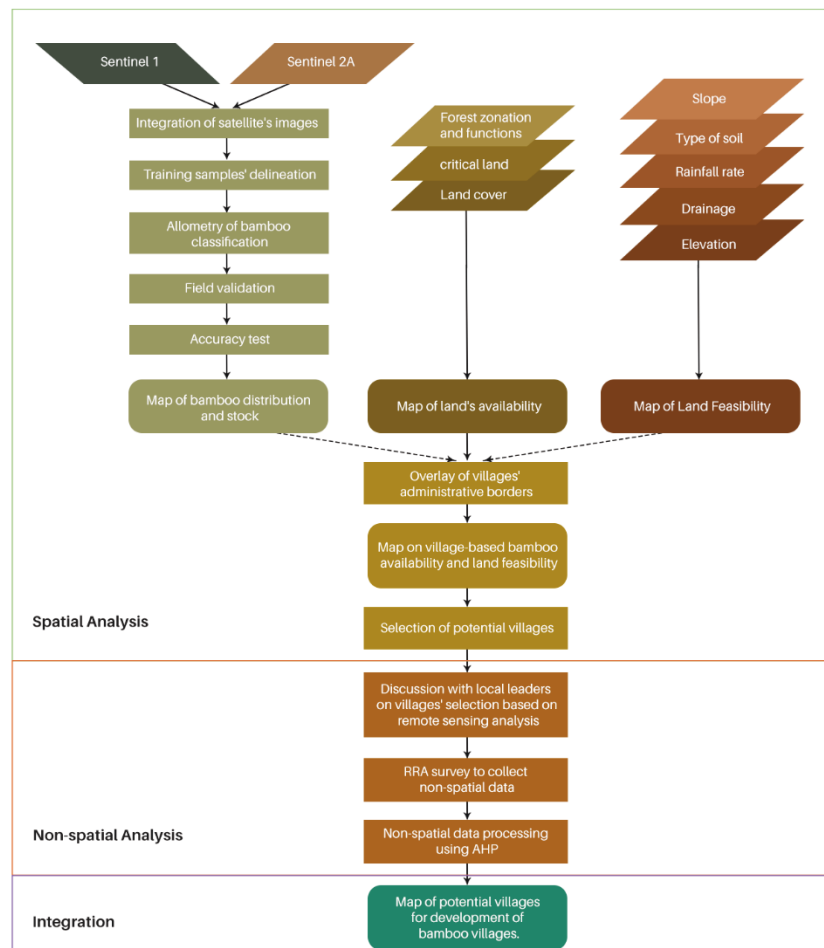
Figure 3 Workflow of the 7-layer village appraisal

The new methodology was then tested after conducting self-assessment, resulting in two determined potential village for further development of bamboo village mechanism, which are Inegena Village in North Bajawa Subdistrict and Ratogesa Village in Golewa Subdistrict. The distinct characteristics were found in the villages where Ratogesa Village had greater bamboo stock and land suitability level, but Inegena Village had better agroforestry potential. This implied that bamboo village did not only take geographical aspect as

perspective, but also valued social, economy, and cultural aspects. The result is visualised in Figure 4 and explained further in Activity 1 Technical Report.

Figure 4 Priorities of highest and lowest potential village for bamboo village establishment based on 7 layers assessment

The 7-layer village appraisal was applied on a regency scale and the AHP was site-specific. AHP score should be renewed and established in every new location and can be applied on a greater scale, based on administrative or ecoregion depending on the assumptions. This methodology is potential to be applied on a greater scale understanding the constraints:

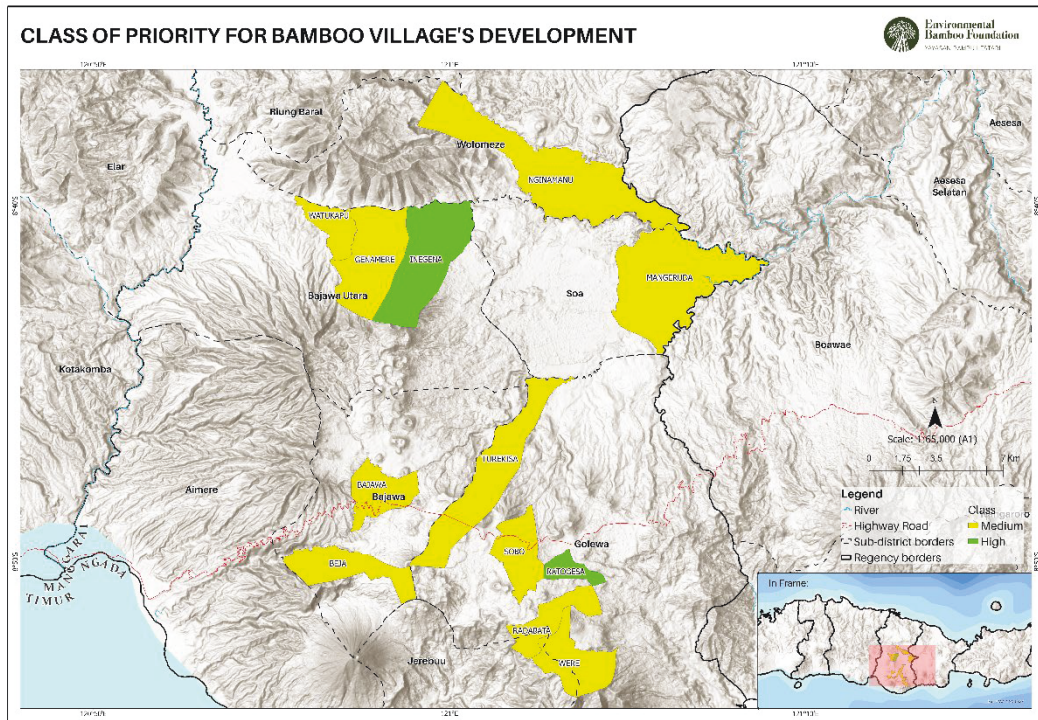a) Remote sensing analysis can capture the general potentials and threats needed for site-selecting the villages but only for the information that can be accessed spatially. Therefore, the information may not as accurate before the village appraisal is done.

b) Village appraisal using self-assessment questionnaires are time consuming if done independently by EBF, thus enhancing the assessment for easier implementation is the main focus of the SRA. Moreover, partnership with local organisation is crucial to improvise the efficacy and data accuracy of the village appraisal.

7.2 Activity 2: Develop locally appropriate bamboo propagation procedures and enterprise arrangements for degraded landscapes in ENT

The main goal of this activity is to provide best practices to produce viable plantlets which have the best survival rate to be planted in degraded land and also to arrange the establishment of farmers' enterprise related to the bamboo commodities focusing on bamboo plantlets. The activity is then divided into two focuses, 1) develop standardized propagation procedures, and 2) develop a mechanism for farmers' group and village level institutions for initiating bamboo agroforestry enterprise. The case study locations for bamboo nursery implementation were in West Manggarai Regency, Manggarai Regency, East Manggarai Regency, Ngada Regency, Ende Regency, Nagekeo Regency, and Sikka Regency in Flores Island, East Nusa Tenggara Province; Mojokerto Regency in East Java;

and Ketapang Regency in West Kalimantan. The case study locations for enterprise arrangements were differentiated into two, which were 1) Inegena Village, Genamere Village, and Watukapu Village inside the Social Forestry scheme; and 2) Radabata Village in private-owned land.

7.2.1 Development of standardized propagation, rhizome enlargement and planting procedures

There main findings were highlighted from literature review and past reports on EBF's bamboo nursery activities followed by data collection to the implementor of bamboo nurseries which were taken into consideration. Plant growth was not documented thoroughly which resulted in no documented effectivity on every procedure implemented in the nursery. Moreover, the procedures were not documented and that led to lack of reference for implementor to implement best practices of bamboo propagation.

Based on the literature review, the implementors were initiated to implement best practices of bamboo nurseries by following the local wisdom in different locations. The action resulted in variety of plant growth and survival rate of plantlets; some were not working but the others were resulting in excellent growth of the plantlets. There was no cross learning and documentation to that process. Different conditions of plantlets in different biogeochemical conditions were a valuable information to be documented, therefore a workshop about bamboo nursery and propagation in different biogeochemical conditions was conducted. It was followed by interviews with implementors for more in-depth information, which described as follows:

a. The species of propagated bamboo were *Dendrocalamus asper¸ Gigantochloa atter*, and *Bambusa vulgaris* considering local species which had economic and ecological function.
b. Procedures that were done in the nursery were propagation using branch and stem cutting. This procedure was the simplest and most practical propagation methodology. The propagation method could be implemented easily in Indonesia. The process was facilitated by EBF to the farmers and local wisdom was considered to enrich the knowledge. The greatest plantlets result was produced from Bambusa vulgaris using this method, due to wall thickness, soft wood grain. After the plantlets passed the first shoot season, approximately within the interval of six to twelve months, plantlets were ready to be moved to the bamboo cocoon nursery.
c. Biogeochemical conditions of existing bamboo nursery that was noted were at least, 1) have a good access to water, 2) good accessibility to trucks for plantlets and for people moving, 3) no flood and other natural risks/disasters identified.

This SRA summarised lesson learned from existing bamboo nurseries, focusing on the plantlets and nursery practices in different biogeochemical conditions, thus generated three phases of nurseries-to-plantation procedures.

a. Procedures of bamboo propagation using branch cutting. The aim of branch cutting is to develop the most time-effective bamboo plantlets to be planted directly in the plantation or moved to cocoon nursery for rhizome enlargement. The characteristics of good plantlets are 1) grown shoots from at least one shoot season (approximately six to seven months after cutting and planted into polybag); 2) established strong rhizome and roots; and 3) developed more than 25 leaves. The procedures of site selection, planting media preparation, growth regulator applications, shade selection, branch sources selection, and methods other than branch cutting were explained in the bamboo propagation procedure.
b. Procedures of bamboo propagation in bamboo cocoon nursery (rhizome enlargement). The aim of the bamboo cocoon nursery is to prepare the growth of the plantlets in 2,5 to 3 years so that the rhizome is strong, large enough, and free from the parasites to be planted in arid, degraded lands. Moreover, cocoon nursery can also multiply the plantlets by splitting the enlarged rhizome and branches into smaller branches. The

    smaller branches then treated according to bamboo propagation procedures in as described in point a). The procedures of moving plantlets in bamboo propagation nursery to bamboo cocoon nursery, plantlet treatment in bamboo cocoon nursery, splitting, and plantlet preparation before the plantation were explained in the cocoon nursery procedure.

c. Procedures of bamboo planting in permanent land (degraded land rehabilitation and industrial purposes). There were two aims of plantation, 1) to rehabilitate degraded lands and 2) to supply village-based bamboo industry. Plantation for rehabilitation is done in the degraded watershed, semi-arid/arid land, riparian forest, or species enrichment/conservation area. Plantation for industrial supply is done in private-owned land (individual or collective owners) or government-owned through social forestry scheme. The rehabilitation area can also become supply area, following the regulation of its region. Technical procedures of the plantation such as plantation model, planting distance, planting techniques for plantlets from cocoon nursery and plantlets from propagation nursery, plantation treatment, and variety of intercrops were explained in detail in the bamboo plantation procedure.

Implementation of these procedures on a national-government or greater scale is applicable by taking these into understanding:

a) Standard Operating Procedures (SOP) developed from this activity is a living document which means every lesson learned from new or existing nurseries (both bamboo propagation and bamboo cocoon nursery) should be considered and documented.

b) Monitoring tools for evaluating the practices of the procedures need to be established

c) More SOPs related to the bamboo agroforestry system need to be established, for example: SOP for agroforestry plantation, SOP for sustainable bamboo forestry, and SOP for integrating bamboo nursery and bamboo agroforestry enterprise

7.2.2 Development of mechanisms for farmers' group and village level institutions for initiating bamboo agroforestry enterprise

Based on the literature reviews in past village appraisal reports done by EBF and data collection through ground checking results, the stakeholders were identified related to the arrangements of the enterprise. The stakeholders had different role in the village community, therefore in-depth interviews with each stakeholder were conducted to gather more information, especially to identify the role of each stakeholder under bamboo agroforestry enterprise. The identified stakeholders were explained as follows, but not limited to:

a. PT. Indobamboo and other off takers of bamboo and agroforestry commodities

b. Regional financial institutions such as cooperatives (Tanoba Lais Manekat Services Cooperatives or TLM-Indonesia), regional company (*Perusahaan Daerah* or PERUSDA), village-owned enterprise (*Badan Usaha Milik Desa* or BUMDESA), and inter-village-owned enterprise (*Badan Usaha Milik Antar Desa* or BUMADESA)

c. The owners and managers of bamboo forests which are the members of farmers' cooperatives, especially women farmers facilitated by EBF

d. Supporting stakeholders from related ministries and institutions

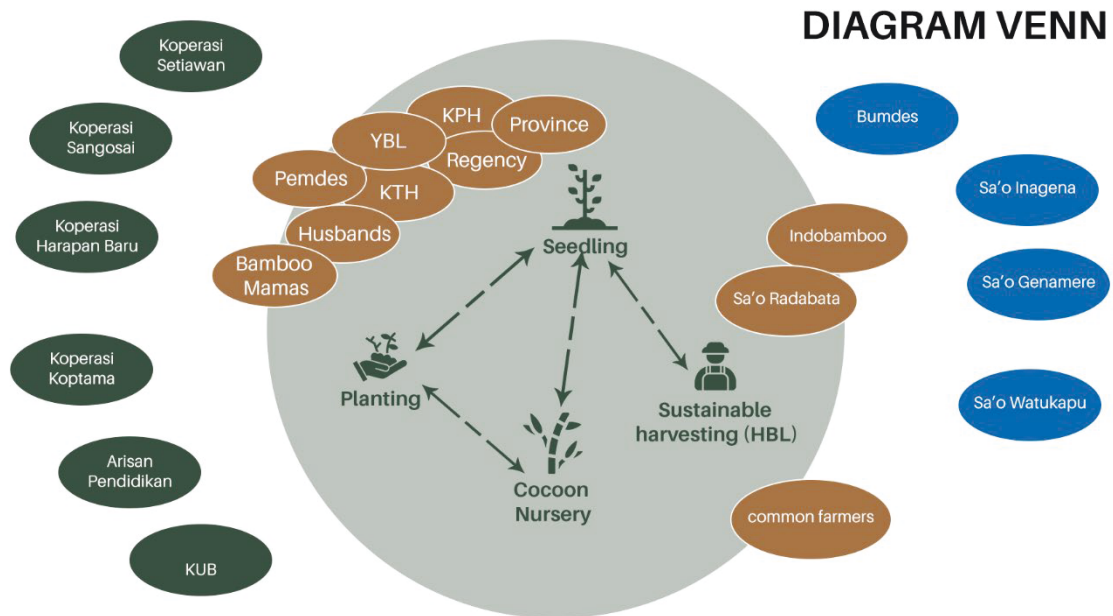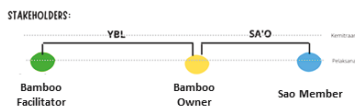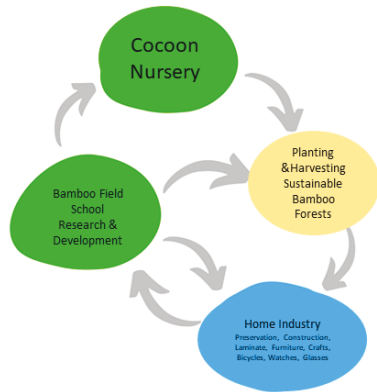The relationship of the stakeholders was displayed in the Figure 5.

Figure 5 Venn Diagram of the stakeholders under bamboo village mechanism

Moreover, the villages were identified that they had been introduced by Sustainable Bamboo Forest management and had implemented it privately or with farmer groups and the cultural use of bamboo was present in all villages. The present conditions that had been identified benefited the business because the village had supported the bamboo agroforestry mechanisms. The approach to re-introduce bamboo into the people's daily activities were successfully implemented so it was followed by assessing the impact of the activities to understand the after-effect of the approach. Therefore, in-depth interviews were conducted to determine the village conditions.

The villages were differentiated into two grouping, 1) traditionally grouped following the culture of the village using family clans (Sa'o), and 2) post-traditionally grouped by modern governance such as farmers' group in Social Forestry scheme, cooperatives, and village-owned enterprises. The differences were affecting the way to implement the business; therefore, this finding was taken for perspective to build a different business model for both groups. On the other hand, bamboo forest and land tenures were differentiated into three schemes, 1) private-owned, 2) communal-owned by traditional grouping (Sa'o), and 3) land concession through Social Forestry scheme. Agroforestry commodities functioned as people's cash crop were different in traditional and post-traditional villages, conceivably due to the distinct distance of the subdistricts. Post-traditional commodities are relatively the same because the villages were located side by side. The business models generated considering the differences of the groups were displayed in the Figure 6.

Figure 6 Business model for traditional village and post-traditional village

This SRA identified the business initial of bamboo agroforestry systems, started with the plantlets made in bamboo propagation nursery to bamboo cocoon nursery, then planted in government-owned and private-owned land. The plantation then managed and harvested under Sustainable Bamboo Forest system. The workflow can be found in Figure 7.
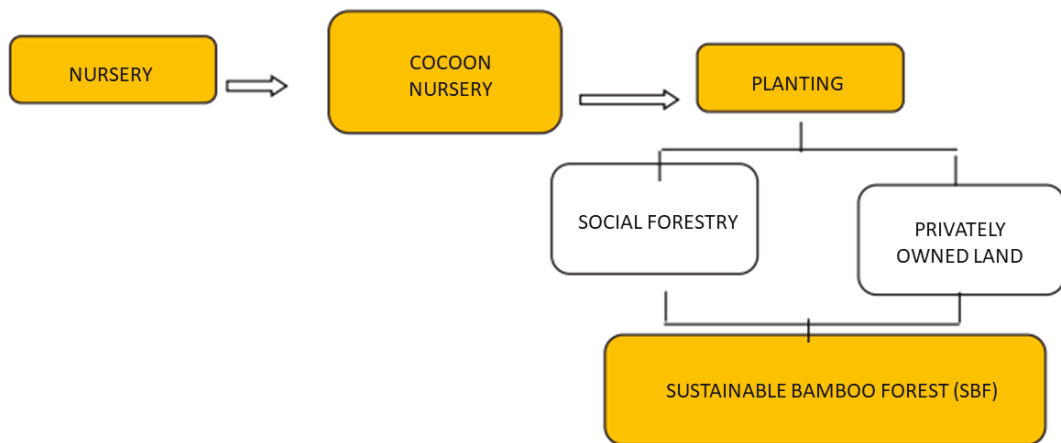
Figure 7 Workflow of bamboo village mechanism

The expected outcome of bamboo village mechanism was to build the capacity of farmer groups with bamboo agroforestry system by developing bamboo commodities combined with local intercrops. One of the driving factors to support the mechanism was Bamboo Field School. The general curriculum of the school was institutional strengthening, Sustainable

Bamboo Forest management and the activation, and establishment of bamboo agroforestry enterprise for community-based bamboo industry.

There were some bamboo commodities which could contribute to income generation for the community. Preserving bamboo poles traditionally was present in the culture and introducing modern preservation to communities could lengthen the durability of the poles, increase the quality and quantity of produced commodities, and create a competitive value to the market. One of the demanded usages for bamboo poles was for construction, especially to support traditional house for cultural purposes. Other than that, the modern bamboo-based construction could be re-introduced to the village to revitalize the indigenous people skill of building houses. To facilitate the capacity building, EBF had established Bamboo Campus Turetogo in Ngada Regency to transfer the knowledge and also for cross learning.

The derived products of the preserved bamboo other than for construction were furniture, simple laminated bamboo made by the community, high quality laminated bamboo made by bamboo industry, and woven crafts. These were the potential commodities from bamboo sources that could be made by the communities under bamboo enterprise. The study was excluding agroforestry potentials due to the limited time of the research. Business plots and value chains of the entire stream were delivered in Figure 8.
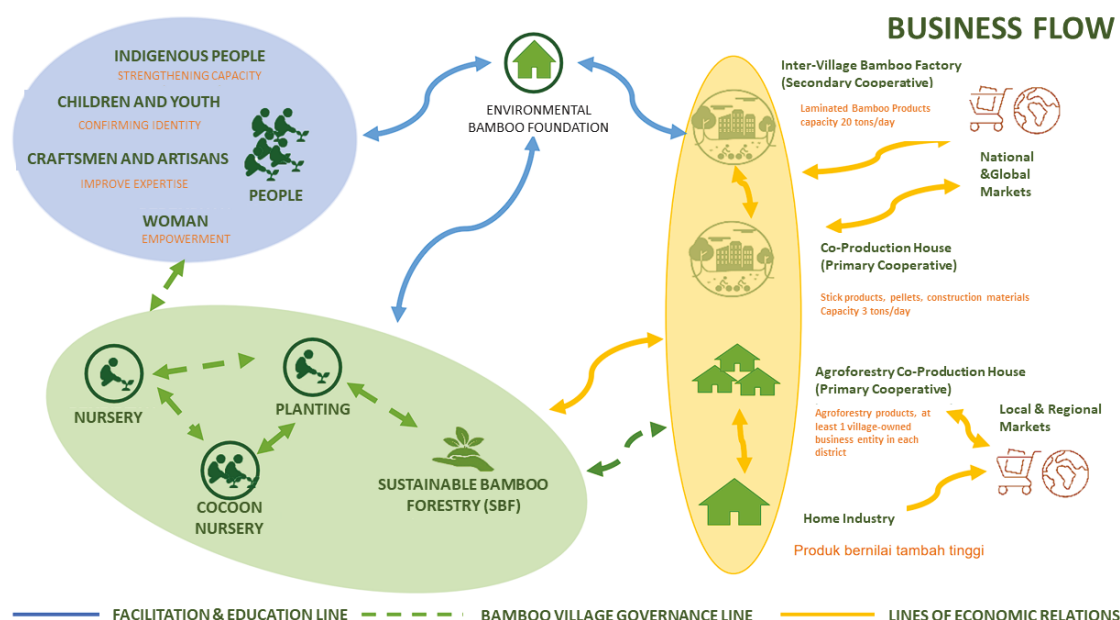
Figure 8 Business flow and value chain under bamboo village mechanism

Business model generated in this SRA was limited in bamboo utilization only, taken from the price of the poles sold, the cost of training and implementing bamboo village mechanism. The breakeven point was modelled in the income statement displayed in the Table 4. The business is feasible to run for ten years with the breakeven point on year 7. The income generated forecasted from this scheme is IDR 750.000.000 or equivalent to AUD 75.000 (assuming AUD 1 equals to IDR 10.000). The profit (after subtracting cost from income) forecasted in this mechanism is IDR 697.500.000 or equivalent to AUD 69.750.

Table 4 Income statements and breakeven point forecast

Year	Cost	# Harvested Culms	Cost per culm	Income	Profit
1	IDR 136.607.500	IDR -	IDR 25.000	IDR -	-IDR 136.607.500
2	IDR 46.150.000	IDR -	IDR 25.000	IDR -	-IDR 46.150.000
3	IDR 46.150.000	IDR -	IDR 25.000	IDR -	-IDR 46.150.000
4	IDR 207.150.000	IDR -	IDR 25.000	IDR -	-IDR 207.150.000

5	IDR	52.500.000	IDR	-	IDR	25.000	IDR	-	-IDR 52.500.000
6	IDR	52.500.000	IDR	-	IDR	25.000	IDR	-	-IDR 52.500.000
7	IDR	52.500.000	IDR	30.000	IDR	25.000	IDR 750.000.000		IDR 697.500.000
8	IDR	52.500.000	IDR	30.000	IDR	25.000	IDR 750.000.000		IDR 697.500.000
9	IDR	52.500.000	IDR	30.000	IDR	25.000	IDR 750.000.000		IDR 697.500.000
10	IDR	52.500.000	IDR	30.000	IDR	25.000	IDR 750.000.000		IDR 697.500.000

The models under bamboo village mechanism were valuing cultural, social, economic, and ecological aspects. Traditional village was recommended to have a clan-based bamboo enterprise, while post-traditional village was recommended to have a cooperative-based bamboo enterprise. This was because cooperatives were more open to partnership, as the already established economic institutions such as the village-owned enterprises (BUMDES) could also contribute to the enterprise. The smaller institutions in traditional and post-traditional village were recommended to build primary cooperatives, where simpler products could be produced and utilized. The greater scale of the enterprise was recommended to build secondary cooperatives, as the unification of the primary cooperatives to produce bamboo-based products which require more complex industries. The comprehensive business model for secondary cooperatives were displayed in the Figure 9.
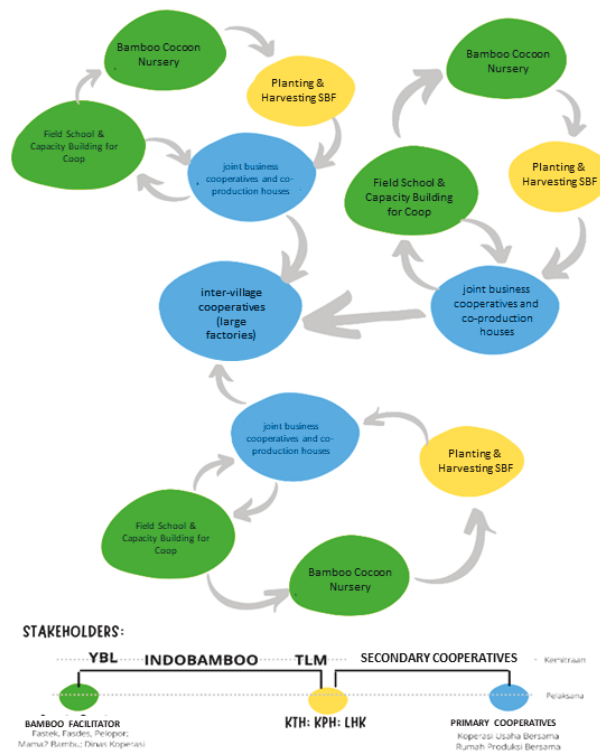
Figure 9 Business model for secondary cooperatives

Implementation of these procedures on a national-government or greater scale is applicable by taking these into understanding:

a) Two village groupings, family clan traditional group (Sa'o); and post-traditional group could be merged into one secondary cooperative to build a bigger engineered bamboo factory. However, the approach of both groups should be tailored to their conditions.

b) In the idle moments of waiting until year 7 for the breakeven point, the communities must be intensively engaged under bamboo village schemes. Developing local and valuable crops for internal and external markets can be one of the options.

c) Stakeholders of the whole business model which were EBF, farmers' group, primary and secondary cooperatives, and PT Indobamboo must have a separated Partnership Agreement Design and the role should be explained thoroughly.

7.3 Activity 3: Identify necessary social and governance infrastructure for bamboo agroforestry

Baseline assessment from literature review and past reports from EBF resulting in selected villages for identifying social-governance infrastructure are intervened villages differentiated by land tenures which were 1) Inegena Village, Genamere Village, Watukapu Village in government-owned land by Social Forestry schemes, and 2) Radabata Village in private-owned land.

Main findings of data collection found in the village's past activity that related to bamboo village establishments in terms of social-governance infrastructure. Village funding was contributed to the establishment of bamboo nursery, especially funding the preparation of moving the plantlets to farmers' land. The needs of the villages to establish governance infrastructure in the form of village regulation. The obstacle to establish the regulation was because the support was not present in the village. Therefore, the follow up action was to identify the support needed by the village.

Process of establishing regional policy was identified and delivered in regional governance procedures which further explained in the Activity 3 Module. Regulation drafts were then formulated under bamboo village mechanisms which incorporate the culture, managerial, and utilization perspectives. The activity was then followed by the identification of Social Forestry schemes and its missing elements to establish bamboo agroforestry system. The SRA generated the outputs to support policy establishment, which were described as follows:

a. Methodology of establishing village regulations under bamboo village mechanisms
b. Regional governance model under bamboo village mechanisms to be referred and tailored with the villages' social-governance conditions, with key perspectives to be considered:
    o Sustainability approaches of managing bamboo forests under bamboo agroforestry system
    o Government, farmers, and other stakeholders' roles in managing and monitoring the Bamboo Village
    o Village's authority in government-owned land tenure under Social Forestry scheme
c. Initial regency-based regulations for sustainable bamboo management and utilization
d. Provincial regulation establishment for bamboo village mechanism under governor's regulation
e. Alignment on Social Forestry schemes for bamboo agroforestry system establishment by refining the partnership between villages and forest management unit

Implementation of these procedures on a national-government or greater scale is applicable by taking these into understanding:

a) General information of the village can be assessed with self-assessment instrument in village appraisal methodology.
b) After site selection process according to the results of the 7-layer analysis, focus group discussions on the selected sites can be initiated to gather more specific information about the social-governance conditions of the village. During the initiation process, regional governance model in the form of regulation draft can be introduced to the village as a reference for the regulation establishment.
c) Partnering with local organisations should be in consideration for time efficacy, especially for a national and broader scale implementation

8 Impacts

This study generates key findings of lesson learned to organize new procedures under bamboo village mechanism that can be adopted and implemented effectively on a national scale. The approaches of this study were: 1) multidisciplinary approach, consisted of socio-culture, economic, and ecological approach with governance and regulation support; 2) public, people, private partnership; and 3) upstream and downstream integration. Due to short period of the research duration (6 months), the overall impacts have not yet been perceived comprehensively. However, this action research is placed as the baseline and the asset to project more comprehensive impacts – whether it is an activity to develop the community, an increase of livelihood or skills built by this research – which affected by the research.

8.1 Scientific impacts – now and in 5 years

Direct, indirect, and potential impacts that will be achieved in five years are described with documentations from the field site.

A refined remote sensing approach for bamboo village development is established. This could accelerate the assessment of potential bamboo village by analyzing bamboo distribution, land availability for plantation, and land suitability as bamboo habitat. If the conventional assessment could take up to a month per village, this methodology will speed up the process 10 times faster due to the scalable range of the refined assessment. The measured impact in 5 years is that, if done properly and engaging the right local communities and organizations, at least one country will be assessed and the potential villages will be selected by this methodology.

Figure 10 Road condition around North Bajawa Subdistrict

Figure 11 Bamboo condition in North Bajawa Subdistrict; a coded clump (above) and bamboo forest in private owned area (below)

Tools and procedures development in site selection process for bamboo village assessment are developed. The integration of remote sensing and questionnaire scoring was formulated to improve accuracy and duration of the assessment. Integrating the scoring system with spatial information is crucial in affecting the accuracy and effectiveness of this assessment. Therefore, the confidence level of data accuracy will be increased to 95% if the procedures are updated regularly.

Standard operating procedures for comprehensive bamboo cultivation from propagation to plantation are successfully improved. Implementation of best practices lead to significant growth of the plantlets and increase the survival rate of the plantlets in degraded lands. In five years, the survival rate of bamboo plantlets in the nursery will be increased to 95%, which leads to more viable bamboo plants to be planted in degraded lands.

Figure 12 *Bambusa vulgaris* plantlets in Bamboo Mamas' bamboo nursery

Figure 13 Bamboo cocoon nursery conditions

Business model and benefit sharing guidelines are developed for the community. The approach on community-based business model in bamboo village development will be successful as a clear understanding and benefit-sharing guidelines affect the eagerness of the community to implement bamboo village mechanisms. By giving the estimated projection on how the community improves their livelihoods, the eagerness of them of conducting a sustainable management of their bamboo plantation is increased rapidly. This is shown by every month, there are at least 10 farmers who are reportedly interested in implementing bamboo village mechanism. By making a regular improvement to the existing farmers and a refined method of projecting the benefit-sharing process, more farmers will be interested in joining the movement. As the study was conducted as action research, the result of this activity directly affected the implementation of the business activities conducted by the communities. A case study is the community in Radabata Village has planned to implement a furniture and construction business managed by villages and the community.

Figure 14 Bamboo-based housing construction made by the communities

Figure 15 Credit union cooperatives based in Ngada Regency used by the communities

New regulatory approaches for bamboo utilization on village-level, regency-level, province-level, and nationwide are established. Regional and village-level government supervising the management and utilization of bamboo commodities lead to financial and facility support to develop bamboo village. There are already three villages which had already been funded by village funding, and with a better communication and stakeholder engagement there will be at least ten villages in each regency of each province that will be aligned with bamboo village regulation in five years.

Figure 16 Rapid rural appraisal for village regulation discussion conducted in Watukapu Village (left) and Inegena Village (right)

Bamboo village development under Social Forestry scheme is successfully aligned. Support gained on social forestry scheme affect the existing farmers group to maximize the utilization of land for bamboo plantation and inspire other farmers to establish a farmer's group and propose the permission of utilizing forest under social forestry scheme. One of the study cases implemented in this SRA was Beja Village, which now had a legal permission to utilize bamboo forest in their Village Forest under Social Forestry Scheme. The activity conducted in this village was the approach to bamboo mamas (female farmers' group) to propagate bamboo plantlets in bamboo nurseries. The follow up action regarding this attempt will be the approach to include bamboo in their Social Forestry Work Plan (RKPS) document to align bamboo utilization as the farmers' commodities.

As for the existing farmers' group who owned Social Forestry permission, which were in Inegena, Genamere, and Watukapu Village, the alignment of bamboo commodities for utilization was established with the rightful local Forest Management Unit in Ngada Regency. Thus, the farmers groups were now legally harvest and manage bamboo resources in social forestry area.

8.2 Capacity impacts – now and in 5 years

Learning processes to develop skills and capacities of the community had been executed in project activities. The lesson-learned results are not only directly accepted by the implementors, but also to the village communities such as farmers and other stakeholders related to bamboo village.

A total of 62 trainers were capable to provide training to a wide range of farmers community. This training for trainers aimed to update and improve the knowledge of the implementing team so that they were reliable in facilitating bamboo field schools from nurseries to sustainable harvesting. The activity was carried out on 17-21 May 2022, Ngada Regency, East Nusa Tenggara which was attended by 34 males and 28 females.
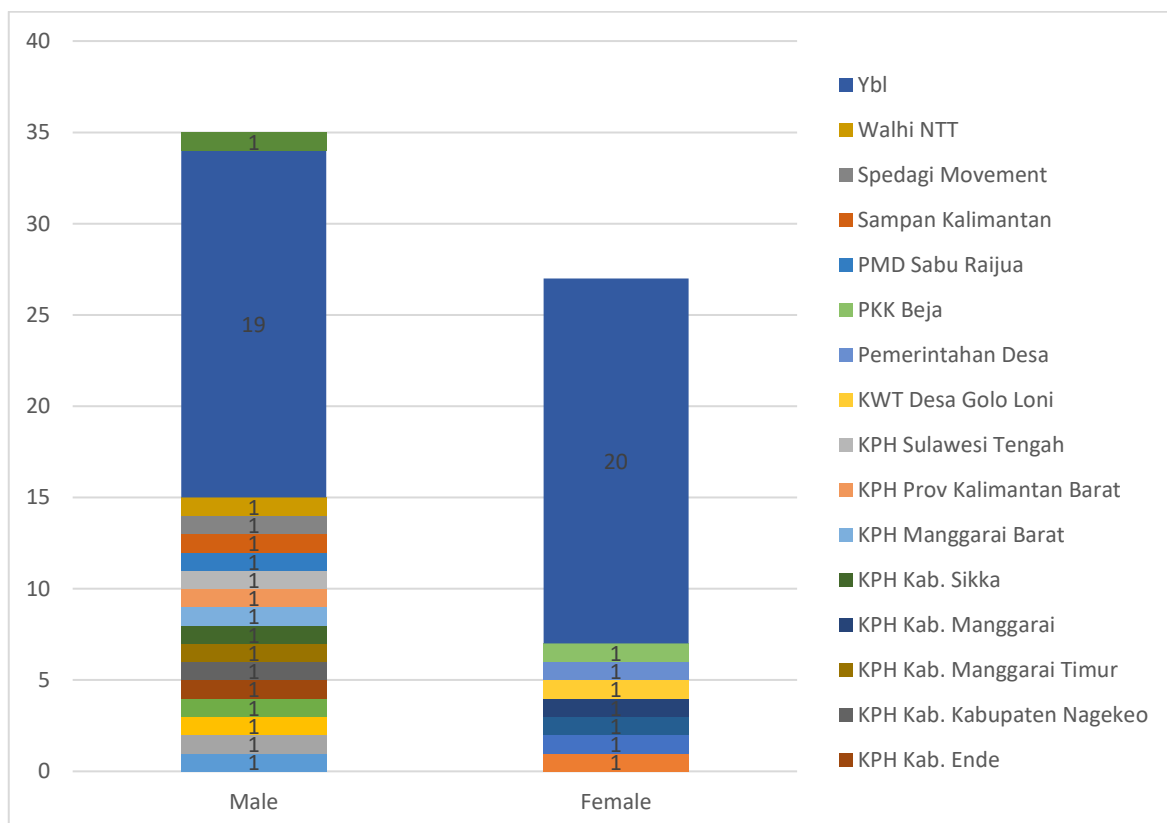

Figure 17 Training of Trainer Participants

Six community groups had implemented the participatory rural appraisal which learned to understand about their potential resources in the village and the best practices of the management of sustainable bamboo forests. The implementation of the preparation of village regulations in the two sub-districts, several parties were involved including village heads, women's groups, youth groups, traditional representatives, bamboo owners from various types of ownership and female heads of families. 144 people involved in this activity.
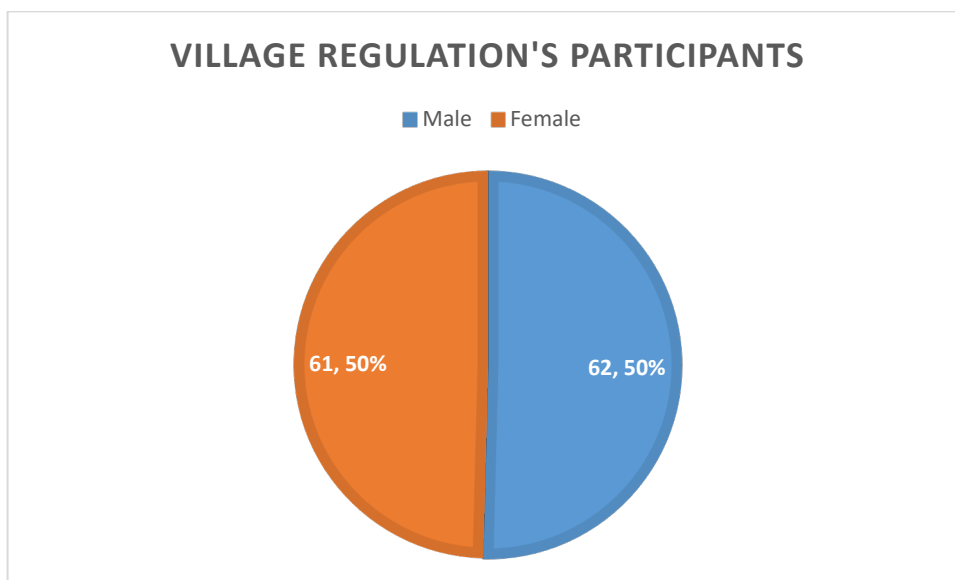
Figure 18 Village regulation's appraisal participants

The existence of Environmental Bamboo Foundation as a facilitator in developing of bamboo village are strengthened. The organizational calibration workshop and the sustainable bamboo foundation program aim to measure the suitability of the organization and program to the theory of change that has been jointly determined. 50 people were involved in this discussion from EBF staff, forest management units, and other local NGOs.

Strengthening capacity building of Bamboo Village Facilitators. To build and develop the knowledge of Environmental Bamboo Foundation staff in order to actualize their thoughts on current issues or knowledge, a Cocoon Collaborative Learning (CCL) was held as a forum for internal discussions of the Environmental Bamboo Foundation. CCL has been held 4 times with the following themes:

- Steps Towards Sustainable Management of Bamboo Forests Through Forest Stewardship Council (FSC). invited Mr. Emil Kleden as resource person as a Free, Prior, Informed, and Consent (FPIC) consultant at EBF. FPIC is the most important part in running a sustainable bamboo forest by applying FSC principles (25 March 2022)
- 7 Layers with GIS team. Presented the results of the feasibility assessment of the agroforestry bamboo village in Ngada based on 7 layers:1. Bamboo availability and land suitability; 2. Village readiness; 3. Regulation support: regulations related to bamboo; 4. Threats and Risks; 5. Village-scale business potential; 6. Potential of Agroforestry; 7. Gender equality (21 July 2022)
- Agroforestry Bamboo Village's Model Business (23 July 2022)
- Development Data Spatial with Google Earth with GIS team (2 Augustus 2022)
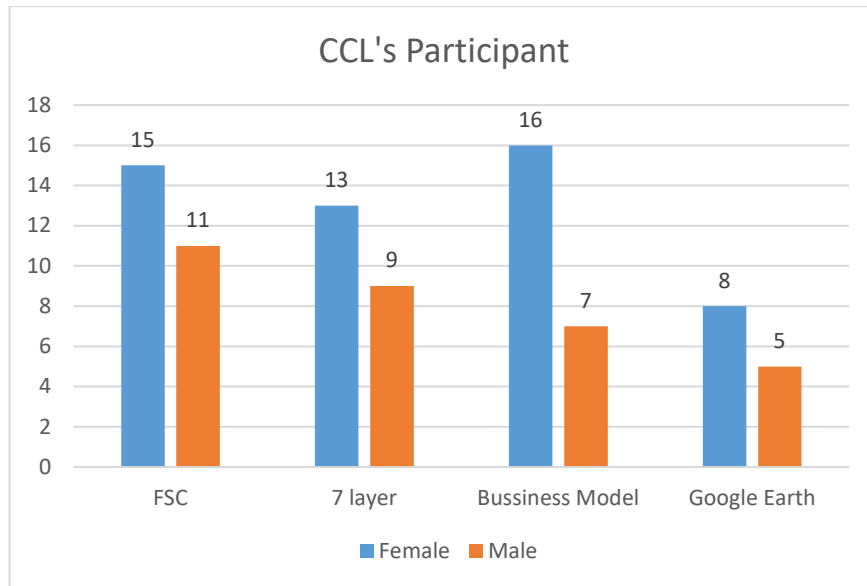
Figure 19 Cocoon Collaborative Learning Participants

A total of 70 female farmer initiators had the capacity to cultivate bamboo and develop bamboo nurseries located in Ngada Regency. In commemoration of Kartini Day, Bamboo Collaborative Learning (BCL) carries the title "Learning from Mama Bambu the Saviour of Nature" specifically aims to provide space and a place for 10 Mama Bambu to share their efforts and experiences to sow seeds as an environmental action as well as efforts to overcome economic and social problems, provide an opportunity for participants to get information about Mama Bambu's role in reforesting ENT with Bamboo, as well as learning lessons from Mama Bambu's activities in reforesting ENT with Bamboo. In this event joined with a total 42 (14 males and 28 females).
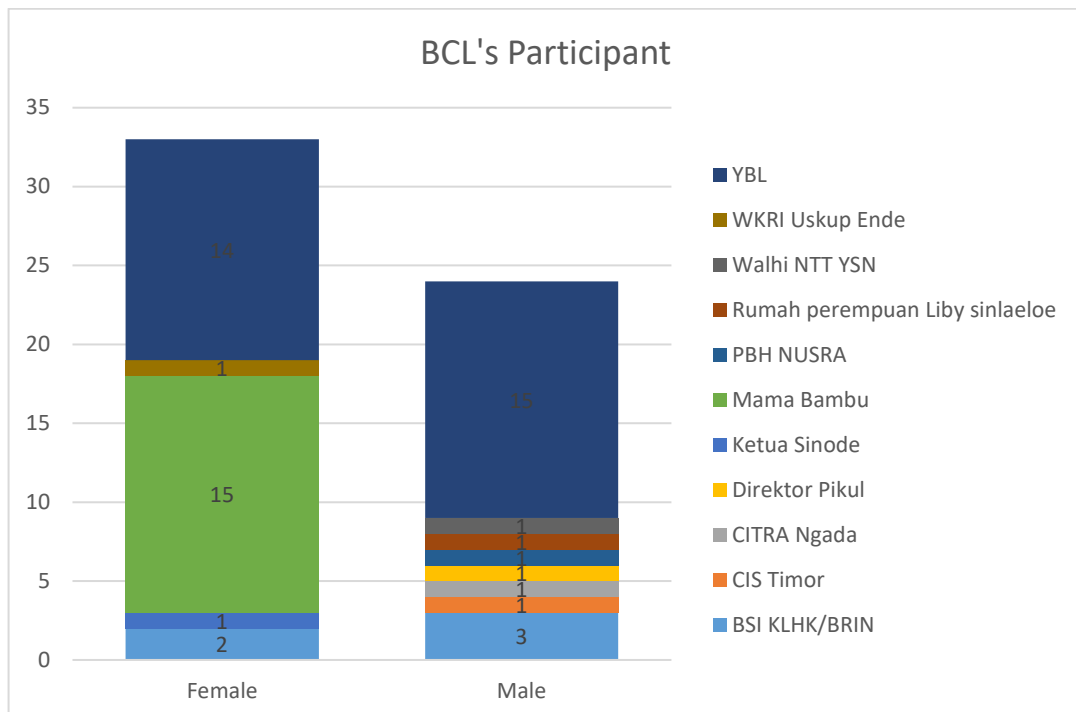
Figure 20 Bamboo Cocoon Learning Participants

There are 377 bamboo farmers that had been informed about Forest Stewardship Council (FSC) system as a part of bamboo village mechanisms. This SRA supports FPIC activities for FSC in two sub-districts. In this activity, the participants involved 368 people. There are 123 participants from North Bajawa Sub-District and 254 from Golewa Sub District.
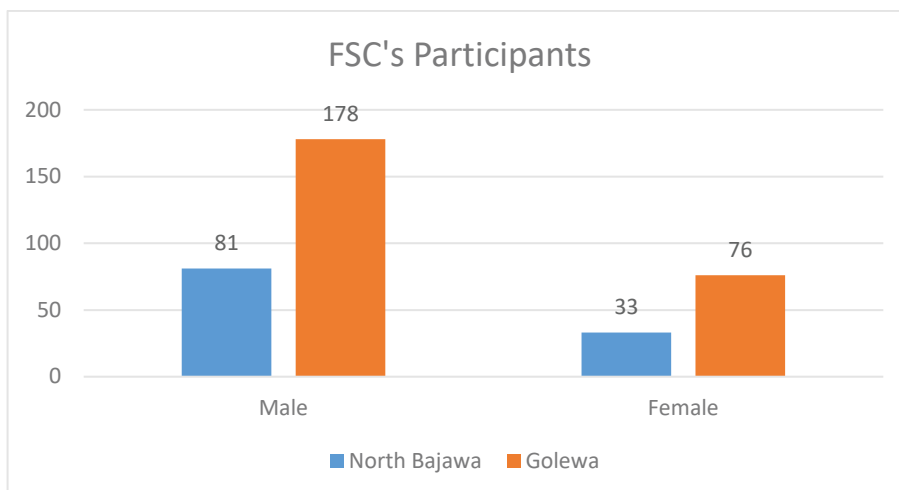
Figure 21 Forest Stewardship Council's Implementation Participants

8.3 Community impacts – now and in 5 years

Bamboo village development on community was carried out by several approaches and described in further details in Table 5.

Table 5 Community impacts by the SRA activities

Community Targets	Activities	Beneficiaries/participants
Approach on bamboo farmers	Bamboo field school (capacity development of SBF, bamboo nurseries, construction, and preservation)	• 369 participants of Sustainable Bamboo Forest management course • 70 participants of bamboo cultivation course • 16 participants of bamboo construction and preservation of bamboo poles
Approach on tribes/cultural community	Household commune (Sa'o) joined bamboo village mechanism to implement SBF and build bamboo industries	• 22 tribes • 121 sub-tribes (Sa'o) households
Approach on village administrative (participatory rural appraisal activities for village regulations)	Agreement on village funding for bamboo field school, nurseries, and plantation Initiation of village policies to regulate bamboo management and utilization	• 3 Village funding on bamboo activities in North Bajawa Subdistrict • 4 Village policies for regulating bamboo activities in North Bajawa and Golewa Subdistrict
Approach on female farmers group	Participation of female farmers' group (bamboo mamas) for bamboo nurseries establishment and plantlets sold	70 female farmers were participating bamboo nurseries in 2021
Approach on famer's group under Social Forestry Scheme	Inclusion of bamboo plants for utilization and commercial purposes	14 groups are implementing SBF in their area (Beja Village, Inegena, Genamere, and Watukapu Village)

34

8.3.1 Economic impacts

Due to short period of the research duration (6 months), the economic impacts have not yet been perceived. However, the feasibility study analysis of community-based business enterprises and benefit-sharing pretty much forecasted with certain conditions.

Approximately, around IDR 814.490.000 was obtained by fifty bamboo mamas during bamboo nursery activity in 2021. In 2022, around IDR 172.742.500 for twenty bamboo mamas was also obtained through bamboo nursery business activities. The plantlets were bought by East Nusa Tenggara government through Village Community Empowerment government office.

Through village funding, another mechanism targeted in bamboo village mechanism, Beja Village received more than IDR 21.000.000 for Bamboo Field School, bamboo nursery activities, and plantation in farmer-owned lands. Small industries conducted by farmers' enterprises were also running, as business activities were present in January to July 2022 for Turetogo Bamboo Campus development. The approximate amount of total revenue for 6.720 poles from 52 bamboo farmer was IDR 168.000.000 (AUD 16.800). In Table 6, monthly revenue and the amount of bamboo poles sold were further explained.

Table 6. Details of income statement from bamboo pole selling activities

Month	Bamboo Farmers	Bamboo Poles	Income
March	7	1.160	IDR 29.000.000
April	21	1.920	IDR 48.000.000
May	18	2.600	IDR 65.000.000
June	6	1.040	IDR 26.000.000
Total	**52**	**6.720**	**IDR 168.000.000**

Moreover, a business incubation from upstream to downstream in La Cove Restaurant in Kupang, East Nusa Tenggara was initiated. The production will involve the local farmers which will be trained to develop their technical skill for establishing bamboo furniture. At the end of training session, participants are expected to build various bamboo-based furniture. The Environmental Bamboo Foundation encourages the establishment of primary and secondary bamboo cooperatives with the aim of improving the welfare of the community both materially and competently in the field of bamboo production and its derivative products. In the next 5 years, the cooperative will be able to run its operations independently and provide additional income for its members. The potential economic impact of sustainable-harvesting and furniture-making involved a cash flow of around Rp 300.000.000 per month that benefitted for bamboo owners, loggers, and craftsmen. The profit for groups or cooperatives was around 30% (IDR 90.000.000 per month or AUD 9.000). The engineered bamboo products and manufacturing process are visualised in Figure 22.
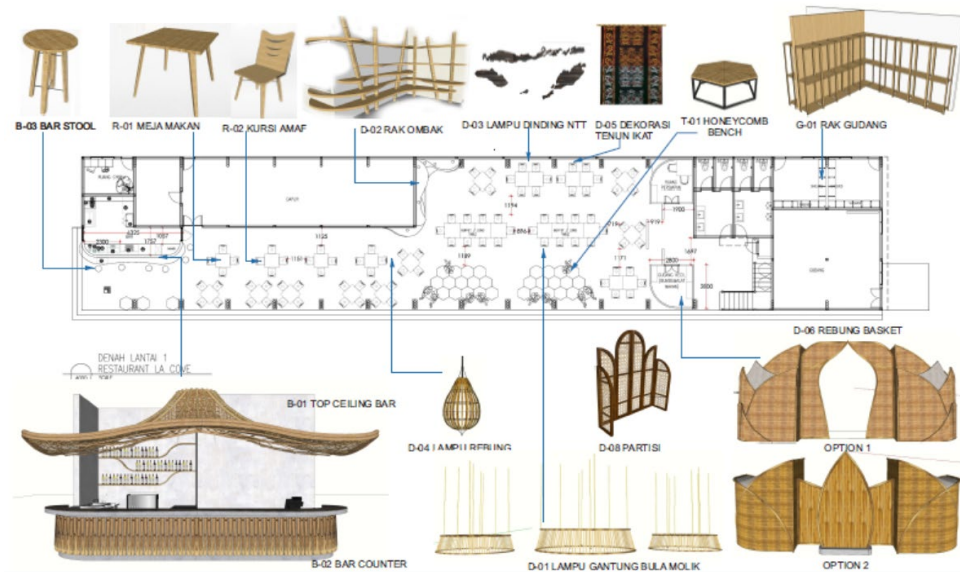
Figure 22 Various products derived from bamboo resources for business incubation

8.3.2 Social impacts

Strengthening institution activities affect the communities, especially the female farmers' who had not been included for increasing livelihood before. As the capacity for institution establishment is increased, the communities have better understanding to manage the production and utilization of bamboo industries at a greater scale.

The local household tribes (Sa'o) were strengthened by conducting bamboo field school to manage village-owned bamboo village in a sustainable way. There was also an increase of accessibility for communities to utilize bamboo resources under Forest Stewardship Council mechanisms as this SRA conducted a Free Prior Informed Consent (FPIC) to economically affected farmers in bamboo agroforestry villages. Furthermore, to acknowledge the capabilities and underlying knowledge of handling bamboos, there will be a certification awarded to bamboo mamas from the First Lady of Indonesia for starters. This endeavour will be followed by awarding bamboo field school participants a certification of completion to be a certified bamboo trainer. Hopefully, this will trigger the curiosity and eagerness to learn more about bamboo management and utilization in site-level communities, while also influence other regional governments to implement bamboo villages and spread more information about the quality of bamboo resources in Ngada Regency.

8.3.3 Environmental impacts

Bamboo plantation programs within Ngada Regency region. There were 392.893 plantlets propagated and 68.072 plantlets planted in Ngada Regency, in which 82.282 plantlets were established with village funding from villages in North Bajawa. Within 5 years, approximately 5.657,6 hectares of agroforestry bamboo land will be planted in Ngada Regency (assuming the planting distance is 12 m x 12 m).

A total of 2.000 plantlets were planted in Tilong and Raknamo dams, Kupang. in collaboration with the Public Works and Housing office of East Nusa Tenggara Province for the rehabilitation of the water dam area. Bamboo as a plant that stored water was chosen as a rehabilitation plant for watershed areas.

Supporting research about carbon storage in bamboo. Potential impacts to be achieved in the plantation perspectives as bamboo nurseries had already been established by bamboo mamas (female farmers of the communities). These activities have the potentials to contribute as one of the supporting mechanisms for the Indonesian government's Net FOLU Sink targets 2030 in bamboo agroforestry land use sector.

For a reference, a research of carbon storage calculation had been conducted in Ngada Regency, focusing on *Dendrocalamus asper* species. *D. asper* bamboo forest in Ngada Regency had a carbon potential of 2.08 megaton CO_2. The carbon fraction in biomass is 43.17% with the most effective allometric equation model is $AGB = 0.038 \times D^{2.625}$.

As a comparison, other research conducted by EBF in Ketapang Regency with different species (*Gigantochloa* sp.) had a carbon potential of 0.37 megatons of CO_2, with a percentage of carbon in biomass 45.63%, calculated using the most effective allometric equation model $AGB = 0.055 \times D^{2.584}$.

8.4 Policy impact

Policy support from the village to the national level for Bamboo Agroforestry Village is evident from the ratification of the Bamboo Agroforestry Village Governorate and the encouragement for village preparation, regency strategy road map (STRADA), and national strategy (STRANAS).

Regional government recognition is present in regulatory approach to ensure the implementation of sustainable bamboo forest management established on the legal document. Governor's Decree of Bamboo Village Agroforestry was referred for changes to the Regional Medium-Term Management Plan 2022-2023 in Nagekeo Regency. This created an impact for Bamboo Village Agroforestry scaling up at the district level.

8.5 Communication and dissemination activities

1. Discussion with bamboo activists, President appreciates bamboo processing technology (https://setkab.go.id/diskusi-dengan-pegiat-bambu-presiden-apresiasi-teknologi-pengolahan-bambu/)
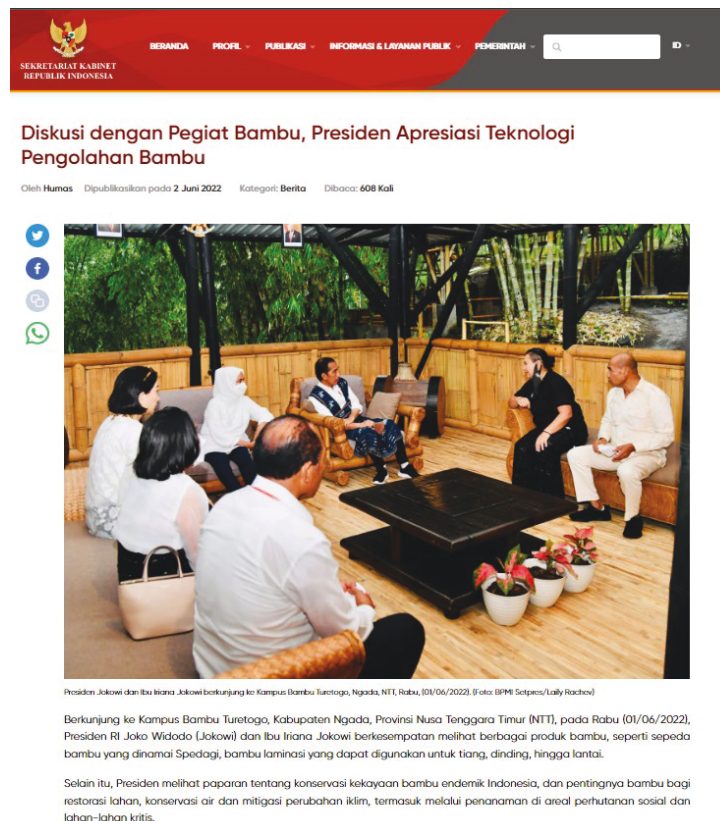
Figure 23 Articles of Bamboo Technology discussed with the President of Indonesia

2. Bicycle diplomacy Anthony Albanese and Joko Widodo gear up for challenging times (https://www.theguardian.com/australia-news/2022/jun/06/bicycle-diplomacy-anthony-albanese-and-joko-widodo-gear-up-for-challenging-times)

Figure 24 Articles of female farmers (bamboo mamas) contribution to Indonesia diplomacy

3. The story of 'mama bamboo' and bamboo conservation efforts in eastern Indonesia (https://www.cnnindonesia.com/gaya-hidup/20220710154151-284-819683/cerita-mama-bambu-dan-upaya-pelestarian-bambu-di-timur-indonesia)

Figure 25 Articles of Bamboo Mamas story for rehabilitation

4. The success story of the struggle of hundreds of bamboo mamas in flores (https://www.mongabay.co.id/2022/05/07/cerita-sukses-perjuangan-ratusan-mama-bambu-di-flores/)

English 中文 (Chinese) Deutsch (German) Español (Spanish) Français (French) Bahasa Indonesia (Indonesian) Italiano (Italian) 日本語 (Japanese) Português (Portuguese)

MONGABAY
SITUS BERITA LINGKUNGAN

TENTANG   READERSBLOG   HUTAN HUJAN   FOTO   PARA PENJAGA HUTAN   Untuk mencari, ketik dan tekai

Sosial

Cerita Sukses Perjuangan Ratusan Mama Bambu di Flores

oleh Luh De Suriyani [Ngada] di 7 May 2022

Figure 26 Article of Bamboo Mamas' Success Story

5. The district government of Ngada Regency took advantage of the potential of bamboo commodities (https://www.republika.co.id/berita/r89yws457/pemkab-ngada-manfaatkan-potensi-bambu)

Home > Nusantara > Nusantara

Pemkab Ngada Manfaatkan Potensi Bambu

Sabtu 05 Mar 2022 21:00 WIB

Rep: ANTARA/ Red: Fuji Pratiwi

Perajin menyelesaikan pembuatan alat musik tradisional dari bambu (ilustrasi). Pemerintah Kabupaten (Pemkab) Ngada, Nusa Tenggara Timur (NTT) memanfaatkan potensi bambu. Pemerintah Kabupaten (Pemkab) Ngada, Nusa Tenggara Timur (NTT) memanfaatkan potensi bambu.

Foto: ANTARA/Arif Firmansyah

Figure 27 Potential Bamboo Commodities recognized by Ngada's district government

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6. A piece of bamboo, a glimmer of hope (https://www.indonesia.go.id/kategori/keanekaragaman-hayati/3595/sebilah-bambu-secercah-harapan)

Figure 28 Article of Bamboo as a sliver of hope to the farmers

7. Mamas of bamboo, kartini nature savior from the interior of flores (https://www.detik.com/bali/nusra/d-6044060/mama-mama-bambu-kartini-penyelamat-alam-dari-pedalaman-flores)

Figure 29 A resemblance of Kartini (Indonesian heroine) is found in Bamboo Mamas

9 Conclusions and recommendations

9.1 Conclusions

The activities this SRA performed summarizes the development of bamboo commodities that could lead to an alternative and more inclusive green economy. Various workshops and trainings were conducted and procedures for village appraisals, bamboo cultivations, benefit sharing, and village regulations were established to support the advancement of bamboo village mechanisms. There were more than a hundred farmers exposed to potentially gain more than IDR 1.000.000.000 (AUD 100.000) of annual revenue through bamboo utilization and an increase of survival rate up to 95% for plantlets planted in arid lands through the refinement of cultivation procedures. Furthermore, a provincial level regulation for bamboo agroforestry village was established and ratified by East Nusa Tenggara Governor during this SRA.

The first refinement applied on village appraisal methodology were adding two more parameters along with the related key indicators resulting in the change of the 5-layer methodology into 7-layer village appraisal. The new layers were 1) potential for cash and food crops within bamboo agroforestry and 2) mainstream gender equity and social inclusion aspects. Four new villages (Turekisa, Sobo, Bajawa, and Beja) which had never intervened before were selected using spatial analysis and appraised using refined village appraisal. Self-assessment questionnaire as the instrument for village appraisal was refined for shorter yet more effective questions to precise answers. A methodology for data integration was formulated and established using parameter scoring and Analytical Hierarchy Process (AHP). Two determined potential village for further development of bamboo village mechanism are both intervened villages, Inegena Village in North Bajawa Subdistrict and Ratogesa Village in Golewa Subdistrict which had distinct characteristics and distinct village conditions.

A comprehensive set of three procedures for bamboo cultivation were produced and established by workshop series and discussion with internal experts. The procedures are in the form of best practices and guidelines of bamboo nurseries, bamboo cocoon nurseries, and bamboo plantation in degraded lands. Best practices were established in different biogeochemical conditions from West Kalimantan, East Java, and Flores Island based on EBF's existing bamboo nurseries.

There were two groupings of village condition for building community enterprise, 1) traditionally grouped following the culture of the village using family clans (Sa'o), and 2) post-traditionally grouped by modern governance such as farmers' group in Social Forestry scheme, cooperatives, and village-owned enterprises. The models under bamboo village mechanism were valuing cultural, social, economic, and ecological aspects. The smaller institutions in traditional and post-traditional village were recommended to build primary cooperatives, where simpler products could be produced and utilized. The greater scale of the enterprise was recommended to build secondary cooperatives, as the unification of the primary cooperatives to produce bamboo-based products which require more complex industries. The business is feasible to run for ten years with the breakeven point on year 7 with the profit for enterprise reaches IDR 697.500.000 (AUD 69.750).

To involve government supervision in implementing bamboo village mechanisms, there were approaches in establishing social-governance infrastructures. A provincial level regulation of bamboo agroforestry village is signed by the governor, as the result of this action research series. An initial process of regency-based regulation for sustainable bamboo management and utilization was conducted. The final guideline and template of village-based regulation for implementation of sustainable bamboo management tailored with local wisdom in the villages was established and discussed for an alignment in the intervened villages. Non-forest timber products harvested in social forestry schemes were aligned to include bamboo as the legal commodity.

9.2 Recommendations

The results of this SRA correlate to the President's Instruction in 2020 for accelerating the increase of village livelihood (Cabinet Secretary Republic of Indonesia, 2020). The recommendations are based on the instructions as well as the general aim of this SRA, which is to test and refine bamboo agroforestry approaches that can be adopted and scaled out for greater effectiveness within the national-Government supported Sustainable Bamboo Forestry and 1000 Bamboo Villages programs. The third instruction of the President of Republic Indonesia, which is to strengthen the leverage of village economy by discovering village potentials to cultivate and utilize bamboo commodities. These first two activities are complying with the instructions, which are the establishment of village appraisals and bamboo cultivation procedures.

The 7-layer village appraisal was applied on a regency scale and the AHP was site-specific. AHP score should be renewed and established in every new location and can be applied on a greater scale, based on administrative or ecoregion depending on the assumptions. This methodology is potential to be applied on a greater scale understanding the constraints:

a) Remote sensing analysis can capture the general potentials and threats needed for site-selecting the villages but only for the information that can be accessed spatially. Therefore, the information may not as accurate before the village appraisal is done.

b) Village appraisal using self-assessment questionnaires are time consuming if done independently by EBF, thus enhancing the assessment for easier implementation is the main focus of the SRA. Moreover, partnership with local organisation is crucial to improvise the efficacy and data accuracy of the village appraisal.

Bamboo cultivation procedures were heavily based on lessons learned in various bamboo nursery sites. Implementation of bamboo cultivation procedures on a national-government or greater scale is applicable by taking these into understanding:

a) Standard Operating Procedures (SOP) developed from this activity is a living

b) document which means every lesson learned from new or existing nurseries (both bamboo propagation and bamboo cocoon nursery) should be considered and documented.

c) Monitoring tools for evaluating the practices of the procedures need to be established

d) More SOPs related to the bamboo agroforestry system need to be established, for example: SOP for agroforestry plantation, SOP for sustainable bamboo forestry, and SOP for integrating bamboo nursery and bamboo agroforestry enterprise

As for the second instruction, which is to integrate and consolidate the poverty reduction program with the improvement of village economy program, the other two activities of this SRA are complying with the instruction which are the establishment of business models and province to village regulations to support the community-based bamboo industry.

Business models under bamboo village mechanisms is applicable on a national-government or greater scale, by taking these into understanding:

a) Two village groupings, family clan traditional group (Sa'o); and post-traditional group could be merged into one secondary cooperative to build a bigger engineered bamboo factory. However, the approach of both groups should be tailored to their conditions. In other cases, there might be different groupings which needed different approaches to establish the community-based village enterprise.

b) In the idle moments of waiting until year 7 for the breakeven point, the communities must be intensively engaged under bamboo village schemes. Developing local and valuable crops for internal and external markets can be one of the options.

c) Stakeholders of the whole business model which were EBF, farmers' group, primary and secondary cooperatives, and PT Indobamboo must have a separated Partnership Agreement Design and the role should be explained thoroughly.

Regulatory approach for bamboo development and utilization can be implemented on a national level, and there are some aspects to be taken into consideration:

a) General information of the village can be assessed with self-assessment instrument in village appraisal methodology.

b) After site selection process according to the results of the 7-layer analysis, focus group discussions on the selected sites can be initiated to gather more specific information about the social-governance conditions of the village. During the initiation process, regional governance model in the form of regulation draft can be introduced to the village as a reference for the regulation establishment.

c) Partnering with local organisations should be in consideration for time efficacy, especially for a national and broader scale implementation

The SRA also supports the three big strategies of Indonesian economy in 2020, which are 1) to downstream industry by exporting semi-raw materials to refined goods, 2) to digitalized small-medium enterprises (SMEs) by transforming the enterprises to digital platform in all levels (regional to global), and 3) to contribute to green economy by creating green products based on green energies for strengthening Indonesia's green economy (Cabinet Secretary Republic of Indonesia, 2020). Bamboo village mechanism could participate in supporting these strategies by conducting more SRA research and implementation of bamboo economy to the potential villages.

10 References

10.1 References cited in report

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10.2 List of reports produced by project

1. **Activity 1 Technical Report:** 7-layer village appraisal approach on intervened and potential villages in Ngada Regency, East Nusa Tenggara
2. **Activity 1 Module:** 7-layer village appraisal approach guidelines
3. **Activity 2 Technical Report:** Bamboo cultivation process in existing bamboo nurseries under Environmental Bamboo Foundation – Conditions and Lesson Learned from different biogeochemical conditions
4. **Activity 2 Technical guideline:** Standard Operating Procedures (SOP) on bamboo propagation
5. **Activity 2 Technical guideline:** Standard Operating Procedures (SOP) on bamboo cocoon nursery – rhizome enlargement
6. **Activity 2 Technical guideline:** Standard Operating Procedures (SOP) on bamboo plantation in degraded lands
7. **Activity 2 Technical Report:** Business model analysis and benefit sharing mechanism for bamboo nurseries and cocoon nurseries
8. **Activity 3 Technical Report:** Participatory Rural Appraisal in social-governance infrastructure establishment (village-based regulation)
9. **Activity 3 Module:** Regional governance model establishment guidelines under bamboo village mechanism
10. Technical report of FSC activities
11. Standard Operating Procedures of Sustainable Bamboo Forest Management
12. Technical report of training for bamboo village trainers
13. Technical report of Calibration Workshop
14. Governor regulation of Bamboo Agroforestry Village in East Nusa Tenggara Province
15. Ministerial Decree of Social Forestry Scheme for Village Forest in Beja Village

11 Appendixes

11.1 Appendix 1: Self-assessment questionnaire

	Self-Assessment Questionnaires for Bamboo Village Appraisal
	Environmental Bamboo Foundation

Choose one of the interviewees:		
Village head	Customary Head	Sa'o Representative
Individual	Farmer Groups that own bamboo land	Village Women's Group
Member of Village Management (BPD)		

Attention! If the traditional head and the village head are the same person, do a one-time interview only, choose one on filling in the respondent's criteria

Filling Instructions: Fill in the description and choice according to the source's answer in the answer column

Data Narasumber					
Tanggal Pengisian					
Nama Enumerator					
Nama Narasumber					
Jenis kelamin	Perempuan			Laki-laki	
Kelompok umur	17-25 tahun	26-35 tahun	36-45 tahun	46-55 tahun	>55 tahun
Suku/Sa'o					
Pendidikan Terakhir	Tidak ada	SD	SMP	SMA	Akademi/Universitas
Jumlah anggota keluarga					
Alamat					

Lama menetap	<5 Tahun	5 - 10 Tahun	10 - 15 Tahun	15 - 20 Tahun	>20 Tahun
Pekerjaan/Jabatan/Mata Pencarian Pokok					
Mata pencaharian lainnya (jika ada):					

1. Ketersediaan Potensi Bambu untuk Agroforestri (Kondisi Bambu)	Jawaban Responden		
Apakah ada lahan bambu di desa ini?	Tidak Ada		Ada
Berapa perkiraan luasan lahan bambu di desa ini? (Ha)			
Apakah ada data pendukung terkait luasan bambu tersebut, seperti monografi desa?	Tidak Ada		Ada
Bagaimana sistem penguasaan lahan bambu di desa ini? ***bisa lebih pilih dari satu**	Tanah adat (Sa'o)	Kelompok tani	Perorangan
Jumlah Sa'o penguasa kebun bambu di desa			
Luas rata-rata kebun bambu milik suku (sa'o) (Ha)			
Jumlah kelompok tani penguasa kebun bambu di desa			
Luas rata-rata kebun bambu kelompok tani (diluar sa'o) (Ha)			
Jumlah kebun bambu yang dikuasai perorangan di desa			

Luas rata-rata kebun bambu perorangan (diluar sa'o dan kelompok tani) (Ha)				
Jenis bambu apa saja yang tumbuh di desa ini? Sebutkan				
Apakah terdapat penyakit pada rumpun bambu? **bisa lebih pilih dari satu**	Jamur	Bengkok	Kering	Lainnya, sebutkan
Pola penanaman bambu	tanaman tepi/batas	satu jenis/ monokultur	campur dengan tanaman lain/ agroforestry	
Pengelolaan kebun bambu	Tidak dirawat (tumbuh alami)	Dikelola mandiri (non HBL), jelaskan:		Sistem Hutan Bambu Lestari
Pemanfaatan bambu	tidak dimanfaatkan, Mengapa?	Pemanfaatan tidak komersil (kebutuhan sendiri dan orang lain), Jelaskan	Pemanfaatan komersil (dijual), Jelaskan	
Apakah pernah melakukan penanaman bambu?	tidak pernah, alasan:		Pernah (sebutkan dimana, kapan, jenis bambu dan sumber bibit):	

2. Kesiapan desa (Sosial Ekonomi Ekologi)						
Apa saja mata pencaharian utama penduduk desa?						
Berapa jumlah penduduk miskin di desa?						
Rata-rata penghasilan/bulan penduduk desa	< Rp. 500.000	Rp. 500.000 – Rp.1.000.000	Rp. 1.000.000 – Rp.1.500.000	Rp. 1.500.000 – Rp.1.999.000	>Rp 2.000.000	
Sebagian besar penghasilan (uang) digunakan untuk pemenuhan kebutuhan… *bisa lebih pilih dari satu*	Makanan pokok (beras, lauk pauk)	Makanan tambahan (buah-buahan, susu, vitamin, dll)	Kesehatan	Pendidikan	Transportasi	Rekreasi	Kebutuhan sosial (upacara keagamaa, upacara adat, sumbangan)
Apakah pendapatan tersebut cukup atau tidak cukup?	Tidak cukup		Cukup		Lebih dari cukup	
Apakah ada pekerjaan sampingan selain dari pekerjaan utama yang disebutkan tadi? Sebutkan						
Bagaimana persebaran pekerjaan yang mendominasi penduduk di desa ini?	Bekerja di luar desa		Bekerja non pertanian di desa		Bertani di dalam desa	
Berapa persen dari kelas umur produktif (18-55?) yang sudah bekerja	<25%		25-50%		50-75%	75-100%
Terdapat masyarakat yang memiliki keahlian di industri/pabrik:						
Pengoperasian computer	Tidak ada			Ada, sebanyak…… orang		

Alat berat	Tidak ada			Ada, sebanyak…… orang	
Mesin pabrik	Tidak ada			Ada, sebanyak…… orang	
Terdapat anggota masyarakat dengan keahlian **mengolah bambu** sebagai bahan baku industry. Sebutkan jumlahnya!	Tidak ada			Ada, sebanyak…… orang	
Terdapat anggota masyarakat dengan keahlian mengolah bambu menjadi produk kerajinan. Sebutkan jumlahnya!	Tidak ada			Ada, sebanyak…… orang	
Kelompok tani komoditas apa saja yang ada di desa ini? Sebutkan					
Keberadaan hutan dan kebun bambu di *Desa* ini adalah hal yang baik dan penting di Desa ini.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Bambu sangat penting bagi adat, budaya dan agama di Desa ini.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Tanaman bambu yang ada saat ini adalah warisan dari leluhur dan pendahulu kami	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Leluhur mengajarkan untuk melestarikan bambu dengan adanya hukum adat yang menjaga bambu misalnya melalui ri'i dan waja.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Kebun/hutan bambu menjaga sumber mata air bagi desa kami.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Kebun/hutan bambu membuat lingkungan menjadi sejuk dan memberikan udara segar.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Kebun/hutan bambu sebaiknya dijaga, dipertahankan dan dilestarikan.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju

Kebun atau rumpun bambu bila dipelihara akan tumbuh dengan baik dan produktif.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Tanaman bambu dapat memberikan sumber penghasilan bagi saya atau keluarga saya.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Saya akan melakukan pemeliharaan dan penanaman bambu untuk mendapat tambahan pendapatan	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Pemanfaatan bambu sebagai bahan pembuatan rumah dengan dinding bambu (naja) dan atap bambu (lenga).	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Perlunya pengembangan pemanfaatan bambu untuk diolah menjadi produk lainnya	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Saya mendukung adanya industri pengolahan bambu agar saya bisa menjual bambu.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Bambu bisa menjadi komoditas khas dari Desa ini seperti halnya produk Kopi Bajawa	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Pemanfaatan bambu dengan nilai tambah dan nilai ekonomi bisa meningkatkan pendapatan masyarakat dan daerah.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Saya memiliki perencanaan/keinginan untuk mengembangkan bambu.	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Menurut anda apa yang harus dilakukan agar pemanfaatan bambu di *Desa ini* dapat maju dan berkembang?					

3. Dukungan Peraturan		
Apakah ada peraturan tertulis terkait bambu?	Tidak ada	Ada
Apa saja bentuk pengelolaan bambu dalam **peraturan daerah**? Siapa saja yang mengatur pengelolaannya?		
Bagaimana implementasinya?	Tidak efektif (tidak dilaksanakan)	Efektif (dilaksanakan)
Apa saja bentuk pengelolaan bambu dalam **hukum adat**? Siapa saja yang mengatur pengelolaannya?		
Bagaimana implementasinya?	Tidak efektif (tidak dilaksanakan)	Efektif (dilaksanakan)
Bagaimana peran pemerintah desa dalam perkembangan penanaman bambu?		
Bagaimana dukungan pemerintah level kecamatan dan kabupaten terhadap pemerintah desa dalam perkembangan penanaman bambu?		
Dimana pelaksaanaan pengelolaan bambu berdasarkan hukum adat dan peraturan daerah?		
Apakah ada alokasi dana/ program dari pemerintah daerah?	Tidak ada	Ada
Bagaimana alokasi dana/ program dari pemerintah daerah?		

Apakah ada sosialisasi terkait pengembangan bambu atau penanaman bambu di sekitar anda?	Tidak ada	Ada
Apakah ada penyuluhan terkait pengembangan bambu atau penanaman bambu di sekitar anda?	Tidak ada	Ada
Apakah ada pelatihan terkait pengembangan bambu atau penanaman bambu di sekitar anda?	Tidak ada	Ada
Jika ada, kapan terakhir dilakukan dan seberapa sering dilakukan?		
Apakah ada pengawasan dan pendampingan pemerintah kecamatan dan kabupaten terhadap pemerintah desa dalam program penanaman dan pengembangan bambu?	Tidak ada	Ada
Bagaimana pengawasan dan pendampingan pemerintah kecamatan dan kabupaten terhadap pemerintah desa dalam program penanaman dan pengembangan bambu?		

4. Risiko dan Ancaman

Apakah ada konversi lahan kebun bambu selama 5 tahun terakhir? Kalau ada, sebutkan penggunaan lahan setelah berubah	

Apakah pernah terjadi bencana alam di desa ini?	Ada bencana		Tidak ada bencana	
Apa bencana yang paling sering terjadi?				
Seberapa sering terjadi bencana tersebut dalam 5 tahun terakhir?				
Apakah ada **potensi pertambangan** di desa atau sekitar desa?	Ada		Tidak	
Kalau ada, sebutkan jenis pertambangan apa?				
Lokasinya dimana? dan berapa jaraknya dari desa?				
Apakah terdapat kegiatan pembalakan kayu di desa ini?	Ada		Tidak ada	
Jika ada, seberapa sering kegiatan pembalakan kayu terjadi dalam 1 tahun?	Tidak Pernah	Sesekali	Seminggu Sekali	Setiap hari
Apakah terdapat kegiatan **penambangan ilegal** di desa atau sekitar desa?	Ada		Tidak ada	
Apakah ada kegiatan adat yang berpotensi mengubah lahan? Seperti berburu, sistem ladang berpindah?	Ada		Tidak ada	
Kalau ada, sebutkan kegiatan apa saja!				

5. Pengembangan unit produksi skala desa

Bagaimana kondisi jalan untuk sampai ke rumpun bambu?	Rusak		Baik	
Bagaimana kondisi jalan untuk sampai ke Pelabuhan?	Rusak		Baik	
Apakah ada sumber air yang dapat dimanfaatkan dalam skala besar?	Tidak ada		Ada	
Kalua ada, sebutkan jenis sumber air tersebut ***bisa lebih pilih dari satu**	Sumur	PDAM	Sungai	Mata Air
Bagaimana tingkat kesulitan dalam mengurus pembangunan pabrik desa?	Sulit	Sedang		Mudah
Jelaskan pilihan dari jawaban yang anda berikan!				
Apakah ada persyaratan khusus dalam pengurusan ijin mendirikan bangunan untuk pabrik desa?				
Apakah ada IPAL (instalasi pengelolaan air limbah) dan tempat pembuangan (TPS dan TPA)? ***pengamatan enumerator saat datang di desa**	Tidak ada		Ada	
Apakah ada jaringan listrik? ***pengamatan enumerator saat datang di desa**	Tidak ada		Ada	
Apakah ada pasar untuk bambu?	Tidak ada		Ada	
Jika ada, seberapa besar skala pasar tersebut?	Lokal (dalam desa)	Lokal (keluar desa tapi dalam pulau)	Kirim antar pulau	Ekspor ke luar negeri
Apakah ada Koperasi/Bumdes di desa ini?	Tidak ada		Ada	
Jika ada, bergerak di bidang usaha apa bumdes tersebut?				

6. Potensi Agroforestry dan Serat Pangan				
Sebutkan komoditas (tanaman yang dapat dijual) unggulan yang ada di desa ini (bisa berupa hasil kehutanan, pertanian, perkebunan, peternakan atau perikanan)				
Apakah ada perbedaan kepemilikan tanaman milik perempuan dan tanaman milik laki-laki	Tidak Ada	Ada	Tanaman milik laki-laki	Tanaman milik Perempuan
Berapa kali panen (produksi) setiap komoditas yang disebutkan tadi dalam setahun?				
Berapa kilogram atau berapa ton sekali panen/produksi?				
Bagaimana pasar dari tiap komoditas tersebut?	Lokal (dalam desa)	Lokal (keluar desa tapi dalam pulau)	Kirim antar pulau	Ekspor ke luar negeri
Apakah ada komoditas lainnya selain yang disebutkan tadi yang dapat dikembangkan menjadi komoditas agroforestry dari hasil desa?	Tidak ada		Ada	
Apakah pernah dilakukan pemanenan pada komoditas tersebut?	Tidak Pernah		Pernah	
Berapa produktivitas (kg) sekali panen/produksi?				
Apakah pernah dilakukan penjualan pada komoditas tersebut?	Tidak pernah		Pernah	
Jika pernah, bagaimana hasil penjualan tersebut?	Kurang laku (harga tidak sesuai/dibawah yang diharapkan)		Laku (harga sesuai yang diharapkan)	

7. Kesetaraan Gender				
Apakah terdapat dasawisma/PKK/Kelompok Wanita Tani/Kelompok Perempuan Tani Hutan di desa ini?	Tidak ada		Ada	
Jika ada, bagaimana keaktifan kegiatan dasawisma/PKK/Kelompok Wanita Tani/Kelompok Perempuan Tani Hutan tersebut? **Tidak aktif: hanya terdaftar** **Jarang aktif: sesekali melakukan kegiatan** **Cukup aktif: ada beberapa kali kegiatan yang dihadiri** **Aktif: semua kegiatan diharidi**	Tidak aktif, Sebutkan	Jarang aktif, Sebutkan	Cukup aktif, Sebutkan	Aktif, Sebutkan
Seberapa sering perempuan memanen hasil hutan	Tidak Pernah	Sesekali	Seminggu Sekali	Setiap hari
Jenis tanaman apa saja yang dipanen oleh perempuan				
Seberapa sering laki-laki memanen hasil hutan	Tidak Pernah	Sesekali	Seminggu Sekali	Setiap hari
Jenis tanaman apa saja yang dipanen oleh laki-laki				
Siapa sumber penghasil pendapatan utama dalam keluarga di desa ini?	Suami	Istri	Suami dan Istri	
Apakah terdapat isteri yang bekerja tanpa dibayar?	Tidak ada		Ada	
Apa yang berubah dalam keluarga, setelah isteri memperoleh pendapatan (uang)	Tidak ada		Ada	
Apakah perempuan ikut serta dalam keanggotaan organisasi desa?	Tidak		Ya	

Organisasi apa saja yang diikuti oleh perempuan			
Siapa saja yang menjadi anggota organisasi itu?	Khusus perempuan	Campuran laki-laki dan perempuan, tapi perempuan lebih sedikit	Campuran perempuan dan laki-laki, tapi perempuan lebih banyak
Berapa persen (%) laki-laki dan Berapa persen (%) perempuan?			
Apakah ada anggota perempuan yang memegang jabatan penting dalam organisasi desa?	Tidak	Ada	Jika ada, sebagai apa
Apakah ada lahan di desa ini, yang kepemilikian adalah perempuan?	Tidak	Ada	
Apakah perempuan dan pemuda memiliki peran dalam pengelolaan bambu	Tidak	Ada	

Catatan Tambahan