Gula Gula Forest Program Indonesia Annual Report for 2024

2025

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Ecosystem restoration in the Singkarak River Basin, West Sumatra

Annual report year January 2024 – December 2024

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Summary

Project overview	
Carbon accounting period	January 2017– December 2024
Geographical areas	Inland Singkarak river basin uplands, Solok District, West Sumatra 1. Kecamatan Junjung Sirih, Nagari Paninggahan 2. Kecamatan Lembah Gumanti, Nagari Air Dingin/Koto Baru 3. Kecamatan Kubung, Nagari Selayo 4. Kecamatan Payung Sekaki, Nagari Sirukam 5. Kecamatan X Koto Di Atas, Nagari Paninjawan, 6. Kecamatan Bukit Sundi, Nagari Dilam Coastal uplands, Pesisir Selatan District, West Sumatra 1. Kecamatan Koto XI Tarusan, Nagari Siguntur Coastal uplands, Pesisir Barat District, Lampung 1. Kecamatan Pesisir Utara, Pekon Pemancar
Technical specifications in use	- Ecosystem restoration in West Sumatra and Lampung. - Improved land use in West Sumatra and Lampung.

Project indicators	Historical (2017-jan 2024)	Added/ Issued Jan 2024-Dec 2024	Total (rounded off where needed)
No. smallholder households with Payment for Ecosystem Services (PES) agreements	388	0	388
No. farmer groups with PES agreements	8	0	8
Approximate number of households (or individuals) in these farmer groups	388	0	388
Area under management (ha) where PES agreements are in place	299.9	0	299.9
Allocation to Plan Vivo buffer (tCO_2) (See Table 12)	13,325	0	13,325
Saleable emissions reductions achieved (tCO_2) (See Table 12)	69,958	0	69,958
Plan Vivo Certificates (PVCs) issued to date (incl. buffer)			83,283
Plan Vivo Certificates requested for issuance, incl. buffer (2024 Vintage)			0
Total PVCs issued (including requested 2024 in this report)			83,283

Part A. Project updates

A1. Key events

1. Moving into new areas with our restoration work: A new District in West Sumatra: Pesisir Selatan

We have initiated new restoration activities in a second district in West Sumatra, specifically in Kabupaten Pesisir Selatan. After some challenges in the initial village, another nearby village (called nagari in West Sumatra), Si Guntur, heard about the program and applied by themselves to join our activities. Their enthusiasm also made us extend the initial 25 ha to 62.5 ha, all under PES agreements since 2024.

2. Moving into a new province: South Sumatra (Lampung)

Also in 2023/2024, our official collaboration with the Ministry of Villages and Development *of Disadvantaged Regions* (Indonesian: Kementerian Desa dan Pembangunan Daerah Tertinggal, abbreviated as Kemendesa PDT) has led us to start implementing restoration activities in Lampung, South Sumatra. The local Lampungese population living here is classified as one of the poorest in Indonesia. We collaborate directly with the local Forestry office, where a woman called Meisha is our project officer. Be a candidate for the program. PES agreements have been signed for an initial 16.5 ha. This serves as a pilot to see how it develops, and to really understand the (potential) different local dynamics before scaling up.

3. Setting foot on a new island: Flores

In late 2024, we made our first visit to the island of Flores in Eastern Indonesia. Our relationship with a befriended local Flores-based NGO culminated in their wish to initiate restoration activities together with the local communities they work with. We will conduct a second visit in 2025, with the goal of initiating a pilot project of 15-20 hectares by the end of 2025, to build trust. This project aims to build trust and gain an understanding of the local social dynamics when doing carbon-based restoration work in a very different socio-cultural environment.

4. Ending intensive collaboration in the fashion forest in West-Timor

Over the past year, we have reported on the fashion forest in West Timor. The project is moving forward. The local NGO prefers to bring the certification under VERRA or the Gold Standard. As they aim to sell carbon credits within Indonesia, these certification schemes are already approved under the new Indonesian government carbon regulations, and they have potential Indonesian clients already. Whenever they decide to sell abroad, we may be contacted first to be a reseller.

5. Coffee sales increase

After the introduction of our "restoration coffee", 2024 saw an increase in coffee exports to CO2 Operate B.V. in the Netherlands. We successfully imported 400 kg of Arabica coffee, 50 kg of Robusta coffee, and 50 kg of high-quality, pure natural *Luwak* coffee.

6. Above and belowground biodiversity impact monitoring

After a pilot in 2023, we started a 3-year biodiversity monitoring project with our partner Biometrio, using machine learning and AI to monitor aboveground biodiversity. It is a holistic approach, as by the end of the 3 years' period, it will also create conclusions on how our activities and the return of biodiversity support ecosystem restoration in its broadest sense. All animals spotted play a role in seed dispersion, and based on this, a prognosis can be made for natural regeneration as well.

In addition, we also conduct belowground biodiversity research with our partner institution, Brawijaya University in Malang, East Java. A comprehensive evaluation of agroforestry systems across different age groups was completed in 2024. The main reason for this was to assess whether our restoration activities can restore soil health by reintroducing a diverse tree cover.

A2. Progress on project certification and New PES agreements

Working with poor small-scale farming communities, which are increasingly challenged by climate change, one might expect unforeseen difficulties when moving into new, "unknown" areas. Similarly, when moving into new, "unknown" areas, unexpected challenges are also anticipated. For one, socio-cultural circumstances might be different, hence our social mapping exercises are crucial to gain a first understanding. These have been completed in 2023/early 2024. In 2024, we moved not only to a new district, called Pesisir Selatan (a 3–4-hour car ride from our field office), but also to a new province, South Sumatra (a 12-14 hour12–14-hour bus ride). All PES agreements were signed in the last quarter of 2024 for both areas (Table 1). Although we signed the PES agreement with the farmer group in December 2024 in Lampung, some farmers still had reservations and hesitated to sign, as they wanted to review the agreement once more. We agreed on this delay, but it meant the final signing by all was done in January 2025. Highly irregular rainfall delayed the distribution and planting of the seedlings. Our team kept the seedlings in the nursery, where they were well cared for, while waiting for good rains that would allow for a good start for the young seedlings in the field. Therefore, planting could not be finished in 2024, and new credits with vintage 2024 could not be issued. All is on schedule for the 2025 vintages for both Si Guntur and Lampung. But these might become available in early 2026.

Table 1. New participants/areas and signed PES agreements in 2023. These participants and the carbon estimates for these areas are not accounted for in this report because the tree planting was not finished. Therefore, no Plan Vivo certificates were applied for in 2024.

Site name	Agroforestry system	No. Participants	Total area (Ha)	No. trees/ha	Total No. Trees	PES Agreement signed	Eligible for certification
Si Guntur (Gotan 8, 2024)	Melinjo-based	47	62.2	650	40,430	**Yes, 1-5-2024**	**Once all is planted***
Pemancar (Lampung 9, 2025)	Damar-based	18	13.6	500	6,800	**Yes 25-1-2025**	**Once all is planted***

*PES agreements were signed in 2024, but due to local socio-political and climatic challenges, planting has been delayed significantly. They will be included in the 2025 annual report for issuance.

A3. Successes and challenges

1. Learning from earlier experiences

Our move to a new district and province in 2023 brought successes but also new, unexpected challenges. Our RPL team has been able to solve the socio-political challenges we faced (See annual report 2023). Despite the challenges and difficulties in both Pesisir Selatan and Lampung, it was heartening to see that neighbouring villages in both areas had heard about the Program and invited us to initiate restoration efforts in their town. Obviously, process has been very time-consuming, particularly in initiating the entire FPIC process in the new villages. PES agreements were signed in May 2024 (Si Guntur). In Lampung, the village head, RPL, and CO2 signed the Agreement in December 2024. Although the farmer group would also sign, they hesitated slightly and wanted to review the contract again. They made a few changes again, done and after completing these adjustments, the PES agreement was signed in January 2025.

2. Planting schedules not matching deadlines for the Annual Report

Some trees were planted soon after, but others require 6-8 months of growth before they can be transplanted into the field. Since the planting did not meet the deadlines for the Annual report (when requests for new credits are made), we were unable to obtain new carbon credits approved for 2024. This was very unfortunate, as we noticed that a substantial number of potential buyers were asking for 2024 credits. The outlook is, however, positive. These areas, along with the carbon credits, will be included in the 2026 Annual Report, which is expected to be prepared. These areas, along with the carbon credits, will be included in the 2026 Annual Report, which is expected to be prepared by early 2026. The new areas show positive signs, as we have already received requests from neighbouring villages also asking to join the restoration program.

3. Adding agroforestry trees to add shade to existing *Gambir* shrubs

In Pesisir Selatan (the new district in West Sumatra), the farmers are highly motivated, and tree cultivation started very well. The baseline vegetation here is *gambir*, a shrub that produces natural dyes. They observe that climate change leads to more intense solar radiation, resulting in plants producing less when there are no trees. Integrating trees into the shrub area will increase production in some years, as shading enhances the production of natural dyes. The agroforestry species will not only add carbon to the system but also provide additional income for the farmers, making it another essential reason to join the program.

4. Motivated staff and backing from the Forestry Office in Lampung

In Lampung, we work with the Forestry office as our counterpart. Here, Meisha, a young female forestry staff member, is our project officer, who is doing a good and excellent Job in the field. She graduated from the Forestry Faculty of the University of Lampung and enjoys field work the most, which is precisely what we need. The Forestry office is also backing up our activities. They have their own nursery, where they raise seedlings chosen by the farmers for planting in the restoration sites.

5. Adapting to climate change continues to be a challenge

Monthly rainfall patterns in the project area from 2019 to 2024 are shown in Figure 1. The rainfall and in 2024, it is very intense, remaining highly unpredictable, with 2024 experiencing particularly intense periods during the planting season.

In addition to unpredictable rainfall, the challenges the program faces are as follows:

- Rains are erratic, over shorter periods but very intense, making it less effective for young seedlings' establishment and growth
- Dry storms increase, coming at times when young seedlings are planted, regularly destroying the seedlings.
- Storms have passed at different times, when both rice and trees are flowering, destroying the flowers and hence the development of grains and tree products.
- The storms have destroyed flowers of cloves; hence farmers could not harvest any, putting stress on obtaining a cash income.
- For us, these storms have meant that we could not get enough clove seeds needed for our nursery to develop seedlings for new farmers who have opted for clove trees.
- This has meant we must purchase clove seedlings, reducing our financial reserves.
- This is aggravated by the fact that survival rates are lower under these climatic circumstances, which requires further financial reserves to be used for replanting.
- Increasing carbon prices to solve this has shown not to be easy.

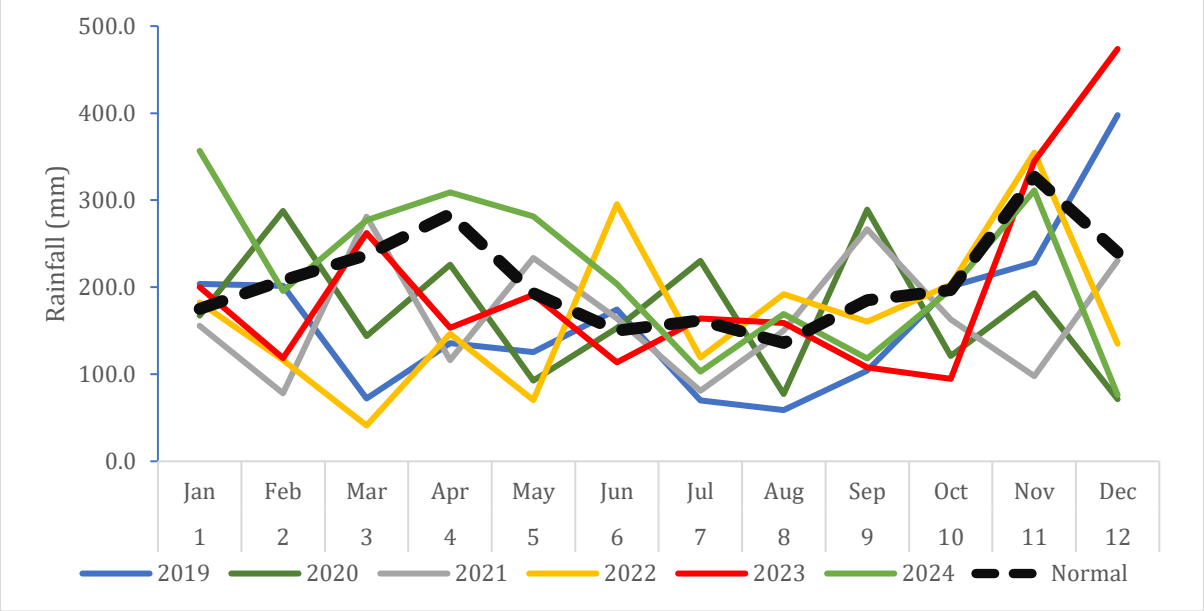


Figure 1. Monthly rainfall in the project area from 2019 until 2025. Source: village based meteorological stations in Nagari Paninggahan, Sirukam, Selayo, Air Dingin.

Figure 2. Climate change adaptation involves ring weeding for young seedlings and keeping weeds as soil cover until the grown trees overshadow them.

6. Adapting to climate change

To mitigate the effects of heavy rains and intense solar radiation, new farmers are increasingly seeking to acquire a piece of land that, although degraded, retains a higher number of existing trees than before. They understand that shading and reducing the impact of heavy rain through some existing tree cover is crucial from the beginning for the success of restoration. In most cases, these are indigenous and fast-growing trees, well-adapted to the changing weather. In addition, these trees provide shade, serve as a

windbreak, and can reduce damage to flowers during heavy rains, acting as an umbrella. We allow this as long as existing tree cover remains below 40%. This approach has another advantage: existing trees are well protected, which might be cut if the field is not under a PES agreement. This also further benefits the build-up of biodiversity. It will mean that the baseline vegetation (and carbon) is higher compared to treeless *Imperata*, but we already see that survival rates are better in these sites, where some big trees are still present. But the majority of our new restoration sites continue to be with hardly any (significant) trees).

During the farmer meeting in Harau (see B2, section 6), one of the Forestry staff members from Lampung explained about grafting. The Forestry staff member conducted a grafting training in Lampung, attended by one of our staff members and a local farmer. Already, some training has been given to other farmers, and we will increase the promotion of grafting with this farmer-to-farmer training (see B2, section 6). Grafting can become a critical adaptation to climate change, as it enhances tree resilience to droughts and heavy rains by utilising a well-developed root system, on which a grafted branch is placed.

A4. Project developments

1. RPL staff changes and capacity building activities

In 2024, new staff were added to our local partner RPL, partly due to the growing workload and partly because some staff members left. RPL hired Gita, a new young woman. She lives in one of the villages, Sirukam, and graduated from Andalas University, Padang, where she obtained a BSc in environmental sciences. Two staff members have left RPL, Bang Zet and Eka. In total, 11 people are now working with our local partner RPL. A twelfth person would be Meisha, our local officer in Lampung. She is paid by and works for the local Forestry Office in Lampung; therefore, she is not included as RPL staff. Figure 3 Shows a picture of the current staff, including Meisha from Lampung (wearing the black jilbab in the middle of the photo). Also, Carina is included, who is the landscape ecologist/carbon expert supporting CO_2 operate BV as a freelance consultant.

Table 2. Current Staff of our local partner RPL (2019-2024).

No	Name	Gender	Period	Position	Expertise	Responsibilities
1	Farida	Female	Nov 2019 - present	Director	Applied climatologist and watershed management	Control and oversee all business operations, personnel, and serve as the first point of contact for CO2 Operate.
2	Bubung Angkawijaya	Male	Nov 2019 - present	Program Manager	Anthropologist, social mapping and community specialist	-FPIC process, -Inclusive business building
3	Jefri Rozi Satriadi	Male	Nov 2019 - present	Project Officer	Geographer, Mapping/ GIS specialist, community engagement	Manager Van Duijnen Paninggahan & FMO Paninggahan-Selayo area
4	Ahmad Haryono	Male	July 2020 -	Project Officer	Forester, Mapping/ GIS specialist, community	Manager FMO Sirukam, Sirukam II and Dilam

No	Name	Gender	Period	Position	Expertise	Responsibilities
			present		engagement	
5	Aristya Wulandari	Female	July 2020 – present	Finance Officer	Animal husbandry and nutrition, financial quality assurance	Finance staff
6	Bakri	Male	Dec 2022 - present	Nursery Coordinator	Nursery development, seedling raising and management	Manager Nursery Program
7	Ferdi Syah Putra	Male	Jan 2023- present	Nursery Assistant	Seedling raising, mapping and tree monitoring support	Assistant Nursery Program
8	Habibburahman	Male	Juni 2023 - present	Project Officer	Forester, community engagement	Manager Gotan Pesisir Selatan
9	Meisha	Female	July 2023 - present	Project Officer	Forester, community engagement	Manager Pesisir Barat, Lampung program
10	Yudha Saktian S	Male	Dec 2023 - present	Project Officer	Mapping/GIS specialist, environmental science	Biodiversity, database and spatial analysis Officer
11	Gita Fatrisia	Female	July 2024 - present	Project Officer	Environmental engineering, community engagement	Manager FMO Paninjawan and assistant for FMO Dilam

Most of the staff consists of young people: our young change makers. This relates to another key pillar of ours, which is to build capacity for local, young people. They represent the future, both in general and for sustainable development in particular.

The field office in Sirukam village (see Figure 3) has become a home away-from-home for all staff working in the field. Although they mostly start from their home, the field office is full whenever the entire team need to work on documents or during regular meetings with the team. Two young project officers stay in the field office permanently. The field office is centrally located for the field activities. Each site can be reached within 30-60 minutes by car or motorcycle. However, the new site in Pesisir Selatan is further away and requires about 2-3 hours from the field office. The project officer for this area stays there permanently, which makes it easier, as he seems to have found a partner there as well. We are still discussing whether this should be included as part of the program's impact.

Figure 3. The entire 2024 team is gathered in front of the field office in Sirukam village.

2. More farmers and farmer groups join

With new areas under restoration, two more farmer groups were established, one in Si Guntur (Pesisir Selatan) and one in Lampung (South Sumatra). In total, we are now working with 10 farmer groups of which 453 farmers and their families, covering 375.7 ha of restoration area in different ages of restoration (see Table 3a and b for an overview).

Table 3a. Established farmer groups, members, restoration sites and size.

	1	2	3	4	5	6	7
Site name	Paninggahan (VD2017-1)	Paninggahan (VD 2017-2)	Air Dingin (VS2020-1)	Paninggahan (FMO 1a,2021)	Paninggahan (FMO 1b,2021)	Selayo (FMO 2a, 2021)	Selayo (FMO 2b, 2021)
Kecamatan	Junjung Sirih	Junjung Sirih	Lembah Gumanti	Junjung Sirih	Junjung Sirih	Kubung	Kubung
Nagari (village)	Paninggahan	Paninggahan	Air Dingin	Paninggahan	Paninggahan	Selayo	Selayo
Jorong (sub-village)	Subarang, Kampuang Tangah, Gando	Subarang, Kampuang Tangah, Gando	Aia Sonsang, Koto, Cubadak, Data	Subarang, Kampuang Tangah, Gando	Subarang, Kampuang Tangah, Gando	Lurah Nan Tigo	Lurah Nan Tigo
PES agreements signed	Oct-17	Oct-17	Sep-20	Jan-21	Jan-21	Jan-21	Jan-21
Farmer Group	Kelompok VCM Paninggahan	Kelompok VCM Paninggahan	Kelompok Tani VCM	Kelompok VCM Paninggahan	Kelompok VCM Paninggahan	Kelompok Tani VCM Selayo	Kelompok Tani VCM Selayo
Sub Group	Kelompok Bukit Panjang	Kelompok Bukit Subaka	None	Kelompok Bukit Panjang	Kelompok Bukit Subaka	None	None
No of participants	35	45	87	3	65	5	6
Total area (ha)	19.9	14.4	65.5	2.2	27.1	11.0	2.5

Table 3b. Established farmer groups, members, restoration sites and size.

	8	9	10	11	12	13	14	15
Site name	Sirukam (FMO 3, 2021)	Koto Baru/ Air Dingin (FMO 4, 2021)	Paninjawan (FMO 5a, 2022)	Paninjawan (FMO 5b, 2022)	Sirukam II (FMO 6, 2022)	Dilam (FMO 7, 2023)	Siguntur (Gotan 8, 2024)	Pemancar (Lampung 9, 2025)
Kecamatan	Payung Sekaki	Lembah Gumanti	X Koto di Atas	X Koto di Atas	Payung Sekaki	Bukit Sundi	Koto XI Tarusan	Pesisir Utara
Nagari	Sirukam	Air Dingin	Paninjawan	Paninjawan	Sirukam	Dilam	Siguntur	Pemancar
Jorong	Kubang Nan Duo	Koto Baru	Balansiah, Kayu Aro, Pasar, Gt. Tabek, Gurun, Kubu dan Batu Laweh	Air Batumbuk	Kubang Nan Duo	Rimbo Tangah, Tambang, Baru Karak	Taratak Tangah, Koto Tuo	Pemancar 1, Tapak Lahu, Kayu Lana
PES agreements signed	Jan-21	Jan-21	May-22	May-22	May-22	Nov 23	May 24	Jan 25

	8	9	10	11	12	13	14	15
Site name	Sirukam (FMO 3, 2021)	Koto Baru/ Air Dingin (FMO 4, 2021)	Paninjawan (FMO 5a, 2022)	Paninjawan (FMO 5b, 2022)	Sirukam II (FMO 6, 2022)	Dilam (FMO 7, 2023)	Siguntur (Gotan 8, 2024)	Pemancar (Lampung 9, 2025)
Farmer Group	Kelompok Tani Cirubuih Indah Nan Jaya	Kelompok Tani Bukit Panjang Saiyo	Kelompok Hutan Pangan Paninjawan	Kelompok Hutan Pangan Paninjawan	Kelompok Tani Cirubuih Indah Nan Jaya	Kelompok Tani Rimbo Tambang Sepakat	Kelompok Siguntur Jaya	Kelompok Pemancar Lestari
Sub Group	None	None	None	None	None	None	None	None
No of participants	34	15	37	6	29	21	47	18
Total area (ha)	45.7	14.5	34.6	4.5	29.8	28.2	62.2	13.6

3. Implementation of a 3-year biodiversity monitoring project

In 2023, we implemented a pilot project with Biometrio.Earth. The pilot generated numerous interesting and new insights, including a wide variety of wildlife. The successful pilot project has turned into a 3-yearperiod of science-based monitoring of aboveground biodiversity with them. In all sites, we have employed a combination of bio acoustics, wildlife cameras, while analyses using AI are giving us insights and quantitative information on the impact we generate regarding biodiversity.

In addition to the above-ground biodiversity monitoring, we continued to work with Brawijaya University in Malang on changes in belowground biodiversity with worms as an indicator species. The initial research showed remarkable variations in belowground biodiversity recovery when moving from open land to agroforestry areas. In 2024, we had additional research conducted by Brawijaya, whereby we looked at restoration of soil health and biodiversity for each soil type. More details can be found in section E4.

4. Further increase in coffee sales

As an increasing number of farmers have coffee trees that can be harvested, we have been able to increase the coffee purchases from those farmers. In total, we bought 400 kg of Arabica green beans and some 100 kg of robusta. We had planned to buy and export 300 kg of Robusta, but the exporter rejected 200 kg because it was not dry enough. In addition, one bag of pure nature-based *Luwak* coffee (50kg) was exported to the Netherlands as well.

A5. Future Developments

1. Project expansion and new partnerships

In 2024, project activities continued in West Sumatra, where increasing numbers of farmers visited the field office or approached field staff in the villages to request participation in the program (exact number pending). Additionally, operations began in a new district, namely Pesisir Selatan, also in West Sumatra, and a 13.6-hectare pilot project was implemented in a different province, namely Lampung province, which is situated in the southern part of Sumatra.

In contrast, project engagement in the Fashion Forest initiative in West Timor has been reduced, as the local team chose to pursue Gold Standard certification independently. The project team respects their decision, and there is potential for future collaboration, especially if certification is achieved. We then may act as their preferred reseller.

Furthermore, preliminary efforts have begun to identify a new project location on the island of Flores.

2. Pesisir Selatan District, West Sumatra

In Pesisir Selatan District, a total of 62.2 hectares involving 47 farmers have been initiated for the restoration of degraded *Gambir* systems. *Gambir* is a shrub-like plant whose leaves are processed into natural dyes. After local processing, these dyes are sold to Indian companies operating in Indonesia and then exported to India. Farmers in the area observed that *Gambir* cultivated without shade underperforms, and they have long sought solutions to integrate tree cover into their systems. With the program's expansion into this district, farmers have been receiving support to reintroduce trees, thereby enhancing the sustainability of *Gambir* cultivation.

The Free, Prior and Informed Consent (FPIC) process concluded in late 2023 even though it faced several challenges, which is detailed in the 2023 Annual Report. As a result, nursery establishment and seedling procurement began only in early 2024. Raising and planting the seedlings requires approximately 4–6 months, which is beyond the scope of this current report.

Compounding the delay, sourcing seeds for particular species proved challenging, necessitating a significant portion of 2024 to prepare adequately for this new expansion area. In contrast, others were delayed due to limited access to high-quality seeds or more extended growth periods.
We anticipate that these new areas — namely Pesisir Selatan and Lampung — will be fully represented in the 2025 Annual Report, including issuance of carbon credits associated with these regions.

Figure 4. Signing contract in Siguntur in the presence of the Deputy *Bupati* of West Sumatra.

3. Pemancar District, Lampung province

The Forestry staff in Lampung, together with the local farmers, have identified large areas of degraded land, covered with a mixture of *Imperata*, shrubs and some scattered trees (see Figure 5). After agreement and measuring and identifying the plots, discussions on the contract, and dos and don'ts by both farmers and project developer/RPL, the signing of the contract was planned in late 2024/early 2025 Although some farmers had already signed the contract in late 2024, others were still hesitant, and further discussion with them was needed. The full contract signing was delayed by one month, and finally the contract was signed in early 2025. Therefore, this report already includes some information about the project in Lampung. Still, some details have not yet been included, as we will certify the area once the 2025 annual report is completed and approved (2026).

In Lampung, the Forestry staff manages the sites and the nursery that they already have in place as part of the efforts of the Forestry Department to increase tree planting. Now that the program is linked to their work, the staff is highly motivated to expand the nursery and ensure trees are planted according to the PVs.

Figure 5. Social mapping in Lampung, South Sumatra.

4. The island of Flores

In October 2024, we visited the island of Flores to discuss new opportunities for our restoration work. We have a befriended NGO there, that asked us to collaborate with them on setting up a carbon project. They are mainly working on (re)introducing sorghum as a food crop. In Flores, sorghum was an important food crop in the past, next to rice, but under Suharto everyone was "forced" to grow rice in Indonesia, and this policy affected the sorghum cultivation in Flores. All communities had to switch to rice cultivation. With an increasingly unreliable climate in Flores, farmers face many challenges with (irrigated) rice cultivation, where relatively long dry spells affect the sustainability of rice cultivation.

An option we are currently looking into is whether or how we could integrate sorghum with tree cultivation. During the farmer group meetings that we organised during our visit, the women present were all very interested in planting fruit trees, as part of a more diverse diet. Fruits can also generate substantial cash income as tourism on the island increases. Additionally, the men were interested in tree-based cash crops such as clove and coffee. In that sense, the systems are quite similar to West Sumatra. The interest and enthusiasm seem very high among the farming communities we visited, so we continue the discussions on what to do and how to do it. We hope to start a small pilot by the end of 2025.

Figure 6. Agreement and signing of the PVs by the individual farmers in Lampung late 2024/early 2025.

Figure 7. First farmer group meetings on Flores to explain our restoration approach.

PART B. Project activities

B1. Project activities generating Plan Vivo Certificates

1. New PES agreements signed

New PES agreements have been signed in 2024. Table 4 summarises the number of participants and areas where PES agreements were signed. In total, PES agreements were signed for an area of 75.8 ha in 2024.

Tree composition and species are somewhat different in these new areas. The desktop carbon estimations show that the potential carbon stocks are within the range of the previous estimations, meaning no substantial differences have been found between the new systems and the similar existing systems. Annex 1 provides a detailed lay out of the species and number of trees planted in each system. Carbon estimations and benefits can be found in Table 12 in section C2.

Table 4. Number of participants and areas where PES agreements were signed, 2024.

Site name	Agroforestry system	No. Participants	Total area (Ha)	No. trees/ha	Total No. Trees	PES Agreement signed	Eligible for certification	
Siguntur (Gotan 8, 2024) *	Melinjo agroforestry system	47	62.2	650	40,430	Yes	In 2026	**Planting delayed until 2025**
Pemancar (Lampung 9, 2025)*	Damar agroforestry system	18	13.6	500	6,800	Yes	In 2026	**Planting first half of 2025.**
Total		**65**	**75.8**	**1,150**	**47,230**			

*All of these participants and the carbon estimates for these areas are not accounted for in this 2024 annual report because the tree planting was not finished in 2024. Therefore, no Plan Vivo certificates were applied for in 2024.

Table 5. Variation in baseline situations in the restoration sites under certification. Some figures may not add up exactly, because they were rounded off scientifically.

Name of agroforestry system	Baseline	Area (Ha)	No smallholder households	No farmer Groups
Ecosystem rehabilitation – clove-based agroforestry systems	*Imperata*	19.9	35	1*
Improved land management – clove-based and robusta-based agroforestry systems	*Imperata*	43.7	113	1* Same as above
Improved land management – arabica/ cinnamon-based and mahogany/cinnamon-based agroforestry systems	Ferns	80.0	102	2

Name of agroforestry system	Baseline	Area (Ha)	No smallholder households	No farmer Groups
Improved land management - arabica/cinnamon-based, clove-based and robusta-based agroforestry systems	Shrubs	156.3	138	5
Total		**299,9**	**388**	**8**

*The location of these systems is in the village Paninggahan. In this area, there is only one large farmer group, divided into 2 subgroups. One subgroup focuses on ecosystem restoration, while the other focuses on the conversion of commercial vegetable areas into agroforestry (improved land management).

Within these farmer-developed systems the significant variation in number of trees planted by the individual participants means that there are various subsystems, with varying amounts of time-averaged carbon stock. It shows that farmer preferences and site differences are being taken into consideration. Where less trees are planted, it may first depend on the selected tree species. For instance, clove trees need wide spacing, as they will grow into big trees, but also farmers need a ladder to harvest the cloves. The *Damar* trees in Lampung will grow very old and very big, and farmers will climb the trees to tap the resin as well, which requires sufficient spacing. In other cases, farmers may wish to intercrop with vegetables (*Tumpang sari*) for the first 2-3 years, until the canopy closes. Less trees per hectare (wider spacing) mean that a few years of vegetable cultivation is possible, and in combination with annual carbon payments further bridges the gap between income from vegetables and tree crops. In the village of Paninggahan, there are older restoration sites. In the past 1-2 years, farmers have requested to add more trees in the gaps. Now that we have set up the coffee processing in this village, most farmers prefer to plant robusta coffee in the gaps, to provide for an additional income, knowing that there is a market. This adds additional carbon, and the system will intensify further. WE expect more farmers to request for seedlings for gap planting in the older sites.

Figure 8. One of our farmers is intercropping coffee in the gaps of quite a large cinnamon-based agroforest.

2. Nursery development in Sirukam, West Sumatra and Pemancar, Lampung

Our nursery in Sirukam village, close to the field office, is running well. Three full-time staff are working there, while local women and men are hired during peak periods to mix soil and put the soil in polybags (mostly men), and engage in putting the seeds in the polybags (mostly women).

We have been able to increase the number of seedlings being grown in our Sirukam nursery from around 81,000 seedlings in 2023 to over 150,000 in 2024 (see Table 6). Our team is collecting seeds increasingly by themselves, since purchases are difficult, and the seed quality from purchased, certified sources is often still below standard, leading to a large percentage of weak or no seedlings (due to lack of germination).

Table 6. Tree species list and counts in the nursery per 30 November 2024.

No	Tree Species (Indonesia)	Tree Species (Latin)	Number of trees
1	Kopi Robusta	*Coffea canephora (Robusta)*	42,546
2	Kopi Arabika	*Coffea arabica (Arabica)*	33,329
3	Kulit manis	*Cinnamomum verum (Cinnamon)*	36,743
4	Jengkol	*Archidendron pauciflorum*	4,865
5	Cengkeh	*Syzigium aromaticum (Clove)*	15,502
6	Alpokat	*Persea americana (avocado)*	5,727
7	Kayu Africa	*Maesopsis Emenii Engl*	5,595
8	Bayur	*Pterospermum javanicum Jungh*	1,035
9	Petai	*Parkia speciosa*	1,660
10	Durian	*Durio zibethinus*	3,250
		TOTAL	**150,252**

We also serve the new area in West Sumatra, namely Si Guntur, with this nursery, even though it is a 3–4-hour drive. We have identified a piece of land in Si Guntur and obtained permission to set up the nursery. However, we were only able to grow a relatively small proportion of seedlings in Si Guntur. Next year, we hope to build a nursery that is large enough to accommodate the growing number of farmers interested in joining the program. This will make it worthwhile to invest in a local nursery and staff. Our project officer, Abib, will manage the nursery (Figure 9), together with the head of the sub-village and the farmers.

In Lampung, we work closely with the Forestry Department, which already has its own nursery where seedlings are grown. With sufficient beds available, the seedlings requested by the farmers are integrated into the daily activities of the Forestry staff who also manage the cultivation of the seedlings (Figure 10).

Figure 9. Photos of the nursery in Si Guntur.

Figure 10. Nursery from the Forestry Department in Lampung with seeds and seedlings for the pilot project.

B2. Project activities in addition to those generating Plan Vivo

1. Coffee imports increase

In 2024, we successfully imported 400 kg of Arabica coffee from our farmers. We planned to import another 350 kg of Robusta, but only 50 kg was allowed to be shipped, the remaining 300 kg was rejected, as it did not match the required dryness. But the farmers continued to collect the coffee beans that have been digested and fermented by the civet cats, who continue to visit the coffee agroforestry gardens at night. We were able to import another 50 kg of *Kopi luwak*, the civet cat coffee, from pure natural sources.

Figure 11. Bags of coffee exported from Indonesia to Woerden, the Netherlands, waiting to be roasted.

2. Biodiversity impact study

In 2024, we signed a three-year collaboration with Biometrio.Earth in Germany to implement a thorough and complete monitoring study on our biodiversity impact and ecosystem health improvement. Results of the first years were beyond expectations and showed a variety of wildlife roaming around in our food forests. Every three months, we send out our newsletter, which includes a section on “what’s roaming”. This section features a short video showcasing what we have captured on camera during that period. Every 3 months, new animals are found, such as a honey bear with a cub. Our newsletter readers increasingly look forward to see what has been roaming around over the past 3 months. Using AI and computer-based learning, all this data gathered is evidence of whether our tree planting over the past three years can attract wildlife and restore healthy ecosystems and their functions. However, the presence of the tiger on video again in 2024 also indicates that the food web remains intact, suggesting that all trophic levels coexist in our sites.

In addition, we also collaborate with staff and students from Brawijaya University in Malang, East Java, to research belowground (agro)biodiversity. An essential activity for the belowground biodiversity is to count and assess worms, as they are one of the most critical indicators for soil health. Again, in 2024, we conducted a comprehensive assessment of our restoration projects, spanning from baseline to old agroforests (more than 10 years). The initial study in 2023 indicated that we may need to differentiate between two distinct soil types in our project area. More details on results are explained in section E4.

Besides soil samples and carbon stock assessments in the soil, worms were collected as an indicator for soil health. Details of the results for the biodiversity monitoring pilot project can be found in section E4.

Figure 12. Worms are collected as an indicator for soil health.

3. One year of training, research and capacity building

"Give a man a fish, and you feed him for a day;
teach a man to fish, and you feed him for a lifetime"

This well-known saying is something we always aim for. We place high value on teaching our farmers and partners how to do things more easily and more sustainably. We have created a co-learning environment. We provide vocational training to farmers on various topics while we learn from solutions developed by farmers. We also collaborate with local universities to conduct research, so that we gain a better understanding of the environmental and socio-economic impact of our restoration activities. All findings will be shared with the participating farmers. In 2024, various activities were undertaken that benefited not only us (CO2 Operate staff and RPL) but also our farmer participants.

4. Student involvement

In 2024, various students supported us with socio-economic monitoring, social mapping and belowground biodiversity research (see Figure 13). Table 7 shows that in total 12 students conducted research or supported the monitoring and social mapping. They stayed for at least for 3 months in the field, and several of them used the findings of the research or practical fieldwork for their thesis. Out of these 12 students, 7 were women and 5 were men. For the socio-economic fieldwork, we work together with the Anthropology faculty of Andalas University in Padang. The belowground biodiversity research is done in collaboration with Brawijaya University, in Malang, East Java.

Figure 13. RPL staff and Brawijaya students during the co-learning fieldwork on belowground biodiversity.

Table 7. Student engagement in our program in 2024.

	Socio-economic fieldwork		Belowground biodiversity research	MSc writings
	Socio-economic survey	Social mapping	Fieldwork	Topic for MSc thesis
Men	1	2	2	3
Women	2	2	3	4
Total	3	4	5	7

5. Participation of staff in training and seminars

RPL staff also further improved its capacity. We are covering educational costs for two of our staff members to increase their intellectual capacity and grow within the organisation RPL. Every year, we aim to sponsor 2-3 staff members to educate themselves, although we have the requirement that it should also benefit the organisation RPL or the activities in the field. Below, the involvement of RPL staff in seminars, webinars and other training sessions have been summarised. RPL staff are also increasingly involved in and invited for presentations at seminars and meetings.

Table 8. Capacity building of RPL staff.

No	Activity	Time	Participant
1	Webinar : Introduction to Tax Report for foundation	17 January 2024	Aristya Wulandari (1)
2	Bio Acoustic Training by Biometrio Earth	24 March 2024	Jefri Rozi, Yudha Saktian, Ai Farida (3)
3	Training of using TREEO application for tree monitoring	27 March 2024	All RPL team (12)
4	Gula – Gula Farmer Meeting	10 - 11 May 2024	46 farmers, 12 RPL team, 3 resource persons
5	Analysis and Data Management for ground water quality organized by Pusat Pelatihan Lingkungan-Sumatera Barat	6 June 2024	Gita Fatrisia (1)
6	TreeO app and TreeO Cloud Training	11 June 2024	Yudha Saktian (1)
7	Webinar Interfaith Rainforest Intitiative: Pentahelix framework for Forest Protection and Climate Change	12 August 2024	Ai Farida (1)
8	Coffee Training (seedling, grafting and post harvesting) in Pesisir Barat, Lampung	2 – 9 August 2024	Ferdi and one farmer from Salayo (2)
9	Support study for taking Bachelor's degree	September 2024 - present	Ferdi (Agrotechnology Department at M. Yamin University, Solok) and Eka Putra Jaya (Law department at M. Yamin University Solok (September 2024 – January 2025)
10	Grafting (avocado) training in Salayo	September 2024	Jefri Rozi, Ferdi and 5 Salayo's farmers (7)
11	Indonesia International Sustainability Forum in Jakarta	5-6 September 2024	Farida, Aristya Wulandari (2)
12	Plan Vivo Stakeholder Meeting	10 – 12 September 2024	Ai Farida, Paul Burgers (2)
13	Webinar : Understanding Types & component of a Social Enterprise organized by PLUS " Platform Usaha Sosial "	4 October 2024	Jefri Rozi (1)
14	Stakeholder Mapping for the Climate	7 November 2024	Bubung Angkawijaya (1)

No	Activity	Time	Participant
	fund in West Sumatra, organised by the Provincial Government of West Sumatra in Padang		
15	Assisted Natural Regeneration (ANR) training with Sirukam farmers	10 November 2024	5 farmers All RPL team (12)
16	Regional Workshop-Training on Artificial Lake Management Part 2, Sustainable Environmental of Marginal Lands and Coastal Areas, organised by SEAMEO BIOTROP - UNNES	19 November 2024	Ahmad Haryono, Jefri Rozi (2)
17	Working Group discussion on greenhouse gas emission reduction for the Forestry sector, organised by the West Sumatra Forestry Agency in Padang	18 December 2024	Bubung Angkawijaya (1)
18	Regional Workshop-Training on Artificial Lake Management Part 2, Sustainable Environmental of Marginal Lands and Coastal Areas, organised by SEAMEO BIOTROP - UNNES	19 November 2024	Ahmad Haryono, Jefri Rozi,
19	Training on using the TREEO application for tree monitoring	27 March 2024	All RPL team
20	Bio Acoustic Training by Biometrio Earth	24 March 2024	Jefri Rozi, Yudha Saktian,
21	Webinar: Understanding Types & Components of a Social Enterprise, organised by PLUS " Platform Usaha Sosial "	4 October 2024	Jefri Rozi
22	Coffee Training (seedling, grafting and post-harvesting kopi in Pesisir Barat, Lampung	2 – 9 August 2024	Ferdi
23	Analysis and Data Management for groundwater quality, organised by Pusat Pelatihan Lingkungan-Sumatera Barat	6 June 2024	Gita Fatrisia
24	TreeO app and TreeO Cloud Training	11 June 2024	Yudha Saktian
25	Webinar: Introduction to Tax Report for Foundation	17 January 2024	Aristya Wulandari
26	Support study for a bachelor's degree	September 2024 - present	Ferdi (Agrotechnology Department at M. Yamin University, Solok) Eka Putra Jaya (Law department at M. Yamin University, Solok, September 2024 – January 2025)

Table 9 lists the most important seminars attended by some of the RPL staff.

Table 9. National/international seminars attended by RPL staff.

No	Activity	Time	Participant
1	Stakeholder Mapping for the Climate Fund in West Sumatra, organised by the Provincial Government of West Sumatra in Padang	7 November 2024	Bubung Angkawijaya
2	Working Group discussion on greenhouse gas emission reduction for the Forestry sector, organised by West Sumatra Forestry Agency in Padang	18 December 2024	Bubung Angkawijaya
3	Indonesia International Sustainability Forum in Jakarta. Organised by the Netherlands Embassy in Jakarta.	5-6 September 2024	Farida, Aristya Wulandari

6. Farmer training

In 2024, we organised and facilitated the first large farmer meeting, focusing on farmers-to-farmers exchange, mutual learning, and explaining the status and approaches of each farmer group. The farmer group representative from Paninggahan (our oldest site) delivered an excellent speech, which further motivated everyone, as he demonstrated that hard work could lead to achieving a good outcome, with trees providing significant food and income sources.

Figure 14. Two-day farmer meeting in Harau, West Sumatra, 10-11 May 2024.

Also, we invited Forestry staff from Lampung. One staff member gave a presentation about the importance of grafting, especially now with a changing climate. Grafting can support stronger and more resistant trees, while also increasing production. This generated broad interest, and soon after, we started to bring two of our staff members from our nursery, together with one farmer, to Lampung. Here, they received a 3-day practical training on how to do grafting. The training focused on grafting coffee trees, but grafting can be done on other species as well. Upon his return from Lampung, the farmer has been actively grafting his coffee trees using branches from the famous Lampung coffee Robusta tree, which he brought back from Lampung.

The farmer and RPL staff who attended the training on grafting were invited to visit Selayo and Paninjawan village to conduct a training. In the village of Selayo 5 farmers attended. Here, avocado trees had been grafted by the participants. The training in Paninjawan was postponed to early 2025. It is great to see that these were all initiated by the farmers themselves, and the outcome of a joint WhatsApp group that was established during the farmer meeting in Harau. After seeing the farmer participating in the training in Lampung in pictures in this WhatsApp group, the farmers in Selayo and Paninjawan asked him to come and give training to them once he was back. Once this takes off, we will

In addition to these new training and capacity building activities, RPL has also been organising trainings to new farmers on ANR and best practices in coffee cultivation (see Table 14 for more details).

Figure 15. Training on grafting with the farmer in Lampung (photo above, left), our young RPL staff Benjo (photo below, left), while the farmer is overlooking the training he gave to farmers in Selayo, grafting avocado trees (photo on the right).

7. Compost distribution

In 2023, we started to distribute compost to our farmers, which we produce ourselves in our own compost unit in Sirukam. Farmers are very pleased that we began distributing this as part of "in-kind" carbon payments. In 2024, we were able to have a second one in another village (Paninggahan), where the village head provided government funding to set up a small cow fattening program, and our team negotiated to combine this with a composting unit as well, using the cow dung for the compost. We would then buy the compost at a subsidised rate for our farmers. This works well. Here, the farmers in charge of the composting unit do not need to go around to collect dung from farmers, as they collect it from the cows next door. With an increasing restoration area, these two units can cover all sites and serve our farmers within a 30-minute drive. Due to budget constraints, compost is given to 2 of the most essential economic trees according to the farmers, or those that are primarily in need of additional fertilisation. The farmer chooses which trees he/she will apply the compost to. In most cases, it is given to the coffee and clove trees, as these provide the primary income for the farmer and the family. Most other trees are also local trees, so they usually grow even without compost.

Table 10. Five-year targets and yearly distribution of compost completed.

No	Site Code	Area (Ha)	Total target for first 5 restoration years (bag)	Total target for first 5 restoration years (kg)	Distribution/ year completed (Bag)	Distribution/ Year completed (kg)
1	VS2020-1	65.5	1,965	29,475	-	-
2	FMO2021_1a (Paninggahan Cengkeh)	2.2	813	12,195	217	3,255
3	FMO2021_1b (Paninggahan Kopi)	27.1	66	990		
4	FMO2021_2a (Salayo Cengkeh)	11.0	75	1,125	202	3,030
5	FMO2021_2b (Salayo Kopi)	2.5	330	4,950		
6	FMO2021_3 (Sirukam 1)	45.7	1,371	20,565	250	3,750
7	FMO2021_4 (Koto Baru Aie Dingin)	14.5	435	6,525	100	1,500
8	FMO2022_5a (Paninjawan)	34.9	1,038	15,570	287	4,305
9	FMO2022_5b (Paninjawan)	4.1	135	2,025		
10	FMO_6 (Sirukam 2)	29.8	894	13,410	380	5,700
10	FMO2022_7 (Dilam)	28.2	846	12,690	408	6,120
11	GoTan2024_8 (Siguntur)	62.2	1,866	27,990	467	7,005
	TOTAL	**327.7**	**9,834**	**147,510**	**2,311**	**34,665**
			TOTAL Budget in 2024 (Rp)			**79,729,500**

Note: This table is not including the VD2017-1 and VD2017-2 systems, as mature trees do no longer need composting.

Table 11. Compost distribution, application by farmers and the second composting unit in Paninggahan (below left).

PART C.

C1. Contractual statement

All claims and reservations have been made since 2017. This issuance submission is entirely based on signed PES agreements with participants complying with all the minimum requirements stated in these agreements. Minimum requirements consist of:

1. Be (or have become) a member of the farmer group with which the restoration contract is signed
2. As such, accepted by the farmer group members as being "able" to restore the land
3. Understand and agree on all aspects of the contract.
4. Have the land available and mapped by our RPL team
5. Tenure security is clear
6. Land is outside the State Forest Land Area
7. Participant's tree choices and numbers of each species to be planted in the area in the restoration contract, which has been finalised and included in the PES agreement
8. Have agreed on (and co-signed) the restoration contract.
9. Tree/shrub cover in the field is below 35-40%.

We continue to explain to them that these are essential trees despite its suitability recently added the final point about tree cover (no. 9), as farmers have come to realise that some form of shading early in the planting process is becoming increasingly crucial for the success of young seedlings in these times of climate change. Most of the plots so far have less than 10% tree/shrub cover, and the trees already present in the restoration areas are usually relatively young, under 4 years old. However, it still provides benefits, especially in the following years, as trees at this age tend to grow quickly, offering more shade. Many plots contain Leucaena (*Lamtoro*) trees, so we continue to emphasise to farmers that these are essential trees to protect- not only for initial quick shading as they grow fast, but also to support and improve soil health. So far, farmers have not shown much interest in these trees, despite their excellent shading ability for coffee. According to them, they do not see any (direct) economic benefits.

Nonetheless, the continued explanation of the indirect benefits slowly begins to settle in the minds of the farmers, especially now that they see the increased need for a certain degree of early shading. As climate change increases the challenges faced by farmers, they tend to prefer joining the program when their land already has some tree cover, or where there are trees in nearby land (see figure below). This will help reduce solar radiation, serve as a windbreak, and mitigate the impact of heavy rains. This does affect the carbon additionality slightly, and we are taking that into account in the carbon calculations under the new PV climate standard in 2025 Another advantage of some existing trees already present is that it also helps to protect the existing trees, as otherwise, if these fields are not used, fires or "outsiders" may come and cut the trees for firewood or timber.

For the past 3 years, our carbon credit sales have been sufficient to invest further in extending the restoration area and adding 50-100 hectares.

Figure 16. More farmers prefer to restore areas where some trees are still present to provide shading.

C2. Issuance request for Plan Vivo Certificates (PVC) allocated to new participants and land

The issuance request for PVCs (Plan Vivo Certificates) allocated to participants from 2017 onwards is provided in Table 12. For 2024, as previously mentioned, we were unable to issue new credits in the news areas (Siguntur and Pemancar) due to new socio-cultural understandings and unexpected delays and challenges encountered in new districts and provinces when starting up the program. All is on schedule for issuance early 2026 (2025 vintages).

Table 12. Total saleable PVCS since 2017, before sales and reservations (including buffer planting). *Some figures may not add up exactly, because they were rounded off scientifically. (colour coding: historical, certified systems/areas and new systems/areas).*

				A	B	C=A*B	D	E=D*C	F=C-E
Site code	Site name	*Tech specs System*	No. participants	Total area (ha)	Carbon Potential (tCO_2/ha)	Total ER's (tCO_2)	*% buffer*	No. of PVCs allocated to buffer this period	Saleable ER's (tCO_2)
VD2017-1*	Paninggahan (bukit Panjang 2017)	*Clove-based*	35	19.89	225.81	4,491.36	*16*	718.62	3,772.74
VD2017-2	Paninggahan (Subaka, 2017)	*Clove-based*	45	14.36	189.42	2,720.07	*16*	435.21	2,284.86
VS2020-1	Air Dingin (2020)	*Arabica - cinnamon*	87	65.52	357.85	23,446.33	*16*	3,751.41	19,694.92
FMO2021-1a	Paninggahan (FMO 1a)	*Robusta-based*	3	2.20	286.18	629.60	*16*	100.74	528.86
FMO2021-1b	Paninggahan FMO 1b	*Clove-based*	65	27.10	298.54	8,090.43	*16*	1,294.47	6,795.96
FMO2021-2a	Selayo (FMO 2a)	*Robusta-baed*	5	11.00	228.88	2,517.68	*16*	402.83	2,114.85
FMO2021-2b	Selayo (FMO 2b)	*Clove-based*	6	2.50	245.14	612.85	*16*	98.06	514.79
FMO2021-3	Sirukam (FMO 3)	*Arabica/ Cinnamon-based*	34	45.70	261.52	11,951.46	*16*	1,912.23	10,039.23
FMO2021-4	Koto Baru/ Air Dingin (FMO4)	*Mahogany/ Cinnamon-based*	15	14.50	347.90	5,044.55	*16*	807.13	4,237.42
FMO2022-5a	Paninjawan	*Robusta-based*	37	34.60	265.62	9,190.45	*16*	1,470.47	7,719.98
FMO2022-5b	Paninjawan	*Robusta-based*	6	4.50	272.21	1,224.95	*16*	195.99	1,028.96
FMO2022-6	Sirukam II	*Arabica-based*	29	29.80	261.52	7,793.30	*16*	1,246.93	6,546.37
FMO2023-1	Dilam (FMO 7)	*Clove-based*	21	28.20	197.52	5,570.06	16	891.21	4,678.85
	TOTAL		367	299.87	3,438.11	83,283.09		13,325.30	69,957.79

Part D. Sales of Plan Vivo Certificates

D1. Sales of Plan Vivo Certificates

The Gula Gula Food Forest Program has previously issued uncertified credits before Plan Vivo certification. These credits have already been sold and a proportion of the climate benefits achieved within this report are allocated to allow these uncertified credits to be converted to PVCs (from 2017 onwards).

In 2024, we have seen a further increase in the sales of carbon credits. Larger companies in the EU are finding it necessary to purchase carbon credits to minimise their unavoidable emissions.

In 2024, we retired 13,223 carbon credits as part of sales to a variety of clients in Europe. Reservations will be sold to clients with whom we have a multi-year contract. This is, in most cases, a 5-year contract that allows the client to oversee the restoration of a specific degraded area reserved for them, transforming it into a productive food forest. Table 13 The chart shows the carbon credits sold in 2024,

Table 13. Retirements in 2024

	A
Planting/ starting year certification	Retired in 2024
2019	5
2020	5,449
2021	3,290
2022	4,398
2023	4,472
Total*	**17,614**

Source: Markit Carbon Credit Account CO2 Operate BV.

In addition, we currently have two ongoing long-term contracts (5 years each). They have not been included as reservations here. The remaining total reservations until the end of the contracts equal 4,016 tons CO2e.

Part E. Monitoring results

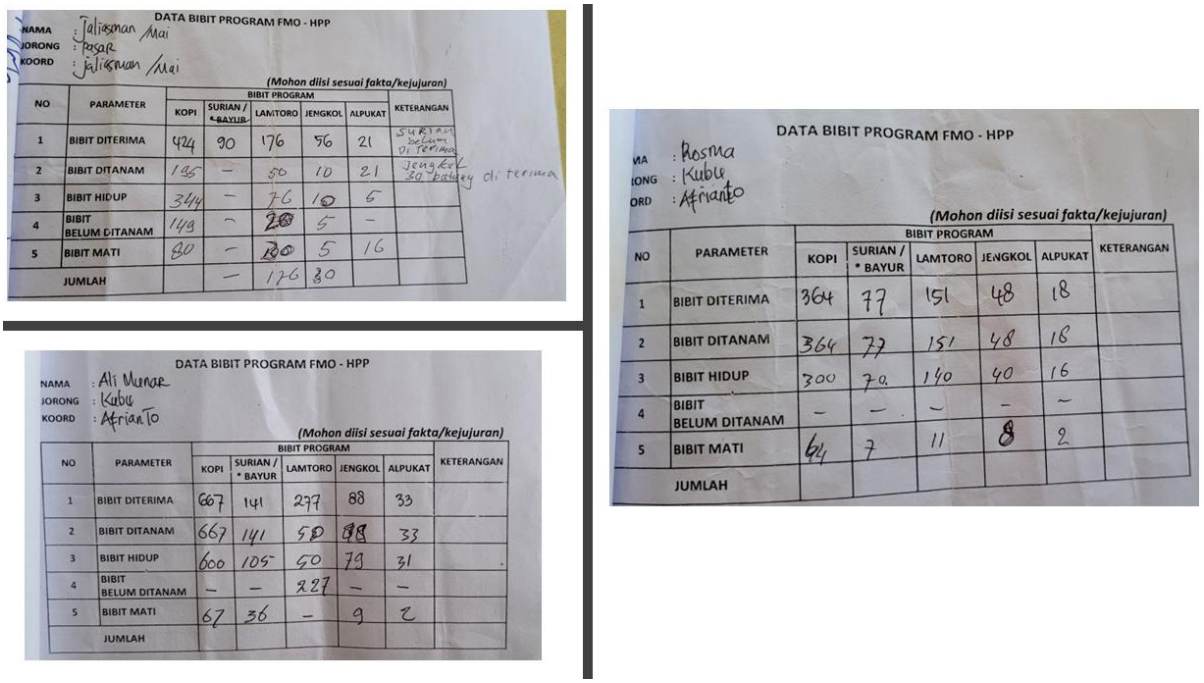
The tree-based systems implemented by the Gula Gula Food Forest Program in the Minangkabau society of West Sumatra have been shown to contribute to a substantial number of Sustainable Development Goals (SDGs). Besides direct contributions on the left side of the figure, more indirect benefits result from water retention, which supports irrigated rice fields and hence food security. Monitoring progress towards the SDGs is growing in importance for the Gula Gula Forest Program, now that some areas are reaching the age of full productivity in relation to ecosystem services, biodiversity and economic production (namely the harvesting potential).

Figure 17. The restoration program in the Minangkabau can contribute to a variety of SDGs.

Late 2023 and early 2024, we finished a survey among participants on the (potential) income that they acquire from selling the tree products, and some other socio-economic data we gathered. For the survey, we asked for the help of anthropology students from Andalas University in Padang. We to develop the social components, including village mapping exercises in new sites, as part of our capacity building efforts. This is part of our capacity-building efforts focused on social components. This initiative is part of our capacity-building program for local young students. They can learn from a “real project” and bachelor's/master's thesis writing from those who are writing their bachelor's/master's thesis.

E1 Ecosystem services monitoring.

Staff of our local partner are in the field full-time during weekdays, working with the participants and monitoring progress. An increasing number of farmers are being trained to assist with monitoring, including joining the team for DBH measurements in the field. The team has provided the farmers with a simple form to fill in (Figure 18). Once a month, the group meets with the project officer of the RPL team, responsible for that area, to discuss these forms and, where needed, make the necessary arrangements for replanting.



DATA BIBIT PROGRAM FMO - HPP

NAMA : Jalisman Mai
JORONG : Pasar
KOORD : Jalisman Mai

(Mohon diisi sesuai fakta/kejujuran)

NO	PARAMETER	BIBIT PROGRAM					KETERANGAN
		KOPI	SURIAN / * BAYUR	LAMTORO	JENGKOL	ALPUKAT	
1	BIBIT DITERIMA	424	90	176	56	21	Surian belum di terima
2	BIBIT DITANAM	195	–	50	10	21	Jengkol 30 batang di terima
3	BIBIT HIDUP	344	–	76	10	5	
4	BIBIT BELUM DITANAM	149	–	200	5	–	
5	BIBIT MATI	80	–	100	5	16	
	JUMLAH		–	176	80		

DATA BIBIT PROGRAM FMO - HPP

NAMA : Rosma
JORONG : Kubu
KOORD : Afrianto

(Mohon diisi sesuai fakta/kejujuran)

NO	PARAMETER	BIBIT PROGRAM					KETERANGAN
		KOPI	SURIAN / * BAYUR	LAMTORO	JENGKOL	ALPUKAT	
1	BIBIT DITERIMA	364	77	151	48	18	
2	BIBIT DITANAM	364	77	151	48	18	
3	BIBIT HIDUP	300	70	140	40	16	
4	BIBIT BELUM DITANAM	–	–	–	–	–	
5	BIBIT MATI	64	7	11	8	2	
	JUMLAH						

DATA BIBIT PROGRAM FMO - HPP

NAMA : Ali Munar
JORONG : Kubu
KOORD : Afrianto

(Mohon diisi sesuai fakta/kejujuran)

NO	PARAMETER	BIBIT PROGRAM					KETERANGAN
		KOPI	SURIAN / * BAYUR	LAMTORO	JENGKOL	ALPUKAT	
1	BIBIT DITERIMA	667	141	277	88	33	
2	BIBIT DITANAM	667	141	50	88	33	
3	BIBIT HIDUP	600	105	50	79	31	
4	BIBIT BELUM DITANAM	–	–	227	–	–	
5	BIBIT MATI	67	36	–	9	2	
	JUMLAH						

Figure 18. Examples of monitoring forms, filled in by our participating farmers.

Usually, the farmers replace the trees with the same trees. However, if farmers notice a particular species is not thriving in their land, they will opt for another species that shows good growth. Usually, the first 2 years of establishment shows the highest variation in successes or failures. A general figure from the literature indicates that there is a death rate between 20-50% in the first 2-3 years. Where we are generally doing well with a maximum of 20% death rate, we do see that sometimes the death rate reaches 50% or more in the first year. As the changing climate continues to put increasing stress on survival rates in the first years, we have decided to extend the intensive monitoring period from 5 to 7 years. Survival rates are sometimes lower compared to previous years, as recent years have shown hostile climate conditions, including short but very intense rains, longer dry spells, and storms at times when seedlings are still young (see also Figure 1, showing the rainfall pattern over the past years). Such adverse weather conditions, rain in particular, can have a large and significant impact on the survival rates during the establishment phases of the trees in the field. Farmers also understand this and periodically decide to replace particular tree species with others that can withstand the impact of climate change and grow well. It also means monitoring carbon sequestration, but so far, there are no significant differences in carbon sequestration when one or two species are replaced. Careful monitoring and updating the planting schemes requires intensive collaboration with the participants. In addition, a more formal monitoring process and an evaluation process is conducted with the head of the farmer groups and respective farmers before the annual carbon payments.

E2 Maintaining commitment

As stated in section A4, new participants must become members of the farmer group to participate in our restoration activities. This is usually done after democratic consultation within the group, and once the new members agree to the rules set by the farmer group. The contracts clearly state that annual carbon payments are paid only after everyone in the group has reached their (planting) target for that year. So, having low commitment will affect all members of the farmer group. In addition, attending meetings is another important aspect. Due to the strong social control within the group, other members monitor individuals to ensure the timely completion of activities. They also participate to ensure all tasks are completed on schedule. In cases where members fail to comply with the group rules, they may receive support from other members, provided there are valid reasons for their absence (e.g., illness, family bereavements, etc.). If the reasons are related to "lack of interest", the member gets two warnings from the group. If, after two warnings, the member is still not doing their job, they will be replaced. It means the management of that restoration area will change. The planted trees remain part of the program, so they do not affect the contracts regarding the trees incorporated. The farmer group conducts the selection, and the high motivation of participants to join the restoration activities has resulted in a few dropouts. The very few dropouts are mostly due to factors beyond their control, such as illness or death (Table 14). Just like 2023, in 2024 there have been no changes. All are still active, which demonstrates the participants' commitments to the program.

Table 14. Participants who left the program, reason why and solution.

Number of Participants	Contract	Area (ha)	Reason for leaving	When	Replacement
1*	VD2017 1	0.7	Lack of management due to Illness	2017	Replaced by 2 new persons, (area 0.5 ha) (0.2 ha)
1	VD 2017-2	1.2	Bad health	2020	Replaced by 4 new persons (0.2 ha, 0.5 ha, 0.4 ha, 0.1 ha)
1	FMO6,2022	0.6	Resigned (job elsewhere)	2021	Early beginning of program, so replaced.
3	VS2020-1	2.5	Three people passed away	2021	Family members now manage the areas. Two of them are the son of de deceased person (0.8 ha and 0.4 ha), while the father of a young deceased person (accident) took over (1.3 ha). This means no change in land area and trees.
1	FMO2a-2b, 2021,	0.4	Land conflict with his wife's family	2022	Replace the area by another member
11	VS2020-1	7.7	Resigned for job elsewhere, move to other province, lack of management due to other main job (horticulture)	2022	The portion of 4,7 ha replaced by new area from 5 other farmer group member and the other 3 ha the land managed by Verstegen farmer group
0		0	In 2023, no farmers left the program or were replaced.	2023	
0		0	In 2023, no farmers left	2024	

Number of Participants	Contract	Area (ha)	Reason for leaving	When	Replacement
			the program or were replaced.		

*Due to privacy reasons, we did not include names; however, records are kept for each participant showing their real names and copies of ID cards. .

E3 Socioeconomic monitoring results

In addition to the socioeconomic survey we have done, we do our usual monitoring based on our performance indicators.

Table 15. Socio-economic monitoring results 2022.

Activity	Socio-economic indicators	Results /progress	Explanation /potential mitigation strategy	
		According to plan	Not according to plan	
Monitor income improvement from tree crops	➢ # Kg harvested/tree crop ➢ # Income (U$) received/tree crop	N.A.	N.A.	Main income earners, clove trees, only bear fruit after 6-7 years. Most coffee arabica was planted 3 years ago and is bearing fruits in 2023/2024.
Monitor progress post harvesting tree products	➢ #kg tree products being part of post harvesting ➢ # Income (U$) from selling (semi) processed products	Post harvesting units in testing phase First test batch of 423 kg dried coffee beans exported to Netherlands.		The large, new distilling unit is not functioning well. Farmers seem less committed, even though the oil can be sold at good prices. We may relocate the unit to another village that has requested a distilling unit. The high demand for the "regenerative coffee" from our sites, and more coffee being produced as coffee trees grow older will allow us to scale up exports to at least 1000 kg in 2025.
Annual Carbon cash payments to farmers	➢ Total Annual Carbon payments (U$) received by farmer participants	**$13,460**	$15,380	Serious delays in payments were caused by not yet reaching annual

Activity	Socio-economic indicators	Results /progress	Explanation /potential mitigation strategy	
		According to plan	Not according to plan	
				targets for various climate-related and COVID effects previous years.. All delayed payments took place in 2023.
Monitor direct women engagement in restoration activities	➢ # women direct involvement in the program # women indirectly involved	**22%** direct women engagement in restoration activities. All women are involved as the managers. In the matrilineal society of the Minangkabau the women own the land. **10** local women hired for working in the nursery to establish polybags with seeds (a total of 21 days/person)		Gender division seems low. However, in the matrilineal Minang society, women own the land. So, in all sites, women are involved as landowner/manager of their sons or husbands to work the land. After marriage, the men will live as "a guest" in the wife's family house. They are supposed to work on and care for the land of the wife and her female family members. This is especially the case for the upland areas, where access is not easy, and, where most of the restoration activities take place.
Inclusion of farmer participants in PES agreements	➢ # of participants managing restoration area with PES agreement	**435**		In total we have 435 participants/families with a PES agreement in 2024.
Capacity building				
Agricultural training post harvesting	➢ # people directly/indirectly engaged in agricultural training ➢ # people attending post-harvesting	**70** participants engaged in one or more field training and meeting sessions in 2023		29 Sirukam II farmers are trained in zero tillage techniques, including Assisted Natural Regeneration (ANR). 1 farmer (representative from all farmer

Activity	Socio-economic indicators	Results /progress	Explanation /potential mitigation strategy	
		According to plan	Not according to plan	
Training for RPL staff		Also, RPL team attended various meetings related to sustainable and net zero program (see table 8		groups) attended coffee grafting training in Lampung 40 farmers attending Farmer meeting as part of first annual meeting for the program
Formation of farmer cooperative groups (Kelompok tani)	➢ # farmer groups	9 farmer groups have been established until 2024, of which 1 in 2024.		All participants holding PES agreements are members of these farmer groups.

In addition to these performance indicators, we also monitor/gather the information on what type of regenerative agroforestry system is being developed by our farmer participants. Table 16 summarizes the different systems. In total we have 15 different systems that are being planted by our participants. System 14 and 15 are new. These are in our new areas, in the new district in West Sumatra, Pesisir Selatan, and the other one is in Lampung (South Sumatra). Here, different species are important to the farmers' livelihoods, like nutmeg trees and *gambir* shrubs in Pesisir Selatan, while *damar* (resin from the *damar* tree) is a very important income earning product in Lampung.

Table 16. Various agroforestry systems (the PVs), number of participants, men or women.

No	Site name	Agroforestry System	No of participants	Women	Men
1	Paninggahan, Bukit Panjang (VD2017-1)	Clove-based	35	2	33
2	Paninggahan, Subaku (VD2017-2)	Clove-based	45	7	38
3	Air Dingin VS2020-1	Arabica/cinnamon	87	17	70
4	Paninggahan (FMO 1a,2021)	Robusta-based	3	0	3
5	Paninggahan (FMO 1b,2021)	Clove-based	65	10	55
6	Selayo (FMO 2a, 2021)	Robusta-based	5	0	5
7	Selayo (FMO 2b, 2021)	Clove-based	6	5	1
8	Sirukam (FMO 3, 2021)	Arabica/Cinnamon	34	5	29
9	Koto Baru/Air Dingin (FMO 4, 2021)	Mahogany/Cinnamon	15	7	8
10	Paninjawan (FMO 5a, 2022)	Robusta-based	37	6	31
11	Paninjawan (FMO 5b, 2022)	Robusta-based	6	0	6
12	Sirukam II (FMO 6, 2022)	Arabica-based	29	10	19
13	Dilam (FMO 7,2023)	Clove- based	21	0	21
14	Siguntur (Gotan 8, 2024)	Melinjo - based	47	3	44
		TOTAL	**435**	**72**	**363**

E4 Environmental, climate and biodiversity monitoring

Table 17 provides a summary of the various activities we implement to monitor impact on climate, environment and biodiversity. The indicators provide guidelines to our progress. Progress cannot always be defined by annual targets, as we begin restoring new degraded areas once an offsetting contract is signed with a client/partner. This can take place throughout the year, and size of the contract also depends on their offsetting needs. After signing, we start the FPIC process, and this could take between 2-6 months before we sign a PES agreement with the farmer groups. Hence, we do not really have annual targets, as each year may show different figures. However, the rough figure we keep in mind is that we aim to add around 100-150 ha per year. Therefore, we mention results/progress towards yearly targets (not necessarily coinciding with a calendar year) in the table rather than annual targets being met or not (as they may cover different calendar years). Next paragraphs will explain in more detail what has been done.

Table 17. Climate, environmental and biodiversity impact result

Climate mitigation impact				
Activity	Indicator	Results /progress		Explanation /mitigation strategy
		According to plan	Not according to plan*	
Zero burning techniques that prevent wildfires	• # Occurrence of wildfires			No wildfires threatened the project sites.
Monitor progress carbon sequestration	• # Total aboveground Carbon stock (time-averaged) • Belowground time averaged Carbon stock/ha • # Soil organic matter change/ha		Delay caused by the TreeO app, which we wanted to use for easy measuring DBH of trees. It did not work (well) under our field conditions.	After 2-3 months of testing, we decided to cancel the use of the technology, as many trees were not yet included in the app, measurements varied compared to manual DBH checks. So we decided to continue using manual DBH measurements. Finished monitoring in 2024.
Monitor changes in rainfall (if any)	• # mm of monthly rain in project sites	Figure 1 shows the updated figures until 2024		Rainfall data collected from meteorological stations in our villages showing wider variety in rainfall pattern affecting the planting and growing seasons.
Environment/Restoration impact				
Restore degraded land	• # of ha reforested under PV (ha)	362.1	Contract signing and planting delayed for the new areas.	Due to socio-political issues , activities in these new areas are delayed by 6-12 months. To be included in 2025, as all was solved early 2025.
Plant agroforestry trees	• # of agroforestry trees planted under PES agreements	472,813 (under PES agreement)	381,165 (planted until Dec 2024)	Some seedlings took longer to grow to transferable sizes, while little rain made participants to hesitate the planting.
	• # trees per ha (average)	1,309 range 700 - 2000		
	• # different species/ha	7-9		

Climate mitigation impact				
Activity	Indicator	Results /progress		Explanation /mitigation strategy
		According to plan	Not according to plan*	
• Biodiversity				
Tree species (bio)diversity	• # different species found in all restoration area (planted & protected/regenerants)	19		
	• # indigenous regenerants (ANR) and protected trees in field	21,086		Indigenous trees, already present in the land are protected, while regenerants can grow after ANR.
Aboveground Animal/bird species biodiversity	• # Report on aboveground # quantification of biodiversity, using bioacoustics	2 reports finalised according to the deadline of the donor (August 2023)		Report on above-ground biodiversity.
Belowground (agro)biodiversity	• Report on (agro) quantification of biodiversity belowground	Report finished in August 2023, meeting deadline of donor.	Planned for 2022, but getting funding & (local) expert-partners only finalised late 2022	

Source: Field monitoring data RPL.

*Not according to plan means the work could not be done according to schedule for a variety of reasons, which are mentioned in the column (explanation" on the right.

In addition to protecting (indigenous) trees and wildlings in the field, many planted agroforestry trees are also indigenous or local species. They are either local to the area, the island of Sumatra or other islands of Indonesia. These include cinnamon, cloves (*maluku*), mahogany, mangosteen, *surian, petai, cengkol, shorea* and *durian*. The other tree species (*coffee robusta, avocado*, *leuceana, soursup* and recently *coffee arabica*) are not considered indigenous. However, they have become naturalised species as they have been introduced into Indonesia many decades ago.

In the new project area of Lampung, the *damar* tree is an indigenous forest tree species, with some in the region over a hundred years old. Obviously, we hope that will also be the future of the soon-to-be-planted *damar* trees in our program.

The number of trees planted per hectare varies between 700 and 2,000 (and 1,355 trees/ha on average), depending on the composition of trees in a plot and farmer preferences. Trees with wide canopies, like clove trees do not allow many trees per hectare, as it would cause too much competition

for light. Farmers also do not prefer too many trees in a clove-based system as harvesting cloves requires the use of ladders, hence space is needed to climb the trees.

Coffee arabica on the other hand concerns small trees/shrubs, and sometimes up to 2,000 trees/shrubs can be found. As part of our collaboration with Solok Rajo, a local NGO focusing on coffee cultivation, provide training to our farmer participants on coffee cultivation. According to them, this high number of trees/shrubs per hectare can result in a good income from coffee cultivation. Although this may be true if one focuses solely on coffee cultivation, our program participants think that this number of coffee trees/shrubs per hectare is too high for them since it would require too much management and labour, the latter not always being available locally. Project participants prefer to have more trees in their farms that require less management, and therefore tree diversity is key. In 2024, we have integrated such participants' inputs and reduced the number of coffee trees per hectare. The RPL team explains to farmers how much income one coffee tree/shrub generally generates, so farmers can calculate how many they would "need" to reach a certain amount of regular cash from selling the berries/green beans.

The preference of farmers for farm variation also results from the fact that some food forest systems are on former vegetable cultivation areas. Farmers still prefer to cultivate some vegetables (mostly chilli) during the initial 2-3 years of tree establishment, before the tree canopies close, which will restrict vegetable cultivation. Here, the agroforestry system is also more open, to allow several years of vegetable cultivation in between the growing trees. After discussion with the farmer groups managing the ex-vegetable areas, gaps will be filled with more trees at a later stage. This is already happening in Paninggahan, where participants are now asking for robusta seedlings to intercrop in the "gaps" of mostly mature food forests.

Biodiversity monitoring: Main results

Main finding(s) from aboveground biodiversity research

Our cameras continue to record footage of amazing and unexpected wildlife, many of them being threatened or near threatened according to the IUCN Red List. The Sumatran tiger passed our cameras again, which continues to amaze everyone. The tapir showed up several times, just like various wild cats, monkeys, squirrels and many other larger and smaller animals. Various honey bears pass regularly. According to the biologists at Biometrio.earth, this is very interesting as honey bears are essential pollinators and seed dispersers.

In line with this, our bioacoustics recordings have identified over 150 bird species so far, serving as another vital indicator for ecosystem restoration, for the same reasons as the bears. The project will finish in 2026, and we are awaiting the results of our activities related to ecosystem restoration and biodiversity increase.

Figure 19. Footage of amazing and unexpected wildlife recorded by our camera traps in the agroforestry sites.

Belowground (agro) biodiversity

In short, three ecological groups of worms can be identified (see also Figure 20):

- Epigenic worms live on top of the soil and live off the decaying biomass;
- Endogenic worms make horizontal burrows and “eat soil”;
- Anecic worms are the largest and make vertical burrows. These worms are crucial in helping water to infiltrate through the vertical burrows they make, sometimes up to 2 metres deep.

A central insight of the 2023 research on belowground biodiversity revealed that the data were quite different between the two soil types in which our food forests are being developed. So, this could be an essential reason for some unexpected results. We therefore decided to do similar research in 2024, with the staff and students from Brawijaya University, but now distinguishing between the two soil types andisols and inceptisols. The study was completed late 2024, but the results and the final research report will be finalised in 2025.

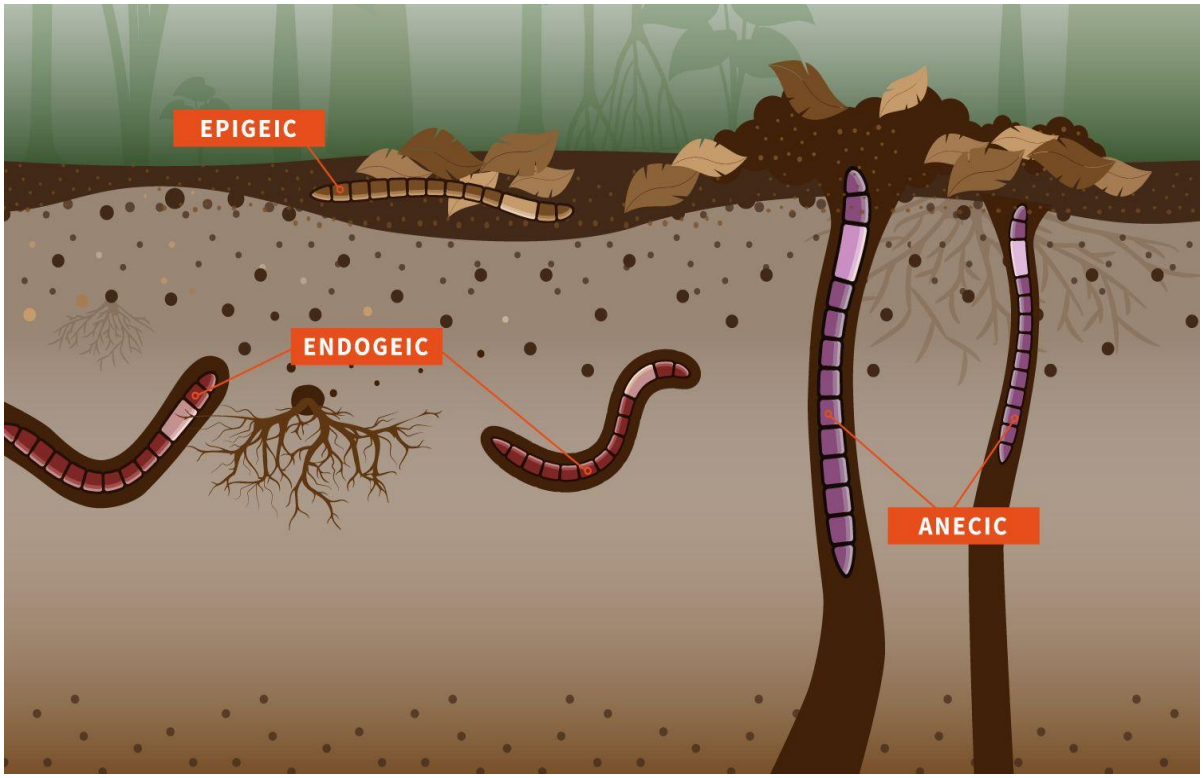


Figure 20. Three main ecological groups of earthworms (Source: YOWZA for Gula Gula Forest Programs).

Outcomes

1. Evidence of outcomes

As food forest areas age, evidence of change becomes increasingly visible, providing valuable learning sites for our returning activities.

2. Evidence of environmental lessons

Assisted Natural Regeneration (ANR) is most effective in the forest "buffer zone", where enough natural regenerants are present and baseline vegetation consists of *Imperata* grasslands and/or shrubs of 50-100 cm (to make pressing successful). In recent years, our restoration activities have been further away from the forest buffer zones. Many of these areas have been subject to former monoculture cultivation of crops and vegetables, where pesticides and insecticides have been used. Treeless landscapes covered with ferns (and very few shrubs) are an increasing baseline for restoration. However, we increasingly see trees like *Leucaena leucocephala* and some indigenous pioneer species (mostly shrubs) growing in these fields. These provide good shading for young, planted trees, particularly coffee, and have become increasingly important with climate change. As more farmers like to incorporate coffee trees in their field, we encourage them to practice ANR, while protecting all existing scattered trees and large shrubs for shading.

Table 18. Restoration techniques are used for various baseline circumstances.

Restoration technique	Assisted Natural Regeneration (ANR)	Minimum/ zero tillage	Planting/vegetative propagation of N-fixing trees	Economically valuable baseline vegetation
Distance to the forest	Forest buffer zone	No/little influence from the forest	No/little influence from the forest	Close to the forest area
State of degradation	Degraded	Severely degraded (no trees)	Highly degraded	Modest degraded
Baseline vegetation	Imperata grasslands, with shrubs and natural forest regenerants, some trees	Predominantly ferns, with some shrubs, *Imperata*, and no/few existing trees	Bare land, hardly any baseline vegetation present. Some shrubs or trees	Gambir shrubs (natural colouring)
Labour intensity	Labour-intensive (family labour only)	Medium labour-intensive. It is often a combination of family labour with	Highly labour-intensive. Group activity at the community level	Low to medium, no weeding/slashing/ANR needed. (hired) labour for harvesting gambir leaves

Restoration technique	Assisted Natural Regeneration (ANR)	Minimum/ zero tillage	Planting/vegetative propagation of N-fixing trees	Economically valuable baseline vegetation
		some hired labour		
Green manure from baseline vegetation	High	Low-medium	Low	Medium-high*
Use of compost/manure	Low - Medium	Medium - high	Medium-high	Low-medium

*Gambir shrubs provide lots of green manure. After harvesting the leaves, the remaining biomass is brought back on the land to serve as green manure.

3. Evidence of socioeconomic lessons

Since the beginning, we have established performance-based farmer groups. These have shown to be effective in working together and getting the work done. Having participants to co-decide on new members has increased social control within the groups, members discuss freely about potential issues to be solved, whether at group level or at the level of individual members.

Although farmers in the communities we work in have been growing a variety of agroforestry tree species for a long time already, we realised that some basic knowledge on best practices related to harvesting and processing to achieve a certain quality (hence a higher price) was almost absent. Training on harvesting techniques and good tree management continues to be an essential pillar in the Gula Gula Food Forest Program. In relation to coffee, we found that farmers had no clue how to harvest coffee berries. They were unaware that they had to pick only the red berries. They used to take all the berries from the branch by pulling all at once, both green and red ones. The result is a mixture of green (unripe) and red (ripe) berries, which is an important reason why the beans are priced low. Now that we train them on picking the red/ripe berries, and the fact that we are buying the coffee from them has made many (new) farmer participants decide to integrate coffee trees into their agroforestry plots. Not only do we pay a premium, but by harvesting red berries only, it provides them with a more regular income, rather than harvesting all in a short period (both green and red beans).

Part F. Payments for Ecosystem Services

F1 Summary of PES payments

We consider PES payments both in cash and in-kind benefits. Cash PES payments (PES $ in Table 19) are typically made annually, following the achievement of the target or aim by the participating farmers. There is, however, a change in payment schedules. So far, we have paid individual farmers, reaching the annual target we agreed upon with the farmer groups. Cash payments are an additional bonus on top of in-kind payments, which include free seedlings and distribution costs (transport), training, food and transport to attend meetings and technical assistance by RPL staff. As mentioned in Table 19, we paid a total of U$ 28,840 in direct cash payments to the farmer groups in 2024. Quite some payments were a result of delayed payments from 2023 when some targets were not achieved. Annex 2 provides an overview of all payments in 2023, and why they were delayed or were paid in time. A similar explanation can be given for in-kind payments. Reservations in 2023 are quite substantial, as they include both delays in the progress of the project (see section A2), and funds that will be spent in later years due to the one-time carbon payments for carbon credits over the total 30 years.

In general, the reasons for not matching the 40-60 divide of payments in a specific year can be summarised as:

- Highest field costs are in the first 3 years of a new site. Also, we pay the highest percentage of PES payments in the first 2 years (in total over 60%). This was suggested by the farmers many years ago, since the highest investment costs for them are in the first 2-3 years to build the food forest.
- Due to climate change, intended planting in November can be difficult, either because of lack of rain or too much rain, which might kill the young seedlings. So many farmers then keep the seedlings in their home garden, often until January/February of the following year. That means that the high-cost component, compost distribution, will also be on hold until they start planting.
- In 2023, we faced challenges in new areas, which we had to leave, due to various reasons (see section A2).
- Since we sell the carbon credits in one year, the funds obtained must be spread over 30 years as each carbon credit must be surely sequestered for a period of 30 years. (the duration of one cycle). We maintain a reserve for the period from 5-30 years to continue paying a “bonus” to farmers for performing maintenance on the trees. This also ensures that if some trees die, we can support them with new ones and possibly address other needs.

Table 19. PVCs sold and PES payments done in 2024 (both in cash and in-kind benefits).

Year	PVCs sold	Wholesale revenue ($)		PES $ disbursed for farmers	In-kind benefits *
	No.	Total	60% (project)	$	$
2024	17,614	203,975	122,385	28,840	81,236

*in-kind benefits only concern actual costs that were made (nursery, seedlings, transport, expenditures for training sessions) part of project costs for the benefit of the participating farmers. Use of field office facilities for farmer training sessions, time of field staff for training and supervision are not included.

Part G. Ongoing participation

G1 Recruitment

In 2024, we successfully initiated new projects in a different district and province. In the Pesisir Selatan district of West Sumatra, we initially aimed for only 25 hectares. This would cover the needs of our client with whom we have a 5-year contract for restoration. However, villagers' interest in joining our program was much higher, and we were able to start with 62 hectares instead. Where this area is still directly managed by a new staff under RPL (Abib), the start-up of a new area in Lampung, southern Sumatra, required a new team to work there. The area in Lampung is a result of the collaboration with the Ministry of Villages and the Development of Disadvantaged Regions. They have helped us to start collaborating with the local Lampung Forestry office. Here, a young female staff member, called Meisha, is our direct contact. She turned out to be an incredible employee. In addition, the entire Forestry Department staff here is very much engaged with the program, hence the area has taken off with a good start. A pilot of 16.2 ha is being restored. Again, the news spreads quickly, and surrounding villages have already asked to begin such a project in their villages as well. Scaling up in Lampung appears to be relatively straightforward, as the Forestry Department office and staff oversee the process under the supervision of RPL staff. They visit the area several weeks a year to assist with specific activities. On the other hand, Meisha also visits the RPL staff in West Sumatra 1-2 times a year to join in field activities and learn from the West Sumatra experiences.

G2 Project Potential

- The new area in Pesisir Selatan holds promising potential for expansion, as more villagers are requesting to join the program. Also, a nearby village has expressed interest.
- The pilot area in Lampung is also generating lots of interest from neighbouring villages, who have visited the local Forestry Department office asking about how they could join the program. An area of 100 ha has already been identified from all these requests, and the Forestry Department staff is identifying the real potential in 2024. But first, we want to gain more knowledge and experience with the social dynamics in the 16.2 ha pilot project.
- On Flores, we had a first identification mission to see the potential of this island. We have had many farmer group discussions to explain our mission and project. There also seems to be tremendous interest to join the program. The year 2024 is seeing further talks with the local NGO on Flores, and how to organize it. This process will take some time but by late 2025, we aim to take the next step, which will enable us to start a pilot project in early 2026. Most probably, the Forestry Department office will also be involved here.

G3 Community participation

We place a high value on community participation. They engage in all steps and all activities. During the belowground research for instance, farmers helped to take soil samples and were always keen to learn

about the study and why it would be good for them. In 2025, we will host another large farmers' meeting to present the findings of our research study, highlighting the significance of biomass, worms, and low-input agriculture practices for farmers.

Given the central location of our field office and the surrounding grounds, most farmer meetings are organised there. Farmers come to the field office grounds using motorbikes, small trucks or cars. We cover the transport costs for them and we arrange meals. Already we can see that the farmers from different villages interact with each other and become friends. The large farmer meeting in Harau and the subsequent WhatsApp group that they created make them feel proud and united. All kinds of issues are being discussed in the WhatsApp group regarding restoration activities and individual farmers' experiences.

Part H. Project operating costs

H1 Allocation of costs (USD$) 2023

The allocation of costs for 2024 can be found in Table 20 and Table 21. The challenges we faced in preparing new areas for restoration have delayed investing funds in 2023. The reservations we keep are essential. The 2023 reservations for delayed restoration activities have been utilised in 2024. Additionally, at several sites, the annual target was not met in 2023, resulting in payments to be made in 2024. This explains the significant additional spending (utilisation of some financial reserves) (US$125,063). In addition, there was a one-year delay in various sites for paying the carbon funds to the cooperatives and individual farmers. Many other causes underpin this delay, ranging from planting delays caused by the changing climate (e.g., no rain) to delays in finalising the FPIC processes in the new areas where we started in 2023. A significant delay occurred because we were unable to obtain clove seedlings, which are essential for the new sites. During the flowering season of cloves, storms and short, but heavy rains destroyed many flowers. The result is that no seeds developed, which we usually use to raise seedlings of clove trees. This also affected commercial nurseries, so we were unable to reach the target of clove seedlings that needed to be planted according to the contractual arrangements.

Table 20. Summary of earnings from carbon sales and their expenditures for project development in 2024.

	Carbon credits	Donor funding	Project		CO_2 Operate	
	U$	U$	U$	%	U$	%
Gross carbon income 2024	203,975	0	122,385	60	81,590	40
Actual expenditures 2024	318,128	1,200	208,551	66	108,377	34
Use of reserves *			111,636		-6,044	

*Project reserve payments include U$ 12,039 (4%) of delayed carbon payments to farmers of 2023.

Table 21. The allocation of costs for 2024, related to carbon sales 2024.

Expense	Narrative	Total project costs (USD$)	Contribution from carbon credit sales	Brawijaya University	CO2 Operate BV reserves
Project costs (60%)					
Technical assistance (VCM) Sumatra	Technical assistance RPL (tree monitoring, mapping, carbon accounting)	58,814	58,814		
	Farmer/ community meetings	3,500	3,500		
	PES payments	76,580	76,580		
	Farmer training	28,898	28,898		
Biodiversity Impact Project					
Brawijaya university Malang, Java	Belowground biodiversity analysis to train farmers on soil improving measures for food forest.	12,400	11,200	-1,200	
Biodiversity aboveground	Community and RPL field-training on biodiversity biodiversity monitoring	10,000	10,000		
Nursery					
Polybags	Seeds, soil, polybags, labour	15,750	15,750		
Compost		3,809	3,809		
Actual costs 2024		**209,751**	**208,551**		
Costs CO2 Operate (40%)					
Salaries (ex. taxes))	CO_2Operate & external experts	53,077	53,077		
Biodiversity data analysis	Biometrio	25,650	25,650		
Total taxes	Dutch taxes				48,766

Expense	Narrative	Total project costs (USD$)	Contribution from carbon credit sales	Brawijaya University		CO2 Operate BV reserves
Coffee purchase/import	Purchase from our farmers	7,181				7,181
Branding	Website, Gula Gula materials	16,969	16,969			
Others	Travel (site visits, Flores)	5,500	5, 500			
Actual costs 2024		**108,377**	**101,196**			
Grand Total ($)		**318,128**	**309,747**			

Annexes

Annex 1. Species composition.

Name of system		Paninggahan (2017)	Paninggahan (Subaka, 2017)	Air Dingin (2020)	FMO 1a	FMO 1b	FMO 2a	FMO 2b	FMO3	FMO4	FMO 5a	FMO 5b	FMO 6	FMO 7	Gotan	Lampung 2024
Total area (ha)		19.9	14.4	65.5	2.2	27.1	11.0	2.5	45.7	14.5	34.9	4.1	29.8	28.20	62.20	13.60
Total no. of trees		13,926	10,055	131,040	3,300	20,325	16,950	1,649	91,400	29,000	51,900	6,750	59,600	20,868	40,430	6,800
Total no. of trees/ha		700	700	2.000	1.500	750	1.500	750	2.000	2.000	1.500	1.500	2.000	740	650	500
Planted crops (no. of trees/ha)	Areca*	40	70													
	Avocado		56	50	50	160	50	160	50	120	30	50	50	40	260	60
	Bayur											60		100		
	Cinnamon			500					500	500			500	240		
	Clove	280	140			240		240						250	83	
	Cocoa															
	Coffee Arabica			1.000					1.000	1.000			1.000			
	Coffee Robusta				1.000		1.000				1.010	1.050				
	Damar															50
	Durian		56											20	34	
	Jengkol	40	56		25	75		80			80	80		60		80
	Jirak	40	70													
	Lamtoro			250	250		250		250	250	252	260	250			
	Mahogany	140	70	200	75	100				130					40	
	Mangosteen*		56											30		
	Melinjo														100	
	Nutmeg														133	160
	Petai	40	56		25	75	50	80								150
	Shorea*															
	Soursop*															
	Surian	140	70		75	100	150	190	200		128		200			

Annex 2. PES cash payments received by the participants, due in 2024 (on time or delayed).

	Payment received by farmers on 2024					
Project site	Nagari	Farmer Group	Payment due (date in contract/ PES agreement)	Actual payment done (date)	Total Amount (Rp)	Reason delay
Verstegen (2019)	Air Dingin	Kelompok Tani VCM	September 2024	-	-	We need to update, clarify and evaluate the number of farmer and land area
FMO 1a	Paninggahan	Kelompok Bukit panjang	February 2024	22 March 2024	4,200,000	On schedule
FMO 1b	Paninggahan	Kelompok bukit subaka	February 2024	22 March 2024	40,650,000	On schedule
FMO 2a	Selayo	Kelompok Tani VCM Selayo	February 2024	22 March 2024	16,500,000	On schedule
FMO 2b	Selayo	Kelompok Tani VCM Selayo	February 2024	22 March 2024	3,750,000	On schedule
FMO 3	Sirukam	Kelompok tani Cirubuih Indah Nan Jaya	Januari 2024	2 September 2024	26,450,000	We need to make sure that farmers replanted the tree before we the payment
FMO 4	Air Dingin	Kelompok Tani Bukit Panjang Saiyo	January 2024	29 Oktober 2024	9,198,468	We need to make sure that farmers replanted the tree before we the payment
FMO 5a	Paninjawan	Kelompok Hutan Pangan Paninjawan	May 2024	30 June 2024	52,500,000	On schedule
FMO 5b	Paninjawan	Kelompok Hutan Pangan Paninjawan	May 2024	30 June 2024	6,000,000	On schedule
FMO 6	Sirukam	Kelompok Tani Cirubuih Indah Nan Jaya	Juni 2024	8 February 2024	18,975,000	We need to make sure that farmers replanted the tree before we the payment
FMO 7	Dilam	Kelompok Tani Tambang Sepakat	June 2024	30 October 2024	42,300,000	On schedule
FMO 8	Siguntur	Kelompok Siguntur Jaya	May 2024	9 August 2024	83,970,000	Delayed due to a problem in bank transferred
FMO 9	Pemancar Lampung	Kelompok Pemancar Lestari	-	-	-	-
				TOTAL	304,493,468	

Annex 3. List of trees and their important uses that are essential to the Minangkabau communities.

Scientific Name	Family	Local Name	Frequency of Use	Category Use	Status
Cymbopogon citratus	Poaceae	Sarai	3	Medicine (0.41); food (0;03); food ingredient (0.56)	Cultivated
Dendrocalamus asper	Poaceae	Buluh batuang	3	Wood for building (0.45); handicraft (0.45); food (0.1)	Cultivated
Gigantochloa apus	Poaceae	Buluh puriang	3	Wood for building (0.49); handicraft (0.49); food (0.01)	Cultivated
Gigantochloa atter	Poaceae	Buluh talang	2	Cultural ritual purposes (0.5); handicraft (0.5)	Cultivated
Imperata cylindrica	Poaceae	Lalang	2	Medicine (0.44); handicraft (0.56)	Wild/natural
Pennisetum purpureum Schum. cv King	Poaceae	Rumput gajah	1	Livestock Fodder (1)	Cultivated
Pennisetum purpureum Schum. Cv. Mott	Poaceae	Rumput odot	1	Livestock fodder (1)	Cultivated
Setaria palmifolia	Poaceae	Lintabuang	2	Livestock fodder (0.96); organic fertiliser (0.04)	Wild/natural
Alpinia galanga	Zingiberaceae	Langkueh	2	Medicine (0.03); food ingredient (0.97)	Cultivated
Amomum compactum	Zingiberaceae	Kapulaga	2	Medicine (0.05); food ingredient (0.95)	Cultivated
Curcuma longa	Zingiberaceae	Kunik	3	Medicine (0.46); food (0.08); food ingredient (0 46)	Cultivated
Curcuma xanthorrhiza	Zingiberaceae	Temu lawak	2	Medicine (0.82); food ingredient (0.18)	Cultivated
Zingiber officinale var. Amarum	Zingiberaceae	Sepadeh kampung	2	Medicine (0.43); food ingredient (0.57)	Cultivated
Zingiber officinale var. Rosc	Zingiberaceae	Sepadeh gajah	2	Medicine (0.43); food ingredient (0.57)	Cultivated
Zingiber officinale var. Rubrum	Zingiberaceae	Sepadeh merah	3	Medicine (0.43); food (0.02); food ingredient (0.55)	Cultivated
Archidendron pauciflorum	Fabaceae	Jariang	1	Food (1)	Cultivated
Calliandra calothyrsus	Fabaceae	Kalandra	3	Livestock fodder (0.24); organic fertiliser (0.6); firewood (0.16)	Wild/natural
Gliricidia sepium	Fabaceae	Sediah/ Saladia	0	-	Wild/natural
Leucaena leucocephala	Fabaceae	Lamtoro	3	Livestock fodder (0.6); organic fertiliser (0.23); firewood (0.17)	Cultivated
Mimosa pudica	Fabaceae	Sikajuik / Sikakajuik	1	Decorative plant (1)	Wild/natural

Scientific Name	Family	Local Name	Frequency of Use	Category Use	Status
Parkia speciosa	Fabaceae	Patai	1	Food (1)	Cultivated
Chromolaena odorata	Asteraceae	Rinju halus	3	Livestock fodder (0.02); medicine (0.29); organic fertiliser (0.69)	Wild/natural
Crassocephalum crepidioides	Asteraceae	Ambuang-ambuang	1	Organic fertiliser (1)	Wild/natural
Elephantopus scaber	Asteraceae	Sikujui	2	Medicine (0.04); food (0.96)	Wild/natural
Mikania micrantha	Asteraceae	Sapik tunggua	1	Livestock fodder (1)	Wild/natural
Titonia diversifolia	Asteraceae	Katendengan / rinju kuning	1	Organic fertiliser (1)	Wild/natural
Musa acuminata (AAA Group)	Musaceae	Pisang manis / pisang susu	4	Livestock fodder (0.14); medicine (0.03); handicraft (0.39); food (0.45)	Cultivated
Musa acuminata × M. balbisiana (AAB Group) 'Silk'	Musaceae	Pisang rajo	4	Livestock fodder (0.14); medicine (0.03); handicraft (0.39); food (0.45)	Cultivated
Musa balbisiana (ABB Group) 'Saba'	Musaceae	Pisang batu / pisang kepok	4	Livestock fodder (0.14); medicine (0.03); handicraft (0.39); food (0.45)	Cultivated
Musa brachycarpa	Musaceae	Pisang kapeh / pisang batu	4	Livestock fodder (0.14); medicine (0.03); handicraft (0.39); food (0.45)	Cultivated
Musa paradisiaca var. sapientum	Musaceae	Pisang buai / pisang ambon	4	Livestock fodder (0.14); medicine (0.03); handicraft (0.39); food (0.45)	Cultivated
Psidium guajava	Myrtaceae	Jambu biji/ Peraweh	3	food (0.46); medicine (0.46); firewood (0.08)	Cultivated
Rhodomyrtus tomentosa	Myrtaceae	Karamunting	2	Medicine (0.2); food (0.8)	Wild/natural
Syzygium aromaticum	Myrtaceae	Cengkeh	4	Medicine (0.04); handicraft (0.21); food (0.02); food ingredient (0.68)	Cultivated
Syzygium malaccense	Myrtaceae	Jambak / jambu bol	1	Food (1)	Cultivated
Syzygium polyanthum	Myrtaceae	Salam	2	Medicine (0.16); food ingredient (0.84)	Cultivated
Colocasia esculenta	Araceae	Taleh	1	Food (1)	Cultivated
Colocasia gigantea	Araceae	Kemumu	1	Food (1)	Cultivated
Xanthosoma sagittifolium	Araceae	Bondang	1	Food (1)	Cultivated
Ageratum conyzoides	Compositae	Rumput angik / Akah-akah	3	Livestock fodder (0.23); medicine (0.62); organic fertiliser (0.15)	Wild/natural
Bidens pilosa	Compositae	Sirangak	4	Livestock fodder (0.63); Medicine (0.09); food (0.03); organic fertiliser (0.25)	Wild/natural
Clibadium surinamense	Compositae	Rinju kasar	1	Organic fertiliser (1)	Wild/natural

Scientific Name	Family	Local Name	Frequency of Use	Category Use	Status
Aleurites moluccana	Euphorbiaceae	Dama	2	Wood for building (0.03); food ingredient (0.97)	Cultivated
Hevea brasiliensis	Euphorbiaceae	Karet	0	-	Cultivated
Mallotus paniculatus	Euphorbiaceae	Balik angin	3	Wood for building (0.5); handicraft (0.07); firewood (0.43)	Wild/natural
Durio zibethinus	Malvaceae	Durian	3	Wood for building (0.07); Medicine (0.03); food (0.9)	Cultivated
Theobroma cacao	Malvaceae	Coklat	2	Food (0.94); firewood (0.06)	Cultivated
Urena lobata	Malvaceae	Puluik	1	Medicine (1)	Wild/natural
Solanum betaceum	Solanaceae	Terung pirus	2	Food (0.5); Medicine (0.5)	Cultivated
Solanum nigrum	Solanaceae	Lumai	1	Food (1)	Wild/natural
Solanum torvum	Solanaceae	Rimbang	2	Medicine (0.45); food (0.55)	Wild/natural
Lantana camara	Verbenaceae	Duri cik ayam	0	-	Wild/natural
Stachytarpheta indica	Verbenaceae	Bungo medan	1	Medicine (1)	Wild/natural
Stachytarpheta jamaicensis	Verbenaceae	Pecut kuda	1	Medicine (1)	Wild/natural
Areca catechu	Arecaceae	Pinang	5	For Adat rituals (0.43); Medicine (0.06); handicraft (0.22); food (0.18); decorative plant (0.11)	Cultivated
Cocos nucifera	Arecaceae	Karambia	6	Wood for building (0.15); Medicine (0.12); handicraft (0.2); food (0.2); food ingredient (0.2); firewood (0.13)	Cultivated
Hyptis brevipes	Lamiaceae	Plompongan	0	(blank)	Wild/natural
Tectona grandis	Lamiaceae	Jati	1	Wood for building (1)	Cultivated
Cinnamomum burmannii	Lauraceae	Kulit manih	3	Medicine (0.13); food ingredient (0.7); firewood (0.17)	Cultivated
Persea americana	Lauraceae	Pokat	3	Medicine (0.29); food (0.69); firewood (0.02)	Cultivated
Peperomia pellucida	Piperaceae	Bayam sendi	1	Medicine (1)	Wild/natural
Piper aduncum	Piperaceae	Sirih-sirihan	1	Firewood (1)	Wild/natural
Saurauia prainiana	Actinidiaceae	Garanun / Gandun	2	Food (0.09); firewood (0.91)	Wild/natural
Spondias dulcis	Anacardiaceae	Kedondong	1	Food (1)	Cultivated
Annona muricata	Annonaceae	Durian belando / sirsak	2	Medicine (0.23); food (0.77)	Cultivated

Scientific Name	Family	Local Name	Frequency of Use	Category Use	Status
Cordyline fruticosa	Asparagaceae	Puding	1	Decorative plant (1)	Cultivated
Asplenium australasicum	Aspleniaceae	Sakek	1	Decorative plant (1)	Wild/natural
Ananas bracteatus	Bromeliaceae	Naneh	1	Food (1)	Cultivated
Carica papaya	Caricaceae	Situka / kalikih / batiak	2	Medicine (0.2); food (0.8)	Cultivated
Drymaria cordata	Caryophyllaceae	Pensi-pensi	2	Medicine (0.96); food (0.04)	Wild/natural
Hopea odorata	Dipterocarpaceae	Pelangeh	2	Medicine (0.05); firewood (0.95)	Wild/natural
Cyrtomium fortunei	Dryopteridaceae	Pakih	1	Decorative plant (1)	Wild/natural
Castanopsis argentea	Fagaceae	Barangan	1	Food (1)	Wild/natural
Rhodoleia championii	Hamamelidaceae	Kasih beranak	2	Wood for building (0.5); firewood (0.5)	Wild/natural
Centella Asiatica	Mackinlayaceae	Pigago	1	Medicine (1)	Wild/natural
Melastoma malabathricum	Melastomataceae	Sikaduduak	2	Medicine (0.94); food (0.06)	Wild/natural
Toona sureni	Meliaceae	Surian	4	Wood for building (0.69); Medicine (0.09); food ingredient (0.13); firewood (0.02)	Cultivated
Artocarpus heterophyllus	Moraceae	Cubadak	3	Wood for building (0.03); handicraft (0.03); food (0.94)	Cultivated
Myristica fragrans	Myristicaceae	Pala	1	Food ingredient (1)	Cultivated
Oxalis carniculata	Oxalidaceae	Asam-asam / asam puyuh	1	Medicine (1)	Wild/natural
Pyrrosia piloselloides	Plypodiaceae	Piti-piti / koin-koin	1	Decorative plant (1)	Wild/natural
Polygala paniculata	Polygalaceae	Uban	1	Medicine (1)	Wild/natural
Rubus rosifolius	Rosaceae	Erbei / Asamrusa	1	Food (1)	Wild/natural
Coffea arabica	Rubiaceae	Kopi	2	Food (0.97); firewood (0.03)	Cultivated
Citrus ablycarpa	Rutaceae	Jeruk limo	2	Medicine (0.29); food ingredient (0.71)	Cultivated
Casearia sylvestris	Salicaceae	Jirak	3	Wood for building (0.56); food (0.04); firewood (0.4)	Wild/natural
Manilkara zapota	Sapotaceae	Sawos / Sao	3	Medicine (0.47); food (0.51); firewood (0.02)	Cultivated
Parasponia rigida	Ulmaceae	Seri / Ramin	2	Livestock fodder (0.04); food (0.86)	Wild/natural

Annex 4. Maps of the sites in Lampung and Si Guntur.

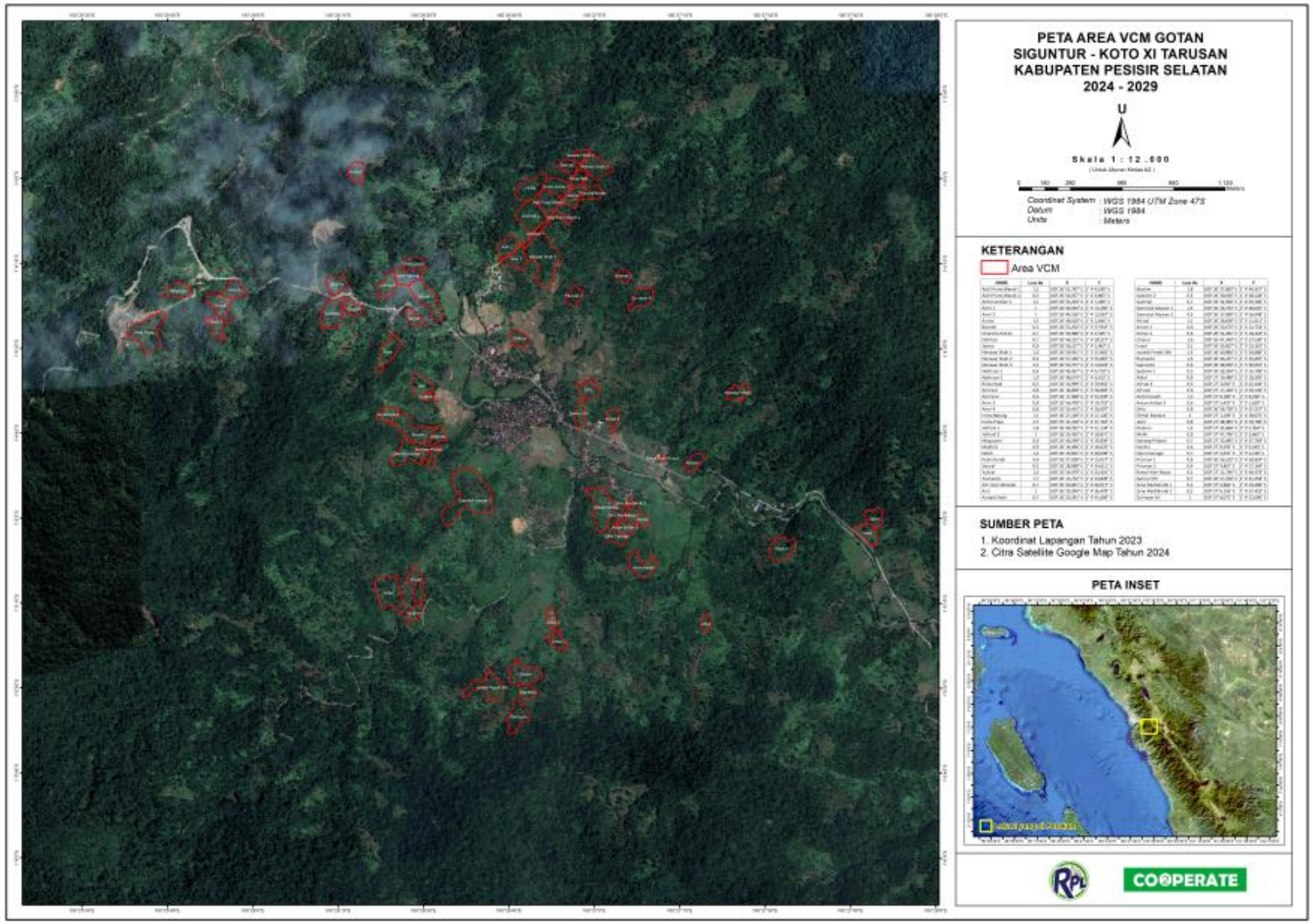


Figure 21. Map of farmer plots in Siguntur area (Go Tan) in Pesisir Selatan, West Sumatra.

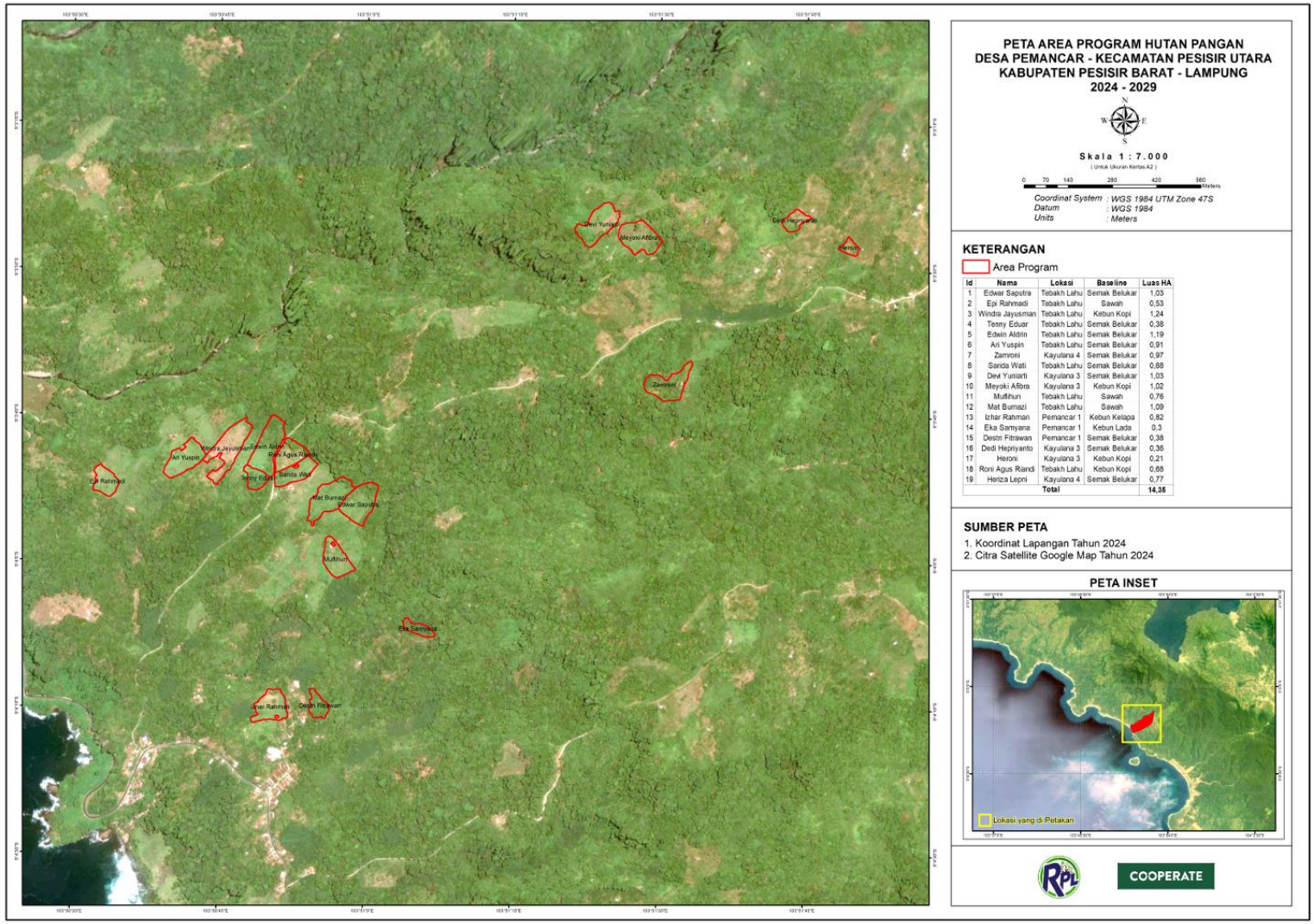


Figure 22. Map of farmer plots in Pamancar area, Lampung, South Sumatra.