# Darwin Initiative Main & Extra: Final Report

To be completed with reference to the "Project Reporting Information Note": (https://www.darwininitiative.org.uk/resources/information-notes/).

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes.

**Submission Deadline: no later than 3 months after agreed end date.**

**Submit to:** BCF-Reports@niras.com including your project ref in the subject line.

## Darwin Initiative Project Information

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| Scheme (Main or Extra) | Main |
| Project reference | 29-020 |
| Project title | Strengthening community capacity for evidence-based forest restoration in Indonesia |
| Country(ies) | Indonesia |
| Lead Organisation | UKCEH |
| Project partner(s) | BRIN, Fauna & Flora, KKI Warsi, Plan Vivo, University of Kent |
| Darwin Initiative grant value | £524,473 |
| Start/end dates of project | June 2022 – March 2025 |
| Project Leader name | Dr Lindsay F. Banin |
| Project website/blog/social media | https://www.ceh.ac.uk/our-science/projects/forest-restoration-indonesia |
| Report author(s) and date | LF Banin, K Olsen, N Berry, K Bohannon, S Budiharta, E Damayanti, L Hughes, J Hutabarat, K Kazlauskis, D Kiswayadi, M Massie, D Muenzel, E Primadona, Radinal, E Raine, M Roddini, E Schoof, M Struebig, H Tittensor, F Yusuf & M Williams<br>30 June 2025 |

## 1 Project Summary

***Overview:*** *Tropical forest restoration is considered a major route to mediating the biodiversity and climate crises whilst also supporting livelihoods and well-being of local communities. To meet these aims over the long-term, restoration actions must be effective and sustainable while benefiting people. Our project will co-produce and apply methods that foster a strategic, evidence-based approach to forest restoration in Indonesia, facilitating i) spatial prioritisation, ii) restoration interventions, iii) efficient restoration monitoring and iv) a route to certification for ecosystem service-based finance.*

Intact tropical forests are carbon-rich, productive and diverse. Land-use change and resource extraction have degraded these functions in many parts of the tropics while large areas of forest have been lost completely, with consequences for native plant diversity and wildlife habitat. Forest restoration and rehabilitation presents an opportunity for the 'triple-win' – positive outcomes for biodiversity, climate change mitigation and people and this has been encapsulated

in the UN Decade on Restoration. However, restoration outcomes can strongly diverge, with many projects hindered by short funding cycles, insufficient long-term planning and challenges around delivering the monitoring to verify their success. Notably, projects that fail to empower local communities in their own land governance often fail to secure long-term success in restoration, particularly where local residents cannot derive or access benefits. Forest-dependent peoples make up a notable proportion of Indonesia's population, and thus forest condition and human well-being are tightly connected. Projects can also fail to optimise outcomes if too few or inappropriate plant species are selected, and opportunities to meet multiple objectives are missed.

To date, forest restoration has strongly focussed on tree planting, with less attention on assisted natural regeneration and long-term maintenance of regenerating stems. Determining the most appropriate interventions in a given location enables more efficient use of resources while supporting the capacity for regional species to be conserved and to recolonise. Similarly, strategic spatial planning could help to maximise outcomes for forest cover, biodiversity and poverty and allow a joined-up approach between different project areas and stakeholders. This incorporation of restoration objectives into the broader needs of landscape planning could be central to minimising further habitat degradation and land-based carbon emissions while enhancing the habitat connectivity and movements of threatened wildlife over the longer term.

One of the main challenges discussed globally in the context of restoration is making it scalable. Our project considers the whole pathway, from restoration area planning, to implementation, monitoring and income generation, providing a model approach which could be applied in other locations worldwide. The project is designed to be self-sustaining by formulating a process through which local communities can derive livelihood, well-being and economic benefits. Local land-users often select economically important tree species when bringing degraded lands back into a tree-dominated system. Payments for Ecosystem Services (PES) may allow land-users to diversify and access another revenue stream, bringing economic resilience and stability, whilst allowing for more biodiverse tree communities.

One of the key criticisms of forest restoration is the lack of involvement, agency and benefit-sharing of local communities, whilst social factors have been identified as important drivers of restoration outcomes. Our project works within the Plan Vivo model of ensuring that restoration is guided by the needs of local communities and we test mechanisms for using forest restoration as an approach for deriving ecosystem service and economic benefits to local communities, contributing to the poverty alleviation aspect of the 'triple win'.

The Indonesian Government introduced a moratorium on clearing primary forests and has committed to reducing carbon emissions by 29-41% by 2030, through its nationally determined contributions (NDCs). The deforestation trend has declined since 2015, but there are still large gaps between pledges, targets, implementation and successful outcomes, an issue that has been identified across the tropics. Our project focuses on two social forestry project landscapes, in two provinces (Aceh and Bengkulu) on the Indonesian island Sumatra (Fig.1). Some of our activities are applicable to the whole of Sumatra and Indonesia, and tropical forest regions more broadly, as we consider opportunities and challenges for scaling up forest restoration activities (e.g. spatial prioritisation; cost-benefit and market analyses; restoration certification methodology).

Our identification of these key challenges and knowledge gaps came from 1) a published synthesis of restoration outcomes and an in-depth knowledge of the tropical/SE Asian forest literature (Banin et al. 2023), 2) in-country knowledge from the project partners, 3) a recent Darwin Initiative Main Grant project on effectiveness of community forest policy in Indonesia and 4) Plan Vivo knowledge of the current status of policies, practice and certification methodology and markets.

Figure 1: Map of the project's two focal landscapes on Sumatra, Indonesia


## 2 Project Partnerships

All formal project partners contributed to the development of the proposal, to ensure that the project outputs reflected in-country needs, and these are represented in our four high level outputs (restoration planning; implementation; monitoring; income generation). Key examples are: spatial prioritisation to allow for strategic restoration decision-making and local-scale spatial planning for restoration activities, provision of nursery and seedling materials and knowledge around propagation and maintenance for on the ground implementation, resource efficient monitoring processes, improved understanding of the market and income generation potential through different methodologies to assess project viability, and support through Plan Vivo project development and certification processes (see Logframe). Generating long-term access to finance and resources has been a strong motivator for in-country NGOs and government departments involved in enacting social forestry policy. Our equitable project governance model, with different organisations leading/co-leading the four work packages has worked well, distributing responsibilities and decision-making power effectively (see Proposal).

We have sustained an excellent collaborative partnership throughout the project, through monthly full-project team meetings (first Thursday of every month; sustained excellent attendance from partners) and frequent bi-lateral/multi-partner meetings for more detailed discussions on particular activities, which have enabled ongoing monitoring and evaluation. These have been consolidated through in-person workshops and field-site visits in Indonesia in September 2022, February-March 2024, and February 2025 (Annexes in cross-cutting folder CC_PS) which delivered a deeper understanding of opportunities and challenges in the restoration activities, cross-fertilisation of expertise and experiences at the two restoration sites, and reinforcing our co-working relationships. These visits have been a particular highlight, allowing the project team to form strong bonds and enabling rapid progress at key moments by discussing things in depth as we observe them, in the field, within community discussions and within stakeholder discussions. Language barrier challenges have been overcome by using closed-captions in online meetings, live translation by multi-lingual meeting participants and written communications which can more easily be translated.

Both project areas and in-country teams have established excellent relationships with local communities in Bengkulu and Aceh. Prior to the start of the project, community land management rights had been secured. NGO partner representatives are embedded in the communities and they have hosted regular meetings and training (see Section 3; Standard Indicators section). The project team have successfully engaged important stakeholders, in particular, the province-level government departments including forest management and watershed management units. As part of this ongoing engagement, representatives attended workshops in Indonesia in September 2022, March 2024 and February 2025 (Annexes in cross-cutting folder CC_PS). This was valuable because we were able to get their feedback on the programme of activities and how progress resulting from the project could be applied and expanded to new project areas, following a similar model.

At the outset of our project, we secured a letter of support from Dan Montgomery-Hunt at the British Embassy, Jakarta for the project (see proposal letter of support) and we provided an update to Triny Tresnawulan via an online presentation on 14 November 2023. The Darwin project lead was invited to attend Biodiversity Challenge Funds: Partners Learning Forum in Jakarta 19 February 2024 but unfortunately it was not possible to attend due to travel arrangements. The team organised a ‘teach in’ with Embassy staff after the Eid celebrations (in Year 2, Annex CC 0.2 yr2) with the view that this could develop into a more formalised partnership as the embassy plans its biodiversity strategy for the years ahead. FFI hosted a meeting with Triny Tresnawulan and Melati Melati of the British Embassy in Jakarta, March 2024, to discuss research needs, opportunities and barriers to the application of biodiversity credits for conservation and restoration in Indonesia (Annex CC 0.2 yr2). Melati Melati joined our final national stakeholder meeting in February 2025 and we hope this strengthens connections between the FCDO office and our research for ongoing activities in Indonesia (Annex CC NS 0.1).

Plan Vivo has been in several discussions (with partners in UNDP and Indonesian governmental departments) over the course of the project, and particularly within the last six months to navigate the process for recognition for the PV Climate Standard which would allow projects certified under PV Climate to generate carbon credits (see Section 3, Output 4 and Outcome Indicator 0.4 for further details).

New collaborations have been established with researchers and academics at Indonesian universities including IPB, and University of Bengkulu (UNIB) (e.g. https://www.unib.ac.id/lppm-unib-jajaki-kolaborasi-riset-dengan-pusat-ekologi-dan-hidrologi-inggris/ ). Project lead LFB was invited to deliver a lecture on forest restoration at the IPB University Summer School in August 2024 and to deliver a keynote talk at Universitas Syiah Kuala’s conference on aligning climate and biodiversity initiatives for a sustainable future (Annex CC 0.7b, November 2024). Representatives and students from local universities (UNIB, Tanjung Pura University, Universitas Syiah Kuala and Sekolah Tinggi Ilmu Kehutanan (SLIK)) attended our provincial stakeholder meetings in February 2025, and UNIB co-hosted student projects with the KKI Warsi team in Air Tenam. We have strengthened collaborations with research scientists at BRIN through research applications, opportunities for PhD student co-supervision and the development of a longer-term partnership agreement between UKCEH and BRIN.

We are committed to maintaining and strengthening our collaborative links with partners in discussion regarding funding opportunities (see Section 12.2). This was also a topic of our end of project meeting in Bogor (Annex CC 0.5 yr3)

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# 3 Project Achievements

## 3.1 Outputs

**Output 1: Restoration Planning -** *Co-produced spatial prioritisation and community land management & intervention plans for two project areas and improved local capability for delivering restoration with multiple objectives*

*National-to-regional scale spatial planning:* From workshops held early in the project timeline (September 2022; Indicator 1.1, Annexes 1.1a, 1.1b yr 1) we learned that a broad range of stakeholders (government departments, NGOs and communities) are engaged in land rehabilitation and restoration, with different governmental departments covering different remits. As such, different departments have different approaches to restoration/rehabilitation decision-making. Spatial planning tools tended to have a single discipline focus. For example, the provincial watershed management departments use a government 'critical catchments' database to identify forests within catchments that require rehabilitation to safeguard water supply and mitigate disasters (landslides; flash flooding). Nonetheless, further prioritisation is needed because resources are not sufficient to allow all critical catchments to be rehabilitated, and some areas could simultaneously benefit other ecosystem service dimensions (e.g. diversity, social impact). This project output addressed the baseline need for a more systematic and holistic (multi-objective) approach to support restoration decision-making at provincial to national scales. Within the project, we created an open-access, spatially explicit decision-support tool which allows potential for biomass accumulation, biodiversity conservation and poverty alleviation to be considered and optimised (with flexible weighting), based on collated spatially-explicit data layers which are available for the whole of Indonesia (Indicator 1.2). The tool allows for different spatial perspectives, including looking at the province level (in the case of this project, for Aceh and Bengkulu). This is now available as a freely-accessible tool online (https://darwinforestrestoration.shinyapps.io/Sumatra/ ; Indicator 1.2), with Year 3 developments including the updating of the biomass data layer (CEDA 2021) and updated protected areas (2025). The tool is accompanied by a draft peer-reviewed paper which details the motivation and methods and discusses opportunities to meet multiple objectives through restoration in Indonesia (Annex 1.2b yr3) and has been disseminated at academic conferences, including Trees for Climate Change, Biodiversity and People symposium organised by the British Ecological Society (June 2023) (Annex 1.2a yr2) and International Congress for Conservation Biology (ICCB) (Annex 1.2d yr3).

The tool has been disseminated through presentations delivered at provincial stakeholder meetings to generate feedback and to provinicial and national stakeholders at the end of the project (Annexes CC PS and CC NS). The tool has also been disseminated through meetings with NGOs (Planet Indonesia and Sangga Bumi Lestari) and is being customised to their specific requirements to prioritise investments in social forestry projects (e.g. focussing on the top third of deprived villages, and prioritising based on biodiversity, landcover and biomass). NGOs may find the tool particularly useful because they either may not have access to government-produced tools, or government tools are less of a strict requirement for their decision-making. Tracking of Target 2 of the Kunming-Montreal Global Biodiversity Framework (KMGBF) may mean there is growing interest and opportunity for uptake for such decision support.

*Landscape scale interventions planning:* Our project developed a new workflow to map landcover and forest condition using PlanetLabs high spatial resolution data and a data fusion approach to support community land management planning (Indicator 1.4; Annex 1.4b-d). The high-resolution mapping was undertaken for the landscape in Bengkulu where spatially-explicit interventions planning was required. In contrast, in Aceh, boundaries for protection and rehabilitation areas

had already been agreed with communities prior to the project starting, however, drone flight imagery was used to gain a better understanding of the nature of the vegetation and ecological condition in the rehabilitation areas to help support decision-making on appropriate interventions and plan ground-based surveys (e.g. Annex 1.4a yr 2). The baseline condition of the project was that the Bengkulu landscape did not have a suitable landcover map, and more generally, to our knowledge, there was a lack of open-source approaches for high resolution landcover mapping. Producing the landcover map involved a rapid ground-truth assessment to train and validate random forest classifiers, facilitated by KKI Warsi and members of the local community (Annex 1.4b yr1). Once the landcover map was produced and evaluated, it was used by project partners and local community members to discuss land management plans (Annexes 1.3d and 1.3e) and specifically, to define areas of good condition forest to designate as protection zones, and to identify opportunities for restoration and rehabilitation (see Annex 4.5c PDD). The map was highly effective for the participatory land-use decision process, particularly as it provided a higher resolution product compared with other landcover products available and gave a more refined land cover classification, separating forests and agroforestry with high accuracy. It captured recent on-the-ground conditions, due to PlanetLabs data also having high resolution temporal coverage. This can be especially important in dynamic, multifunctional landscapes. The map was subsequently used to support design of plot-based monitoring for this project (Output 3) and going forwards as part of the method outlined in the Plan Vivo PIN/PDD (see Output 4). The remote sensing study was presented as a poster at the Trees for Climate Change, Biodiversity and People symposium organised by the British Ecological Society (June 2023) and is currently being prepared for peer-review submission (Annexes 1.4c yr2; 1.4d). These activities raised capacity with the project partner and there has been interest to extend capacity-building in collaboration with UNIB.

*Community land management plans:* Development of sustainable land management activities (ICF KPI17) with both landscapes was highly participatory from the initiation of the project, and activities were determined by the communities with facilitation from project partners FFI and KKI Warsi, with free prior informed consent (FPIC) processes followed (Indicator 1.4). These discussions were also supported by surveys and mapping activities described above (Annexes 1.3d,e). The decisions were formalised by the co-production of the Plan Vivo PINs (Annexes 4.5a,b). This is further elaborated in the PDD in development for the Bengkulu Landscape (Annex 4.5c). In supporting village forest management planning in Lutueng village (Aceh), F&F supervised the process of developing a social forestry work plan (RKPS) involving the LPHD (village forest management agency), village officials, community leaders, KPH (forest management unit) Region I and forestry extension workers, holding nine meetings during 2024. The objective of this support was to ensure that conservation, protection, and forest protection activities, as well as restoration activities, are included in the work plan. Currently, the document is under review by KPH Region I and will be approved as the RKPS for a 10-year period (2025–2034) (Annex 1.4e).

Community and stakeholder involvement in restoration planning and implementation has been supported through a number of training activities coordinated by FFI and KKI Warsi (Indicator 1.5). In Aceh, in year 1, 33 women and 21 men received nursery management training and in year 2, 22 people attended a training workshop on tree planting and maintenance and pest control including landowners and representatives from village and mukim government. The training included practical sessions on tree maintenance such as clearing grass around trees, applying fertilizer, and checking for pests and diseases (Annex 1.5a). In Bengkulu, in year 2, 5 women and 26 men received trying in mobile applications relevant to restoration activities (KARLON and AVENZA). 3 men received training in coffee cultivation and 15 women and 1 man received training on developing organic fertiliser (Annex 1.5b). In the third year, 14 women and 5 men received training on resam weaving (non-timber forest product) (Annex 1.5c). These training opportunities were developed in response to community aspirations and community members reported the positive benefits and raised confidence these activities had brought to them (Annex 0.2b; see also section 3.2 Outcome 0.2 and poverty alleviation section).

**Output 2: Restoration Action -** *Two project areas with seedlings planted, protected and/or maintained*

*Nursery establishment, planting, monitoring and maintenance in rehabilitation zones:*

The baseline condition in both landscapes was that communities lacked functional nursery facilities and consumables (including for example shade netting, seedling poly bags) and seedling supply. Areas of land had become degraded as a result of previous clearing and grazing without replanting, which was causing environmental challenges. In Bengkulu, especially, local village residents described issues with soil erosion, landslides and flash flooding. In both landscapes, community members were eager to plant more multi-purpose trees (MPTS) as a key source of income. Land users also reported challenges around poor productivity of their coffee plants and the economic challenges that created.

Overall, six nurseries were established and stocked, in Air Tenam, Lutueng, Pulo Kawa, Mane, Bland Dalam and Turue Cut (Indicator 2.1; e.g. Annex 2.1f) with additional nurseries in use for growing native forest/rare threatened and endangered (RTE) species. In Air Tenam, Bengkulu, in year 1 of the project a village nursery was established and seedlings were provided by BPDAS (watershed management). 9,829 seedlings (Jengkol, Durian and Pinang – species selected by the community and described further under Section 3 Outcomes) were distributed to smallholders and planted in 28 land plots within the social forestry area (Annex 2.1_2a; Indicator 2.2). The seedlings were monitored between October 2023 and January 2024 and again at the beginning of 2025 (Annexes 2.2b,c). Maintenance activities were undertaken by land parcel owners, having received some training and agricultural advice, which included information about plant nutrition and weed clearing. Survival rates were very high, averaging 93% across species, land parcels and land-owners, resulting in 9150 surviving seedlings (Annex 2.2b). In some cases, additional seedlings were further planted by land-owners during the project, explaining positive changes in abundance over the course of the monitoring. Maintaining seedlings was further incentivised through Gojek's GoGreen scheme, whereby payments are distributed to landowners when they periodically submit evidence of tree survival using the approved KARLON mobile app.

In our Aceh landscape, two nurseries were constructed in year 1 of the project (Indicator 2.1). The nursery built at Pulo Kawa, built in October 2022 - January 2023, involved 40 people (15 men, 25 women) and included land preparation, nursery construction, filling soil into polybags, and seeding 20,000 Liberica coffee seedlings. The nursery in Lutueng was built in November 2022-March 2023 with 7,000 petai seedlings, involving 14 people (6 men, 8 women) from the village forest community. Some seedlings were contributed in-kind from watershed management units (BPDAS). The seedlings were planted in the restoration site and community forest 'buffer zone' (community gardens neighbouring the community forest boundary). An initial 4000 seedlings (MPTS species) sourced from BPDAS had a survival rate of only 20% and it was deemed that the seeds were of low quality; a further 2,017 seedlings were planted in the restoration area and buffer zone adjacent to the restoration area (Indicator 2.2). The planting process involved 18 people (16 men, 2 women) who are land managers in the restoration area. In year 2 (April 2023 to March 2024) the project supported the cultivation of 22,000 seedlings across four nursery locations: Lutueng, Blang Dalam, Mane, and Turue Cut villages (Annex 2.1c). Unfortunately, 7,200 seedlings perished due to disease, leaving a total of 14,800 seedlings, comprising 8,500 petai (Parkia speciosa) seedlings and 6,300 robusta coffee seedlings. The project also supported nursery materials (nets, poly bags) and the community provides the labour. Monitoring of planted trees in the restoration area was conducted in November 2023 by a trained team of 10 people (6 men 4 women; Annex 3.4a, also relevant to Output 3 Indicator 3.3). From the monitoring results, the team successfully recorded 2,677 trees out of approximately 6,000 planted. Of these, 1,702 trees (63.58%) were found to have died, while 975 trees (36.42%) remained alive, including 915 petai trees, 11 jengkol trees, 43 durian trees, and 6 avocado trees. Only 100 trees were replanted in March 2024 due to dry weather conditions, with the remaining replanting activities postponed to prevent tree mortality. By year 3, within the rehabilitation area in Lutueng, Aceh, there were 433 surviving stems (338 petai, 5 jengkol, 90 durian) at the endline survey. Within the community gardens, 13,800 (7,700 petai and 6100 coffee) seedlings were distributed to 4 villages and a partial survey of these seedlings was conducted between October 2024 to January 2025 revealed 3,841 live seedlings (the remainder are yet to be monitored, and this represents c. 28% of the full sample). Overall, seedling survival

was deemed much higher in the community garden areas compared with the rehabilitation zone, and this was attributed to (i) ease of access for maintenance activities, (ii) more challenging environmental conditions and grass/shrub competition in the rehabilitation zone and (iii) challenges with customary grazing in the rehabilitation zone. We discuss challenges and differences in survival rates further in Sections 6 and 7 (Lessons Learned and Actions based on Reports). Area-based results are describe under Outcome 0.1 and 0.3.

In both landscapes, an increase in access to MPTS seedlings was positively received by communities. The nurseries provide an ongoing resource and training has raised capacity within the communities for continuing rehabilitation in the future. This is reflected in the longer-term commitments in the community land management plans. In Bengkulu, there is an opportunity to extend impact to other customary land holders within the social forestry project area and there has also been engagement and interest from additional social forestry management organisations from neighbouring villages within the Ulu Manna landscape. In Aceh, there is an opportunity to extend activities into the rehabilitation zones within the Mane, Blang Dalam and Turue Cut *hutan desas*.

*Building native and rare, threatened and endangered forest species into restoration zones:*

The baseline condition in both landscape areas was that tree planting focussed on economically important multi-purpose tree species and incorporating native forest trees into rehabilitation areas was not prioritised, and to an extent could conflict with other land-use and tree productivity priorities.

In our Aceh site, there was an ambition to incorporate 20% of native forest and/or RTE species into plantings (Indicator 2.1). Surveys of mother trees and seedling locations were conducted to identify propagule sources. Native species and Rare, Threatened, and Endangered (RTE) species nursery activities were carried out in three locations, namely Turue Cut, Lamlo, and Aceh Besar, involving patrol teams and local communities. Efforts to propagate native pioneer species to improve microenvironmental factors at the restoration site were not successful. In year 2 of the project (Annex 2.1d) 400 seedlings of meudang puteh (Lauraceae *Beilschmiedia sp.*) and an additional 70 seedlings belonging to other taxa were sourced in the village forest area. 300 meudang puteh seedlings survived over seven months in the nursery in Turue Cut and were planted within the 20 ha rehabilitation zone in Lutueng village forest in March 2024, with a particular focus on using these trees to define landowner boundaries. Unfortunately, survival was generally poor and due to high growth of shrubs and understory vegetation, many seedlings were hard to relocate for monitoring, despite record of geolocation. 34 mother trees around the Mane sub-district village forest were surveyed between April 2023 and March 2024 (Annexes 2.1d,e). These trees were from the Magnolia, Dipterocarpus and Shorea genera, known locally with the vernacular names Meudang Jeumpa, Meudang Meurawan, Meranti, Bran, Seumantok Langsat and Seumantok Durian. In addition to monitoring the 34 RTE trees, RTE tree seedlings were collected through patrol activities (a local team employed to check for signs of illegal poaching and logging activity) supported by F&F. Collection is carried out when large tree seedlings or fruits are found. In addition, the team must take photos and coordinates of the mother trees of the fruit or seedling which aims to identify the species of tree that has been collected. The number of fruits and seedlings collected was ±70 trees.

A total of 224 trees were seeded with survival rates showing the highest success rate in Aceh Besar at 90% (139 out of 154 trees survived) and Lamlo with the lowest rate of 41% (29 out of 70 trees survived) (Annex 2.1_2b yr3), 168 survived and were planted into the rehabilitation zone and community gardens between December 2024 and March 2025. Taxonomically, the species belong to the families Lauraceae (Meudang) and Dipterocarpaceae (Shorea sp.). Both families have important ecological roles in the structure and function of tropical rainforests and include several species that have been categorized as RTE in the IUCN list. In Bengkulu, in the third year of the project the local community with support of KKI Warsi and UNIB student team, attempted to collect and grow tenam seedlings (a dipterocarp tree considered to be *Anisoptera marginata,* based on Wiryono et al. 2019) in a village nursery to be planted in suitable restoration areas, but unfortunately these attempts were not successful (Annex 2.1g).

Conservation of old-growth forest areas and large trees has been promoted in the landscape by a successful tree adoption scheme, facilitated by an online platform created by KKI Warsi. People can use the website to pay an annual adoption fee for trees (identified and measured) to help support the community's activities and offset opportunity costs of not converting forest areas to other land use (https://www.pohonasuh.org/ ). In the future, this could be coupled with activities around monitoring fruiting and seedling production to support propagation. In more degraded areas, naturally regenerating seedlings could also be released from weed suppression to support their growth, if the labour costs can be supported. Enhancing the cover of good quality forest within the forest protection zones and beyond could improve habitat connectivity with the adjacent Raja Mandara Protected Forest.

Our project successfully engaged some community members in the potential for incorporating culturally valued species into rehabilitation and restoration but identified there are important barriers to overcome. These include (i) the need for deep engagement and facilitation so communities can identify suitable opportunities for integrating diversity into land systems that does not compromise other needs, (ii) economic incentivisation for the labour involved, for example through development of seedling supply markets, (iii) improved species-specific knowledge around harvesting, nursery management and maintenance to ensure successful propagation.

**Output 3: Restoration Monitoring -** *Mobile-based application enabling robust and efficient monitoring of restoration objectives, developed for use in community-managed forests*

*Mobile app development:* The baseline condition was that there was no freely-available app that was suitable for forest and tree based monitoring that would be suitable for tracking forest recovery and restoration in Indonesia. An online survey was conducted to establish basic app requirements, distributed to project partners and potential app users (Indicator 3.1). Internal project design workshops were held during the course of the project (Indicator 3.2) and a Plan Vivo technical expert (Nick Berry) was also involved closely in the design through meetings with the app developer (Flumens Ltd.) and output and project lead (Lindsay Banin) to ensure that app design would be suitable for carbon credit based project monitoring, reporting and verification and integrated well with the restoration methodology developed under Output 4. We also learned from FFI's web-based tool design.

We have produced a mobile app to support with efficient data capture, storage and processing to help with monitoring forests and restoration outcomes. It is named TR3: Tracking Regeneration & Restoration Results and is available for Android phones (Beta version: https://tr3.app.flumens.io). The flexible design can handle a wide array of survey data types, ensuring that our app can adapt to various research needs without requiring extensive redesigns and to cover the different methods and approaches different organisations and users may require. For example, we have created features that allow bespoke plot dimensions and nesting to cover a breadth of plot survey designs determined by users. Our database supports longitudinal studies by allowing data from multiple surveys over time to be linked. We've also incorporated spatial query capabilities, enabling the analysis of data based on geographical locations. Additionally, our database can manage binary files for survey inputs to include images and other media. Another core requirement in building the framework was to support offline-use and enable surveying without network connection. Our backend infrastructure is hosted on a managed database service based in London. Opting for a managed service means we benefit from high availability, automatic backups, and scalability, which are handled by the service provider, allowing us to focus more on development and less on infrastructure management.

Our app has initially been tailored for use by Indonesian partners, so we built a constrained species list. We downloaded and extracted the plant species checklist data for Indonesia from the World Checklist of Vascular Plants https://powo.science.kew.org/ using R Studio 2023.06.2. We then used the taxon name from the WCVP species checklist dataset to extract the Catalogue of Life and Global Biodiversity Information Facility data for each species via the Global Biodiversity Information Facility API (Catalogue of Life checklist Catalogue of Life Checklist (gbif.org) and Global Biodiversity Information Facility taxonomic backbone dataset GBIF Backbone Taxonomy). In the

future, the app could be broadened to cover pan-tropical species lists. Users had been keen for vernacular names of species to be included as a pull-down list. This is challenging because (i) there are no definitive lists of Latin and vernacular names, and relatedly (ii) vernacular names vary regionally and crucially sometimes same local name is re-used for different Latin names, affecting identifiability). As an alternative, we included a free-text box so that vernacular names can be recorded if the Latin name is unknown by the user. However, this is not then linked to the wood density data within the species list, so biomass cannot be estimated unless a family or genus is also selected from the drop down list.

Our app embeds mathematical functions and wood density data that are used to derive summaries of key structural, diversity and biomass metrics from the tree-by-tree data. Reports can be downloaded to give tree level and plot-level information which can then be used flexibly by users. These reports are designed to present the key information required for MRV reporting (including PV Climate methodology). We have initially included Indonesia-relevant height-diameter allometries and biomass estimation models, and with future app development we can incorporate a broader suite of options for users to select and tailor their biomass estimation methods.

We have also initiated work on organisational controls. This will enable multiple users within a single organisation to combine data across space and time, to streamline data capture and pooling (for example, multiple users may participate in a single set of plot measurements, but this facility will allow those plots to be combined across a project area or landscape).

Our app has been produced in the English language but we hope to develop it further to have multiple translations available (Bahasa Indonesia, in the first instance).

*Faunal biodiversity baselines:* We recognised it would not be possible to assess impact of restoration activities on faunal communities within the timescale of the project (largely because of the time required for canopy structure to develop and habitat condition to improve). Instead, we took the approach of i) raising capacity within the teams and communities to be able to conduct/participate in faunal surveys, ii) creating a baseline survey for future assessments, iii) compare faunal communities between social forestry areas and neighbouring high-quality, intact forest areas to better understand the factors affecting faunal distributions and occupancy (Indicator 3.5). As such, the baseline condition was that the faunal communities and their determinants were not well-understood in our two focal landscapes and in agroforestry areas compared with intact forests in Indonesia, and the change that occurred during our project is that we have gained significant new insight as to how animals are using these multi-functional landscapes, where animal populations may be constrained and how restoration efforts could alleviate bottlenecks to animal movement and abundance. To achieve this, mammal communities were assessed using camera traps, deployed on a 1 km grid in the Aceh landscape (61 camera traps locations; March-June 2024, plus sampling in 2023 from 20 additional locations) and Bengkulu landscape (40 locations; July-November 2024), distributed across the social forestry areas and neighbouring protected forest (hutan lindung) (Annex 3.5a). A total of 31 medium- to large-bodied mammal species (>1kg body mass) were recorded during our camera trap surveys across the two sites (Table 1). Most species (n = 21) were recorded in both social forestry and hutan lindung, three species were uniquely detected in social forestry areas and four species were uniquely detected in hutan lindung (detailed in Annex 3.5a; Table 1 shows the IUCN status of the species detected). Multispecies occupancy models were produced for 23 species (>5 detections). The key findings were that both social forestry areas (Aceh and Bengkulu) support high diversity, with overall species richness comparable to adjacent intact forest areas. However, community composition shifted towards more generalist species. Within-site connectivity had the greatest effect on mammal occupancy (probability of species' presence), particularly for forest specialist species, underlining the importance of restoration projects in considering their impact on enhancing the overall connectivity of sites when designing interventions. In Bengkulu, bird count transects were also undertaken in August-September 2024 on seven transects, each

transect containing nine points, and these data also provided ground-truthing for monitoring from bioacoustic sensors and will be analysed as part of Liam Hughes' ongoing PhD project.

In addition to capacity being raised in organisations and communities in-country, this unit of activity has been delivered by Liam Hughes, a PhD student recruited for and supported by the Darwin Initiative project, showing further benefit to the academic & research community. These preliminary results have been disseminated at academic conferences (British Ecological Society, Liverpool, December 2024 Annex 3.5b; International Congress for Conservation Biology ICCB, Brisbane, July 2025 Annex 3.5c) and shared back to in-country organisations through online presentations.

*Plot-based monitoring (Indicator 3.4):* At the project site in Aceh, baseline plot surveys were conducted in 2023 in the Lutueng rehabilitation area to understand vegetation status and monitor changes in vegetation structure and composition associated with (i) rehabilitative interventions (20 m x 50 m survey plots, 13 plots) and (ii) natural regeneration (4 plots) (Annexes 3.4a-c). These plots were remeasured in February 2025 (Annex 3.4d). As expected, given the short time, there was relatively little change over the duration of the project. In both surveys, the vegetation generally had an open canopy (estimated 15% cover) and was dominated by pioneer trees and early successionals and shrubs such as *Piper aduncum, Melastoma malabathricum,* and *Pteridophyta*. In the rehabilitation area, other than species planted for cultivation, *Erithrina sp., Gliricidia sepium and Piper aduncum* were most abundant. Erythrina sp., a pioneer species, is able to quickly adapt to open soil and light conditions. Gliricidia sepium (bak lasam) increased by 17 individuals between cencuses – it is another pioneer species and is commonly used as a living fence or shade tree, and its fast growth rate allows it to quickly establish in open areas. The dominant tree family was Fabaceae (accounting for 24.7% in 2023 and 30.3% in 2025). The dominance of the Fabaceae family in 2023 and 2025 is driven by ecological factors. The legume family is capable of nitrogen fixation through symbiosis with *Rhizobium* bacteria, which helps improve soil fertility—particularly important during the early stages of ecosystem recovery. Additionally, many Fabaceae species are pioneer plants with fast growth rates, high tolerance to extreme environmental conditions, and effective regeneration and seed dispersal abilities. In the natural regeneration plots, the most abundant species shifted from *Mallotus paniculatus* (locally known as bak balek angen) to *Piper aduncum. Baccaurea parvifolia* and the number of unidentified stems also increased. Across the restoration area as a whole, there was an increase in the abundance of juvenile stems which may be early indication of regeneration processes, but longer-term monitoring would be required to confirm this.

In Bengkulu, plot surveys were undertaken in December 2024 to January 2025 to better understand the vegetation community of different landcover types, understand the potential for natural regeneration and sources of propagules for restoration and to establish the baseline carbon stocks for the Plan Vivo PIN/PDD (see section on Output 4 below). 23 plots of measuring 20 x 50 m (with nested subplots of 20 x 20 m and 10 x 10 m for smaller stem size classes) were measured across the landscape, covering four landcover types, derived from the landcover map in Output 1, using a stratified random sampling design. These included 3 plots in agroforestry, 10 plots in closed canopy forest, 5 plots in partial canopy forest, and 5 plots in degraded forest (Annex 3.4f). The sampling intensity was determined using the Winrock tool. The KKI Warsi team incorporated results from the plot-based study into their PDD (Annex 4.5c) highlighting taxa of ecological, functional and conservation significance particularly present in the closed/partial canopy areas, including: members of the Dipterocarpaceae family, such as Anisoptera marginata (Tenam), Dipterocarpus palembanicus (Lagan), Dipterocarpus hasseltii (Keruing), and Shorea leprosula (Kelungkut Daun), Koompassia excelsa (Menggris), one of the tallest tropical hardwoods, and Agathis spp. (Damar), a resin-producing conifer with high ecological and economic value. Species like Pometia pinnata (Kungkil) and Palaquium burchii (Balam Sadu) also contribute to the ecological complexity of the forest and provide seasonal food sources for wildlife.

Monitoring training was provided to community members involved in the plot- and tree-based monitoring activities in Aceh (Annex 3.3; Indicator 3.3). In Bengkulu, community members involved in MPTS planting were trained in monitoring and use of the KARLON app in support of generating green finance income for maintaining trees.

**Output 4: Restoration income generation -** *Model to incentivise communities through income generation from restoration is developed and available to community-managed forest PES projects*

The baseline condition for this output was that community driven PES projects were under threat due to the 2021 moratorium on carbon trading and that there was currently no viable alternative such as biodiversity crediting or a PES model specifically designed to support restoration activities. Output 4 sought to (i) provide and explore options for communities to access PES finance through alternative routes including the emergent biodiversity credit market, (ii) develop a new methodology focussed on maximising benefits from restoration efforts and (iii) support certification through the Plan Vivo Standard to enable access by partner communities to the carbon or biodiversity market. At the same time Plan Vivo had ongoing engagement with Government stakeholders to monitor its evolving position on the Voluntary Carbon Market.

*Income-generation opportunities through credit-based approaches:*

During the first year of the project a 'cost-benefit analysis (CBA)' (see Annex 4.1) and 'market analysis (MA)' (Annex 4.2) was undertaken to understand the potential for community managed restoration projects to benefit under different Payment for Ecosystem Services, including carbon and biodiversity markets (Indicators 4.1 and 4,2). The CBA revealed that collaboration with smallholders is one of the more cost-effective ways of delivering restoration and that Plan Vivo requirements to develop and implement long-term management plans and to have strong social and biodiversity outcomes help to ensure efficacy and good value for money, and these should be a factor in setting a fair price for restoration outcomes. The market analysis (Annex 4.2) provided a good insight into the rapidly evolving biodiversity credits markets, as well as a picture of demand for restoration PES units from community projects. During the project, Plan Vivo has also provided training in the PV Nature methodology. Harry Tittensor provided training and facilitated discussions with partners (KKI Warsi, F&F, UKCEH, and University of Kent) in August 2023, November 2023 and February 2024 to build understanding of the methodology and enable consideration of opportunities for the Indonesian project areas and the opportunities to conduct 'sensitivity' around different levels of data acquisition for faunal biodiversity monitoring. Whilst partner projects did choose to pursue 'conventional' carbon routes to finance, following the clarification of the position of the Government on Indonesia on carbon trading, the analysis clearly points to an alternative route, and an opportunity to spread risk, in the future and this Darwin project has raised understanding and capacity to participate. During this project, Plan Vivo has continued its work on biodiversity credits and launched PV Nature in December 2023.

Over the project lifetime, Plan Vivo, and Plan Vivo project developers (including KKI Warsi and F&F) has kept informed with the evolving policy situation (see Annex Output 4 - GoI legislation policy documents) and engaged directly with policy makers and key stakeholders (including with UNDP and USAID) to advocate for high integrity community carbon projects. Between December 2024 and March 2025, Plan Vivo engaged directly with the Ministries of Environment and Forestry on achieving 'mutual recognition' status from the Ministry of Environment – culminating with in-person meetings between Plan Vivo (Ellen Damayanti and Kristin Olsen) with both Ministries in February 2025. New GoI legislation requires that a Mutual Recognition Agreement (MRA) between Government and the VCM Standard is required as a basis for operating in the Carbon Market in Indonesia. In January 2025 GoI reopened carbon trading for the renewable energy sector on the Indonesia Stock Exchange (IDX), with plans to open trading in the AFOLU sector in August 2025. Following consultation with the Sector and stakeholders in Indonesia, GoI are also preparing legislation that will enable international carbon standards, including Plan Vivo, to operate within Indonesia. The Government were keen to pursue the MRA, and also to collaborate to demonstrate how communities and forests can benefit through carbon certification in social forest designated land. A draft MoU detailing the basis for collaboration towards an MRA was prepared in March 2025. We are hopeful that KKI Warsi's flagship Plan Vivo project, Bujang Raba, will be one of the first project approved under the new legislation – providing a

strong basis for existing and new projects (e.g. Air Tenam and Mane) will also be approved in coming months.

*Restoration methodology under the Plan Vivo Standard*: The project has enabled the development of an approved restoration methodology under the Plan Vivo Standard (Indicator 4.4). The development process followed rigorous external peer-review, response and revision steps in line with Plan Vivo procedures. The methodology received final approval in May 2025 of the Restoration Methodology which has been integrated within the 'Estimation of baseline and project GHG removals by carbon pools in Plan Vivo projects' methodology PU001 v1.1, and includes tools PT003 Guidance for the use of models validated with measurements in PV Climate projects and PT004 Identification of degraded and degrading land in PV Climate projects developed through the project, are now available for use by restoration projects seeking to issue carbon credits, in Indonesia and beyond (see Annex 4.4, PU001v1.1).

*Plan Vivo Process (PIN/PDD development):* In the second year of the project, following assessment of PV Nature and PV Climate options, both F&F and KKI Warsi decided to develop their project areas as Plan Vivo Climate (carbon) projects and pursue the development of a Project Idea Note (PIN) and PDD (Project Design Document) for their project areas. The PIN is a document that outlines the project and intention to become a Plan Vivo certified project and demonstrates basic eligibility with the Plan Vivo Carbon Standard. The PDD is a more comprehensive document that must be submitted as part of the certification process and includes details on stakeholder engagement in design of project interventions, as well as its methodology for measuring and verifying carbon reductions and its impact on communities and the environment. During the course of the project, projects have received training and support from the Plan Vivo team and other Darwin partners to support project development, including in relation to a) Participatory Well-being Assessment (Annex 0.2 a,b) b) PV Nature and PV Climate project development and c) Monitoring & Evaluation for biodiversity and restoration projects.

In the final year of the project, both KKI Warsi and F&F have submitted PINs that were approved, following some revisions, in September 2024 (Air Tenam) and May 2025 (Mane), respectively (see Annex 4.5a,b, PINs). The projects also underwent an environmental and social safeguard assessment, the results of which will feed into the PV projects' risk management. In addition, KKI Warsi has submitted their PDD for Air Tenam for approval, and at the same time has developed a further project in Bengkulu Province (Lemo Nakai), learning from the Air Tenam project, whose PDD was approved and submitted for public consultation in April 2025.

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## 3.2 Outcome

*Project outcome: High-quality and sustainable ecosystem restoration is delivered on social forestry and degraded forest land in Aceh Province and Bengkulu Province delivering climate, biodiversity and socio-economic co-benefits*

**Outcome Indicator 0.1**

Our project covered two community forest areas in Sumatra. Sustainable land management practices were applied under the categories: a) sustainable management through protection, b) area under rehabilitation and restoration (Standard Indicators ICF KPI 17; DI-DO1). The project has delivered sustainable land management practices across 370.12 hectares (ha) (exceeding the 130 ha target). Our rehabilitation and restoration activities have added in excess of 13,592 surviving trees across the landscapes (exceeding our target of 5000 trees). *Our assessment is that this indicator has been achieved*. This is broken down with reference to relevant evidence as follows.

308 ha has newly been designated as protected within the social forestry area in Bengkulu, comprising 7 protection zones within the landscape. Through the project, these areas were co-agreed in consultation with the community and have been marked with signage and are supported by community patrols (Annexes 4.5b,c; 1.3d,e). The project activities indirectly support the protection of 7,939 ha of forest across four village forests (hutan desas) in Aceh through income generation and generating local community support (these areas are not included in our totals given above).

Rehabilitation has been undertaken in 41.65 ha (28 land owners, 31 land parcels) through planting of MPTS in Bengkulu (Annexes 2.2b,c). Rehabilitation in Aceh covers 20.47ha (18.59 ha with tree planting, 1.88 ha dedicated to natural regeneration; Annex 3.4d,e) within the Lutueng village forest boundary. Additional areas within buffer zones (community gardens outside of the village forest boundary) benefitted from rehabilitation activities, bringing additional ecosystem and livelihood benefits but only some of these trees and areas have been monitored (those monitored cover an estimated 25 ha) - since sustained land management practices are not documented in the village forest agreements we have taken the precautionary approach of not including these in our total for this indicator.

Under rehabilitation and restoration activities (b), an additional 9150 surviving durian, jengkol and pinang trees (documented in 2025 endline survey, Annexes 2.2b,c) were introduced to the landscape in Bengkulu as a result of the project. Within the rehabilitation area in Lutueng, Aceh, there were 433 surviving stems (338 petai, 5 jengkol, 90 durian) at the endline survey (Annex 3.4d,e). Within the community gardens in Aceh, 13,800 (7,700 petai and 6100 coffee) seedlings were distributed to 4 villages. During October 2024 to January 2025, a partial survey was conducted so 3,841 live seedlings are now documented (the remainder are yet to be monitored, and this represents c. 28% of the full sample). An additional 168 individual trees of RTE species were planted (106 within 5.69 ha of the 20 ha rehabilitation zone, and the remainder planted within community gardens) between December 2024 and March 2025 (there has not yet been any further monitoring) (Annexes 2.1d,e; 2.1_2b).

Our outcome indicator also incorporated a target for onboarding at least 4 additional villages to demonstrate potential for upscaling activities. In Aceh, rehabilitation focussed on the village of Lutueng. Through project engagement and PIN development, F&F have been building capacity to extend activities to 3 additional villages (Blang Dalam, Turue Cut and Mane). Within each of these areas there is also potential to formalise the sustainable land management and restoration practices outwith the hutan desa boundaries and in the community garden areas. In Bengkulu, the KKI Warsi team have had productive discussions around the implementation of activities in other social forestry schemes in neighbouring villages in the Ulu Manna sub-district, comprising a further 4 villages and 5 social forestry permits (Kayu Ajaran; Lubuk Tapi; Merambung; Bandar Agung).

**Outcome Indicator 0.2**

A key outcome for the project is that well-being of smallholders and forest-dwelling communities (8624 people) in at least 2 community forest areas will be similar or improved relative to baseline, as a result of multi-objective restoration activities and access to community-based restoration payment for ecosystem services (PES) by end of the project. *Our assessment is that this has been achieved*.

Participatory wellbeing assessments were carried out in 4 villages[1] at the start (baseline) and end (endline) (Annexes 0.2a,b). We chose the Participatory Wellbeing Assessment method because it allows for a multidimensional view of poverty and wellbeing and allows communities to identify the indicators of highest local relevance and to set locally-relevant criteria under each indicator, using a focal group discussion (FGD) approach. The indicators that were prioritised and criteria to establish poverty levels were set by the communities (through a facilitated participatory approach) and are given in Annexes 0.2a and b. The indicators demonstrate the multi-dimensionality that was considered.

Assessments indicated that overall wellbeing was improved or similar since the project began in 3 Aceh villages (9,085 people)[2]. The proportion of people that were considered poor was perceived to have decreased in Lutueng and Mane and remained the same in Blang Dalam. In Air Tenam (250 people) qualitative assessment indicated that although poverty levels remained high, the project had helped participants to feel empowered and has improved skills levels as a result of inclusion in project activities, participatory approaches and regular engagement with the community facilitator. In both project areas, the process of undertaking the PWB assessment was an opportunity for people to think more deeply about the factors that made them feel relatively more poor or ‘capable’. In all villages, the criteria and thresholds (defined within the

PWB approach) were amended to some extent to reflect this understanding and reflection. In Air Tenam, a number of additional criteria were incorporated to distinguish between poor, moderate and capable (including food security, roles in enterprise and ownership of electronic goods) which meant that PWB assessments for Air Tenam were not comparable between 2022 and 2025.

In the final year of the project, significant progress was also made towards enabling access of communities to payment for ecosystem services to support forest restoration and local development. In Aceh, a PIN was submitted on behalf of Mane, Lutueng and Blang Dalam villages and approved by Plan Vivo. In Bengkulu, a full *first draft* PDD was submitted on behalf of Air Tenam village (Annex 4.5c). These documents identify key project interventions that are intended to deliver ecosystem and livelihood benefits and that have been identified as priorities in discussions with representatives from the local community (including through focus group discussions with women and youth groups). In Aceh, livelihood benefits are intended to come from a combination of agroforestry and improved agricultural practices as well as carbon income that will contribute towards village development. The PIN also details the proposal to extend the project to a further 21,986 households within Pidie and Pidie Jaya Districts. In Air Tenam, the project aims to enhance human resource capacity and strengthen the role of women, men and youth groups in the management of forest areas, tourism and alternative economic development. Participants are also expected to benefit from tree adoption and carbon income that will support forest management and income generating activities. Finally, KKI Warsi has developed a further project in Bengkulu Province (Lemo Nakai) whose PDD was approved and submitted for public consultation in April 2025. Once the PDD is approved, and the project is assessed by an independent Validation and Verification Body, projects can start to issue and sell carbon credits that accrue from restoration, conservation and forest management activities.

In this final year, both projects also underwent an environmental and social safeguard assessment, the results of which will feed into their respective PV projects' risk management.

[1] During this time the population in the villages (direct and indirect beneficiaries) increased from 8,624 people to 9,585 people.

[2] In Aceh, the proportion of the population considered to have moderate and 'capable' wellbeing were reported at 20-55% in Aceh in 2025 compared with 20-23% in 2022. The proportion of people considered 'poor' and 'extremely poor' was reported as 77-80% in 2022 compared with 45-80% in 2025.

**Outcome Indicator 0.3**

Across both landscapes, nursery growing and tree planting activities largely focussed on economically-important tree species which included the following four native species (exceeding our target of 3): durian (Malvaceae *Durio spp* most likely *zibethinus*), jengkol (Fabaceae *Archidendron pauciflorum*), petai (Fabaceae *Parkia speciosa, also known as stinky bean*), pinang (Arecaceae *Areca catechu* also known as betel nut or areca nut, thought to have originated in the area encompassed by the Philippines, Malaysia, Celebes (Sulawesi) and New Guinea (Heatubun et al., 2011). Durian, jengkol and petai are planted for fruit/bean production for local consumption and selling; pinang is used for intercropping and green fences in agroforestry, betel nut production and leaves are pressed to make NTFP household items. To meet local socio-economic needs and help to support local conservation efforts through reduced pressure for land clearance, non-native species with strong markets and well-known production processes were also supported, namely coffee (Rubiaceae *Coffea liberica and C. canephora var. Robusta* native to west and central sub-Saharan Africa) and avocado (Lauraceae *Persea americana)*, though avocado was planted in small numbers and had poor survival.

With regards to native forest species (in summary of Section 3.1. Output 2), 300 meudang puteh seedlings survived over seven months in the nursery in Turue Cut and were planted within the 20 ha rehabilitation zone in Lutueng village forest in March 2024 (Annexes 2.1d,e; 2.1_2b), with a particular focus on using these trees to define landowner boundaries. 168 seedlings of *Beilschmiedia, Shorea* and *Dipterocarpus spp* were successfully grown in nurseries and planted into the rehabilitation zone and community gardens between December 2024 and March 2025. Whilst not all seedlings were identified to species level (partially because of the use of local vernacular names and due to the challenges of definitive ID of juveniles), we exceeded our target of increasing abundance of 3 species, since at least 3 genera were grown in nurseries and

planted (*Beilschmiedia, Shorea* and *Dipterocarpus spp)*. The propagation of native/RTE species in Bengkulu has not yet been successful – towards the end of the project, growing wildings of *Anisoptera marginata* for re-planting was trialed but mortality was high and this activity remains an ambition in the project area (Annex 2.1g).

Overall, the abundance of native species has been increased over approximately 85.24 ha (slightly lower than our target of 130 ha). Planting of the native economically-important species (as per our logframe indicator 0.3) took place over 41.65 ha in Bengkulu and 18.59 hectares in the restoration area of Aceh plus an area in excess of 25 hectares within the community garden area. Planting of RTE seedlings covered c. 5.7 ha within the 18.59 ha rehabilitation site and an area within the community gardens. The key reasons our areal target has not been achieved are: (i) prioritisation of securing protected areas as a key intervention requiring community engagement, with time taken to understand land ownership, (ii) perceived income generation opportunities and the investment of time needed to generate community interest in diversifying planted species and secure commitment to maintain plantings in a community-led restoration context, (iii) inefficiencies in time as a result of seedling mortality in the nursery and field earlier in the project (see Section 6 for further discussion), (iv) challenges in sourcing germplasm for planting of native and RTE species.

Our work has identified clear opportunities to support plant conservation through restoration, importantly complemented by the protection of remaining areas of forest and plant populations within both landscapes. The work with the communities identified key opportunities for delivering conservation co-benefits even in 'ultilisation zones' by incorporating additional native forest species in boundaries and corridors and by identifying species that are of cultural value and hold meaning to the local communities. Experience through the project has highlighted the need for cross-sectoral support (research and academia; government departments; NGOs) and knowledge exchange to deliver effective propagation, nursery and planting protocols, and that for some species these processes may not yet be known.

*We assess this indicator to largely have been achieved with regards to enhancing areas covered by native forest and economically important species* and having enhanced engagement around supporting plant diversity within rehabilitation activities, identifying future opportunities to extend this impact both spatially and in terms of species.

**Outcome Indicator 0.4**

A key outcome for the project is the development of a viable model (see logframe for definition) for income generation from multi-objective restoration (Indicator 0.4). The baseline position at the start of the project is that no viable model existed, due to the Government of Indonesia moratorium on carbon trading (introduced in 2021). *Our assessment is that this outcome has been largely achieved, with the model and structures in place but some key policy development still to occur within coming months* as the Government of Indonesia re-launches its VCM, including for social forestry projects.

The project has achieved this by exploring and providing alternative routes to finance through restoration and sustainable forest management activities, as well as working closely with the Government of Indonesia to ensure that the Plan Vivo Standard is approved and recognised as a leading carbon standard for social forestry designated land in Indonesia. Through this project, we have:

- Established a bespoke, independently approved, methodology that enables community-based projects to calculate the carbon sequestration from restoration activities, enabling generation and sale of carbon credits for community benefit.
- Determined that the emergent biodiversity credit market is a viable alternative route for community-led forest restoration projects through our cost benefit and market analyses (Annexes 4.1; 4.2). Whilst biodiversity credits were seen as a riskier route to PES income compared to carbon credits (as Government position on VCM shifted positively during Year 1 of the project), PV Nature has since been launched and is being established in Indonesia and will therefore be available for communities in future. Plan Vivo is also working with partners to develop a non-offset route to crediting through "climate contributions" as an alternative route for communities where carbon trading is not an option.

Supported planting of 85 ha and 4 species economically valuable tree species on community-managed land which will provide an income for local communities in the medium term when plants become productive.

In March 2025, following a series of online and in-person meetings with representatives from the Ministry of Environment and Ministry of Forestry, Plan Vivo submitted its initial proposal as part of the Mutual Recognition Agreement that will allow Plan Vivo to become approved under the new carbon trading regulations in Indonesia. We are also pursuing discussions on issuance and registry arrangements through the IDX (Indonesia Carbon Exchange) and have had positive discussions with the Ministry of Forestry around using the KKI Warsi managed 'Bujang Raba' project (certified by Plan Vivo) as an example of what a 'good' community-led carbon project looks like. Indications are that the VCM for Social Forestry will be launched in coming months and that the Plan Vivo Standard will be approved as part of that – allowing the Darwin-supported projects to benefit from the high integrity carbon market.

### 3.3 Monitoring of assumptions

We monitored our assumptions through regular cross-partner meetings, where partners have contact with a range of stakeholders and knowledge sources.

Outcome level:

1. Indonesia remains committed to its stated goals on poverty alleviation, restoration, community-managed land and addressing climate change. *Comments*: This assumption held true – part-way through our project a new government was elected but we did not become aware of any policy changes related to these goals, as communicated by in-country partners.

2. Ongoing support from key government institutions (Ministry of Environment and Forestry; Ministry of Land Use and Spatial Planning) for involving influential thinkers among their staff at national and local levels in our sequential workshop in spatial planning consultation processes. *Comments*: This assumption held true. We continued to have support from government agencies through BRIN and provincial government level support through meetings held. There was some restructuring of departments following the election, and some of the changes may still be coming to fruition.

3. There will not be any large-scale mortality events (e.g. severe drought, fire) which affect ecological restoration. *Comments*: There have been no such events affecting our project sites in year 2. We had been concerned about a predicted El Niño event in 2023/24 but it did not seem to adversely affect our focal sites. Challenges around planted tree mortality have occurred at one site as discussed under Progress. We will continued to monitor the situation and recognised the need to adjust community engagement and commitments prior to re-planting areas and planning any new restoration activities. In our other project site, a new road was cleared ready for construction and this affected relatively small amounts of land area dedicated to MPTS planting but also provided new access bringing with it the risk of land clearance from people external to the village. Our project partner Warsi, alongside local stakeholders (Forest Management Unit) put in measures to mitigate and protect land areas from encroachment, but this remains an ongoing risk. Seedling support helped to offset impact to local landowners directly affected by the clearance of the road.

Output 1

1. Multiple stakeholders continue to see value in the process. *Comments*: The stakeholders maintained good engagement throughout the project. Further engagement could generate additional uptake of tools.

2. Agreement reached on multi-objectives and management. *Comments*: Partners have achieved good collaboration and agreement with local stakeholders and communities regarding local land management, demonstrating the assumption that agreements can be achieved holds.

3. Community forestry representatives and government extension workers available to attend training. *Comments*: This assumption held – there was excellent engagement from local stakeholders, and project participants have attended training sessions coordinated in both landscapes. Extension to a broader number of participants in Aceh will be beneficial going forwards.

Output 2

1. Selected seedlings/restoration materials would be available. *Comments*: MPTS seedlings were provided by watershed and forest management units and some purchased. In some instances, quality was deemed not to be good and restocking/replanting was necessary. Developing nursery stocks of RTE and native species was quite challenging, and continued efforts to develop and share knowledge and practices to support this activity will be beneficial.

2. Activities are not interrupted by major natural hazards (e.g. El Niño drought). *Comments*: There have been no such events affecting our project sites. The El Niño event later in 2023/24 does not seem to have adversely affected our focal sites. Some dry spells delayed replanting efforts and may have impacted seedling survival rates in exposed areas.

Output 3

1. Multiple stakeholders continue to see value in the process. *Comments*: This assumption held – we had good engagement from local partners and stakeholders; we still plan to expand our stakeholder group to generate further uptake.

2. Community forest representatives and government extension workers available to attend training. *Comments*: This assumption holds – we have good engagement from local partners and stakeholders.

Output 4

1. Multiple stakeholders continue to see value in the process, supported by the cost-benefit analysis. *Comments:* The CBA has been successfully completed, with input from relevant stakeholders. The project work has identified that initial financial reward for seedling maintenance can also support the field work and participation at the earliest project phases, whilst seedlings mature.

2. Co-benefits from nature-based PES certification schemes continue to command high market prices and demand for high quality PES credits (including from restoration in Indonesia) continues to grow. *Comments*: This assumption holds – there continues to be high demand in the market for high quality PES credits. The government of Indonesia continues to support carbon trading framed by new legislation.

## 3.4 Impact

Our proposed impact was *"Forest restoration in Indonesia achieves 'the triple win' of sustainable biodiversity conservation, carbon sequestration and enhanced livelihoods and governance outcomes*".

Our project has delivered some short-term impacts – local communities and stakeholders in the two landscapes have actively participated in restoration activities (planting, maintenance and monitoring and designating areas for natural regeneration and protection) that we hope will derive ecosystem services benefits and yield medium-term economic benefits when the planted multi-purpose trees become productive. The project has facilitated the communities to protect vulnerable plant populations in forest areas designated as 'protection zones' and, through community engagement, we have initiated opportunities to incorporate native forest species into rehabilitation areas and these have been planted in some areas. Culturally-valued tree species have been of particular interest to the communities (e.g. *Magnolia sp* known locally as meudang jumpa in Aceh; *Anisoptera marginata* known locally as tenam in Bengkulu). Our project identified additional opportunities for incorporating broader suites of species into rehabilitation land areas but this will likely require continued engagement. The findings of relationships between habitat quality and faunal communities biodiversity further reveals the capacity for these landscapes to contribute to supporting RTE fauna populations and reveal opportunities for habitat connectivity to optimise the positive biodiversity impacts of restoration and rehabilitation (Output 3). Improved sustainable land management targets climate mitigation through carbon sequestration in tree growth and climate adaptation by improving soil stability and reducing run-off in catchments prone to flash-flooding.

Developing relevant tools that relate to the three objectives within 'the triple-win' was key to our pathway to impact in Indonesia more broadly, beyond the activities within the two focal landscapes. We have successfully delivered these tools and believe they will contribute to the medium-long term achievement of sustainable and just approaches to restoration. During development of the project, in-country partners described two challenges - I) resource intensive processes for forest monitoring and data processing and ii) poor data capture on the fate of seedlings distributed to community members. Our co-produced monitoring app is designed to alleviate some of these pressures, making it easier for individuals and organisations to motivate and track progress, leading to more positive restoration outcomes. Engagement with additional stakeholders (e.g. project managers and NGOs) should support broader adoption and scale the impact and the role the app may play in monitoring, reporting and verification (MRV) for the PES market. The full benefits may take some time to realise, both in the focal landscapes of this project and across other sites in Indonesia (e.g. low biomass gain at small tree sizes; slow rates of population change; time to on-board new communities). More systematic approaches to designing and prioritising interventions (Output 1) should also help direct the most effective measures in terms of poverty alleviation and carbon and biodiversity outcomes.

Our market analysis has also enabled us to understand the potential for community restoration projects to benefit from the emergent market in biodiversity certificates as well as interest in less formal PES markets. The analysis indicates that the market places high value on robust monitoring, cost transparency and social impact. This project therefore contributes valuable learning for community projects in Indonesia and beyond.

The advances that our project has made will facilitate the scaling up of community-led tropical forest restoration in several ways: 1) our vision is that our two project sites will form positive demonstration sites for successful community-led restoration (Output 2 and 3). 2) Development of the restoration standard methodology will create a route for communities to access benefits from restoration action. 3) Provision of a range of PES methodologies provides choice in alternative income generation models and provides a route for communities to be recognised for

nature-positive, biodiversity-focussed activities in restoration (Output 4). 4) Capacity building (e.g. land use analyses, spatial planning and restoration monitoring tools (Output 1; Output 3) supports strategic decision-making and more efficient MRV for forest restoration.

In-country project partners have sought opportunities to extend the application of our restoration pathway model to other communities and have generated positive engagement to expand the impact.

# 4 Contribution to Darwin Initiative Programme Objectives

## 4.1 Project support to the Conventions, Treaties or Agreements

Our project contributes to the following national policies and international conventions, treaties and agreements:

IBSAP/ CBD Aichi Targets No. 2 by providing spatial planning & prioritisation tools to integrate biodiversity values to local development plans (see Output 1);

IBSAP/ Aichi No. 14 by restoring degraded ecosystems to improve essential ecosystem services. Aichi target No. 12 on efforts to maintain and restore habitat of the critically endangered species (such as the Sumatran elephant, Elephas maximus sumatranus, also listed in CITES Appendix 1) (see Output 2 on restoration action); SDGs 13 and 15, by restoring degraded ecosystems through tree planting activities and assisted natural regeneration in project sites – and mitigating climate change threats and impacts. The project will also build resilience within communities to climate change in the long term (see Output 2). This project also contributes to the National Action Plan for Climate Change Adaptation in Indonesia (RAN-API, 2014) by increasing local community capacity in reducing climate risk through the rehabilitation of degraded ecosystems, using agroforestry.

IBSAP No. 21 by providing restoration tool for assessing, monitoring, and mapping biodiversity and restoration impact in target areas (see Output 3 on restoration monitoring);

SDGs 1, 5 and 8, by enabling access to direct and indirect income from PES and planted trees, equitable benefit sharing and community-led development opportunities (including seasonal and permanent employment) for project communities. The project will have an inclusive approach, and ensure safeguarding of marginalised groups, women, and children and of traditional knowledge and rights in all project activities. (see Output 4, working towards Plan Vivo certification and income generation).

Sugeng Budiharta (SB) was nominated by CBD National Focal Point (Indonesia) to attend Workshop “Developing a Roadmap for the Kunming-Montreal Global Biodiversity Framework Target 2” organized by The Convention of Biological Diversity (CBD)/the Food and Agriculture Organization (FAO) at FAO headquarters, Rome, Italy, on 22 -24 November 2023 (fully funded by CBD/FAO). The Target 2 Workshop provided opportunity for relevant organizations, stakeholders and Parties to the CBD to share progress towards Target 2 of the Kunming-Montreal Global Biodiversity Framework (GBF) and jointly develop a roadmap for implementation, monitoring and reporting of the target. Participants learned about GBF and Target 2, restoration experiences on the ground, and participate in the discussions on restoration monitoring, target setting and stakeholder engagement during interactive breakout sessions. There were also opportunities to identify capacity needs and provide inputs to the Draft Resource Manual for Target 2. SB has also been nominated by CBD National Focal Point (Indonesia) to participate in the Global Workshop on Forest Ecosystem Restoration Initiative (FERI) in Seoul, Republic of Korea, 26 to 28 August 2025 (fully funded by CBD). The objective of the workshop is to take stock of ten years of FERI implementation (2014-2024) and to identify ways forward to maximize FERI’s alignment with the Kunming-Montreal Global Biodiversity Framework. The workshop outcomes will include recommendations for the programming of FERI’s third phase to prioritize most effective and impactful work areas as well as mechanisms to assist countries and build partnerships to accelerate the implementation of the Framework. Sugeng’s attendance at

these meetings allows what has been learned during the Darwin Initiative project to be effectively translated into broader international policy frameworks and action. UK participants have not yet had any direct interaction with host country CBD convention focal points during the project. Now the results of our work are concluding we will seek opportunities to feedback on our project more explicitly.

Sugeng Budiharta was also invited as speaker/resource person in the government workshops in the theme of restoration and funding: (i) Workshop on “Developing an Indicative Map for Integrated Ecosystem Restoration and Developing Indicators for Assessing the Success of Ecosystem Restoration” organized by the Ministry of Forestry (27-28 May 2025); (ii) Workshop on “Economic Valuation and Funding on Biodiversity” organized by the Ministry of Environment (17 June 2025).

Presence and panel participation of the ministerial offices at our national stakeholder meeting may further help to inform discussions happening within the relevant government departments and one of the speakers at our meeting is a representative on a policy advisory panel for social forestry.

Several members of the project team (L Banin UKCEH, K Bohannon and H Tittensor Plan Vivo) attended COP 16 in Cali, Colombia 2024 (supported through external funding mechanisms). They engaged with other delegates on matters relating to restoration, just landscape transitions, high-integrity biodiversity credits and IUCN activities in the ASEAN region.

Two members of the project team are members of the UN Decade on Restoration Task Force for Restoration Best Practice and two members of the UN Decade on Restoration Task Force for Restoration Monitoring, presenting an opportunity for the lessons learned from the project to be disseminated more widely. PI L Banin also hopes to attend the FAO Global Forests Observation Initiative in Bali, Indonesia in October, funding permitting. This will be an opportunity to connect the research to Indonesia’s research, policy and practice community engaged in sustainable forest management, with relevance to NDCs and CBD commitments.

## 4.2 Project support for multidimensional poverty reduction

Our beneficiaries were considered to be 9,089 community members from households within 3 villages in Aceh (Mane, Blang Dalam and Lutueng) and 250 community members in 1 village in Bengkulu (Air Tenam). Poverty reduction and well-being were the focus of our Outcome Indicator 0.2 (reported in Section 3.2; Annexes 0.2a,b). As described, we used a participatory well-being approach, which takes a multidisciplinary view of poverty and well-being, with communities developing their own indicators which hold local relevance.

The area of agricultural land was considered a major determinant of wellbeing. Seasonal agriculture—for example from production of durian, petai, jengkol, coffee, and cempedak – is a key source of income for these rural communities. Seasonality creates financial insecurity between harvests, especially when crops failed or market prices dropped, so income can be unstable and insufficient to cover expenses. Additional income sources included non-timber forest products such as rattan, jernang, and pandanus, and fishing. Income was also tied to access to education requiring travel.

Though limited change in poverty levels during the timeframe of the project (2022-2025) were reported by the communities, some important qualitative evidence of wellbeing change was reported in our Bengkulu site. Confidence in expressing opinions in public, ability to meet daily food needs, and ownership of electronic goods were all considered meaningful markers of enhanced wellbeing by participants. Several households now possess skills and capacities that can improve their resilience and livelihood strategies in the long term and participants clearly expressed pride in the personal and collective transformations that have occurred since the project began.

There have been several key achievements delivered within the project to support poverty reduction. In the short-to-medium-term our project contributes to strengthening community governance of natural resources, building local skills and capacity (tree nursery management,

tree cultivation, restoration and tree planting practices, monitoring social and ecological progress and generating income from multi-purpose tree species). Seedlings were provided by the BPDAS (watershed management agencies, purchased, or for a small proportion of trees, locally propagated and have been planted, with guidance and support of project staff across both project landscapes. As these trees mature they will contribute to income generation in the landscapes as products can be sold. High survival rates in Bengkulu and the community garden areas in Aceh will help to realise this income -generation potential. In Bengkulu, the land users were able to access additional payments for maintaining trees through GoGreen Jejakin payments and through a tree adoption scheme facilitated by KKI Warsi, to generate income for large trees in the protected areas of the social forestry landscape. In the longer-term, communities may be open to expanding the range of species planted and nurtured, through community nursery schemes directed at conservation of vulnerable species and to use and market a broader range of useful species.

Our project aims to strengthen benefits derived from improved ecosystem services (carbon sequestration biodiversity, soil and water regulation), through restoration efforts (tree planting and natural regeneration) and enabling communities to access PES finance to support long-term management of natural resources and community development, and longer-term access to finance. Local organisations and communities have been supported through first stages of Plan Vivo project development (PIN and PDD). Once these project areas are registered and enabling conditions are suitable, access to credit-based finance will deliver an additional income stream within the medium-term. Plan Vivo project development requires detailing of benefit sharing mechanisms, which is an important aspect as project areas reach credit issuing stage and projects can start to derive economic benefits.

We anticipate that more notable reductions in poverty and improved wellbeing should be realised over a longer time frame, especially when (i) trees have reached maturity and are productive in terms of fruit-growing; (ii) benefits of new agricultural/agroforestry management knowledge are realised; (iii) security of land tenure and access to additional income streams (e.g. PES/credit-based income; marketing of NTFPs; other green economy opportunities) come to fruition. Interventions were also designed to enhance ecosystem services, for example, reducing soil erosion and flooding and enhancing biodiversity, and these ecosystem-scale changes will also take time to develop and for real change to be observed by communities.

In both our focal landscapes, communities now also benefit from greater access to networks and stakeholders (local authorities, academic institutions, project coordinators) which can facilitate sharing of knowledge and resources. The development of tools to allow scaling of restoration activities and more efficient use of resources (see Section 8 on Scaling) should also extend poverty alleviation impact to a broader set of beneficiaries.

## 4.3 Gender Equality and Social Inclusion (GESI)

| GESI Scale | Description | Put X where you think your project is on the scale |
|---|---|---|
| **Not yet sensitive** | The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach | |
| **Sensitive** | The GESI context has been considered and project activities take this into account in their design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities. | |
| **Empowering** | The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to | X |

| GESI Scale | Description | Put X where you think your project is on the scale |
|---|---|---|
| | assets, resources and capabilities for women and marginalised groups | Both project partners seek to enable participation of women in project design and capacity building opportunities within the cultural constraints. KKI Warsi has sought to mainstream gender into their PIN & PDD and have a dedicated team member working to ensure inclusion of youth and women. |
| **Transformative** | The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change | |

Indonesia has been addressing gender inequality and inequity, but gender-based discrimination persists, often linked to poverty and the rural economy where women can be marginalized, with reduced access to financial resources, knowledge, and technology. The project has sought to address gender and social inclusion through:

**Building capacity in project teams:** Plan Vivo provided an online training session for KKI Warsi staff on gender mainstreaming in May 2023 (F&F staff had already undertaken gender-related training prior to the project) and held in-person discussions with all project teams on considering gender equality in PIN/ PDD development in February 2024.

**Embedding GESI into project design:** Both KKI Warsi and F&F have sought to include women and youth in the project, through participation in project meetings and project activities, and through consideration of how projects could address barriers to inclusion and deliver opportunities for women and youth. In Air Tenam, project design was informed by GESI analysis, the support of a gender and youth specialist and dedicated consultation with the community. GESI was also integrated into project M&E, with project partners committing to gender disaggregated monitoring. Plan Vivo PIN and PDDs (Output 4, Section 3) also require consideration of GESI. Finally, annual project meetings have provided opportunities to share learning on approaches to GESI.

Key project results include:

Involvement of women and youth groups in Bengkulu and Aceh has ensured that they have been/ and will be integral to longer-term activities within the landscapes (e.g. women in Lutueng, Aceh have expressed preference for growing pinang (areca species) to support their small handicraft enterprise for which they won a district-level championship in 2025) and creating opportunities for engagement of these groups in project activities (e.g. youth of Air Tenam have been supported to establish an ecotourism enterprise and access training in survey work).

Women have participated in project activities and capacity building including a workshop on making organic fertilizer (in Bengkulu in October 2024) and youth training in tree measurement and data sheet completion (Aceh in November 2023), with a total of 58 (IPLC) women received training through the project (compared with 51 men). In general, representation of women in village forest activities is lower than our target of 50%, however we believe the project is going beyond the documented cultural norms for this province where men and women have typically very distinct areas of participation. Youth groups are represented in village forest management in both landscapes. In Air Tenam, women's groups are represented in village forest management, and the 2025 PWB assessment (Annex 0.2b) found that "*women and youth have shown*

*increased willingness to express their views*" in public meetings, and that they shared that "*they now feel more respected and heard within their groups, and can articulate their aspirations or concerns more clearly than before [the project]*". Women are not yet represented in village forest management in Aceh.

Both PINs and the first draft PDD for Air Tenam (submitted to Plan Vivo in June 2025) include commitments to address gender and social inclusion challenges and design equitable benefit sharing that specifically support community groups including women and youth. The draft Air Tenam PDD (Annex 4.5c) details several initiatives that have been agreed with village leaders that will be implemented to support GESI, including actively encouraging vulnerable groups (including landless, people with disabilities) to attend and speak in village meetings, establishing focus group discussions prior to village meetings and ensuring that skills development for women and youth are prioritised (including gender-inclusive leadership training). The KKI Warsi team will also continue to be supported by a gender and youth specialist.

Project teams have also valued learning from each other, including around GESI. In our end of project reflection, all partner teams stressed the importance of conducting and embedding learning from gender analyses into sustainable land management projects, and specific M&E targets and activities linked to GESI, from the beginning. The opportunity to increase focus on other vulnerable groups was also raised.

## 4.4 Transfer of knowledge

The primary form of dissemination to practitioners and policy makers so far has been through a series of province-level and national stakeholder meetings (Annex folders CC_NS and CC_PS). As elaborated on further in Section 9, this has exposed opportunities for our approaches and tools to be used more broadly, with tangible progress on engaging new villages and communities (Outcome 0.1, Section 3.2). At both sites, project partners worked closely with local forest authorities, who were also exposed to learning around restoration, tree planting and maintenance and monitoring technology and it was reported at end of project meetings that this has been highly valued.

Our intention (with advanced paper manuscripts available; e.g Annexes 1.2b and 1.4d) is to publish our work in peer-reviewed journals and use this as a launch-pad to disseminate the Darwin project's activities more widely through relevant international platforms, including the UN Task Force on Best Practices for Restoration. We will also promote these outputs through social media channels and consider broader-audience communications and online outlets (e.g. The Conversation) and through ongoing dialogue with academic and NGO beneficiaries of the research.

## 4.5 Capacity building

We have included DI-A03 (number of local and national organised with increased capacity) and A04 (Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training) as two of our standard indicators (see Annex 3 Table 1 in Main Report).

Within our project partner organisations, a total of 11 women and 12 men received training across a range of technical areas from participatory wellbeing analysis and Plan Vivo's PDD development, to wildlife monitoring, ground truthing for landcover mapping and data analysis. The KKI Warsi team also gained new insight through the support and involvement of a gender and youth expert and participated in the Restoration Methodology Working Group and Plan Vivo Stakeholder discussion panel. The activities that the NGO partners have been undertaking also gained recognition during the stakeholder meetings, and there may be opportunities for these organisations to provide nationally-relevant exemplars (see Output 4 reporting).

Members of local governance institutions also benefitted from increased capacity. They expressed their pride in learning how to use GPS and wildlife monitoring equipment and participating in surveys. They also benefitted from training activities including planting and maintenance, organic fertilisers and agricultural methods. Another significant notable example is the recent employment of a youth community member in Bengkulu to KKI Warsi's personnel.

Our project partner from BRIN, Sugeng Budiharta was awarded Fulbright Visiting Scholar to do research in University of California Santa Cruz hosted by Prof. Karen Holl in September-December 2024 (https://fulbrightscholars.org/grantee/sugeng-budiharta ). Lindsay F Banin and Matt Struebig provided recommendation when applying the grant. The visiting research program resulted in a paper "Harnessing opportunities to upscale forest landscape restoration in Indonesia" published in Trees, Forests and People. (https://www.sciencedirect.com/science/article/pii/S2666719325001438). Some key findings of the paper align with the objectives of the Darwin Project led by LFB, including: The large extent of secondary forest (> 43 million ha) provides an immense opportunity for forest landscape restoration in Indonesia, primarily through restoration concessions and social forestry schemes; Carbon markets, direct investment and compensation schemes can provide funding to upscale forest landscape restoration in Indonesia. Sugeng's profile has also raised as a national expert in forest restoration and has been invited to a number of key policy activities (see Section 4.1).

## 5 Monitoring and evaluation

*Changes to the logical framework:* Several changes were made to the log-frame during the course of the project to improve specificity of indicators and better reflect focus of activities.

- Outcome indicator 0.1 encompasses a core commitment of working in two community forest areas to deliver 130ha land under sustainable management (as per ICF KPI 17) at project end. The indicator was amended to be more specific regarding the targeted change in abundance of trees and targets on planted species and species richness were updated as our knowledge of community-based decision-making and local plant assemblages grew (see also Section 6 on Lessons Learned and the nature of the restoration sites)..
- Outcome indicator 0.2 focuses on the socio-economic impact of the project. This was amended in response to feedback to provide a more specific and relevant measure of impact. As a result, we have monitored participant wellbeing through participatory wellbeing assessments.
- Outcome 0.3 was amended to differentiate between the restoration focusing on economically valuable trees identified by communities, and the native forest/ enrichment planting activities with more clarity. Assessment focussed on abundance and biodiversity of plant species.
- Under Output 3, an additional activity was included to reflect the baseline assessment of vertebrate fauna (mammals, birds), including species of conservation concern, via ground surveys and remote-sensing technologies that was conducted across the two study landscapes.

*M&E focus and responsibility:* Monitoring, evaluation and learning effort has been focussed on poverty and wellbeing, biodiversity and restoration, and project implementation. As far as possible, the project has focussed on drawing on MEL expertise of partners, whilst also strengthening capacity where needed (e.g. Participatory Wellbeing Assessments, Land Cover Mapping and GIS, Tree Survival Monitoring, Vegetation baseline survey and sampling design, PIN and PDD development and Camera Trapping), and aligning project monitoring efforts with wider requirements of the certification process. M&E is the responsibility of all project partners, with Plan Vivo Foundation as lead partner.

*Activity and output tracking and reporting:* Project delivery is guided by project design (outlined in the Darwin application) as well as the logframe. Project partners are responsible for tracking and reporting on the activities for which they hold responsibility (as outlined in the governance structure). A project M&E plan was developed to support partners in understanding what should

be measured as they carry out activities, as well as responsibilities for monitoring. A project OneDrive has been established to enable projects to upload reports and other forms of 'evidence' that activities have been carried out and records of meetings held – all members of the project team have access to this shared space. Planning, reporting and discussion of activities takes place during monthly team meetings. This has been extended with an M&E Tracker which clearly outlines the evidence needed for each indicator and activity aimed at supporting a greater level of coordination amongst project partners and providing a useful tool in our face-to-face meetings for collating evidence.

*Outcome tracking:* Baseline monitoring activities were described in Year 1. The team undertook additional baselining activities to support ongoing and future assessment of outcomes, namely a survey of the existent vegetation in rehabilitation zones in Bengkulu and natural regeneration zones in Aceh and faunal surveys in both landscapes. Endline assessments were undertaken in Year 3.

*Ongoing monitoring and evaluation:* Our monthly meetings have continued to provide an important mechanism for tracking progress between partners, with partners often sharing progress and updates via Powerpoint presentations. Similarly, our annual team meetings and field trips in Indonesia have provided an important opportunity to provide capacity building as well as build an understanding of progress – as well as gaps and challenges. During our final project visit we organised learning events with partner communities in Aceh and Bengkulu, as well as internal project learning and exchanging ideas for future project developments (Annexes CC 0.5, 0.6). This has provided valuable lessons for all project partners including around species selection and nursery establishment, enrichment planting, community engagement and approaches to gender inclusion. The project has not been externally evaluated prior to delivering this report, however our financial auditor is concurrently looking at reports and Annexes as evidence of delivery.

## 6 Lessons learnt

Our project M&E specialist (Kristin Olsen) facilitated a session on lessons learned during our final in-person project meeting (Annexes CC 0.5, 0.6). Each organisation's team cycled around flip chart sheets on the following six topics: each of our four Outputs (restoration planning; implementation; monitoring; financing); gender and social inclusion, and working in partnership, and under each topic the project team members reflected on things that had gone well, less well and things we would improve or do differently in future projects. We synthesise the outcomes of this session with general learning and reflections from the project.

*Lessons learnt which relate to working in community-led restoration:*

We found the project strongly benefitted from multi-stakeholder involvement in restoration planning stages and the development of best practice. The provision of maps facilitated discussions on land management decisions, generating spatially-explicit understanding, especially regarding designation of protection zones (Annexes 1.4b,c,d). Future activities will benefit from further integration of connectivity into planning.

Land owner/user involvement and commitment were fundamental to restoration activities and success. This commitment varied, and this variability was attributed to challenges around (i) access, (ii) motivation and incentive or remuneration. Motivations were also strongly linked to species choices (with economically important species with good markets being strongly preferred). We collated opportunities to enhance native forest species into restoration and rehabilitation that could complement MPTS planting (see presentation in Annex CC NS – Banin Background to Project) but realising these opportunities may take longer periods of community engagement and extension to socialise the issue and potential benefits and work to remove the ecological and logistical barriers. We believe these insights are important project findings and we are working on a perspectives paper to share these insights. During our final community discussions (February 2025) it was powerful to hear how different social groups had experienced and valued the project, the challenges they have perceived and then their aspirations and concerns going forwards. Specifically, we heard about the personal impact capacity building had made, their hopes for sustainable land management within their landscape, their concerns over

land encroachment, wildlife conflict and changes in markets and their enthusiasm about expanding markets, such as handicrafts.

In one of the project sites, engagement of community patrols to identify mother trees, seeds and wildlings was an efficient way to combine activities and reduce the additional labour required for this activity. Overall, the project lacked sufficient time, resource and the appropriate partnerships to work on seed supply, propagation and nursery management to support growing a broad range of RTE species. Greater involvement of local institutions could support this in future, through larger scale funding opportunities. We recognised this as an important area for development and collaboration – we made contact with another Darwin project funded in the same round (project code DARCC-006) and co-developed a new, successful proposal (see Section 12.2). The networks created in this project will allow us to share back those emerging lessons too.

There were positive and negative aspects to developing tools and methods alongside conducting the active restoration work. On the positive, we were able to bring learning directly into the tool development, whilst questions and issues were fresh in our minds. In some cases though, the development and learning was not able to keep pace with activities and in some cases timelines had to be adapted (examples being, application of the mobile app in the field, delivery of landcover maps used in decision-making, application of the new restoration methodology in PINs).

*Lessons learnt regarding impact-focussed research projects in Indonesia:*

Our project started at a point of transition for our research partner on the project (LIPI to BRIN) and during this transition, bureaucratic processes and administrative structures were being revised. Meanwhile, early in the project, there were updates to foreign research permit requirements and there was still a transitionary phase from post-Covid travel restrictions. All of these factors contributed to additional labour and uncertainty around processes. The new systems are now well-established and supportive but we would recommend projects finalise collaboration agreements swiftly and prepare permit-relate documents quickly to avoid delays at the outset of projects. This requires careful and detailed planning at proposal stage. Our project team now feels we have benefitted from this experience and developing long-standing collaborative partnerships between UK and Indonesian institutions will help to navigate future projects smoothly.

*Lessons learnt regarding project oversight, management, working in partnership and M&E:*

Our project benefited from a highly engaged and diligent team. Our monthly meetings helped to keep us on track with our programme of work and created an opportunity to discuss difficulties as they arose. Nonetheless, online meetings can be tiring and exacerbate language barriers, especially if connectivity was weak. Aspects that were particularly hard to achieve online were creative/brainstorming activities (e.g. developing concepts for the mobile app). Our in-person meetings were invaluable for us to deepen relationships, to have less-constrained time to discuss issues in depth and reach common understanding, and our online meetings also increased in efficacy after we had all met in person. The in-person visits also created an opportunity for the UK team to see how things are working on the ground and learn directly from local stakeholders and communities, and to be able to respond directly to questions and build trust.

We feel our project benefitted from the strong foundation of clear logical framework. It enabled a common understanding of what the project was trying to deliver, and a figure was created to visualise the log frame which also enabled us to communicate the project simply externally too. Our M&E expert created a framework for delivering evidence against indicators which helped, but further capacity building for all project partners around Darwin's M&E processes would still be beneficial. We created an online repository for sharing evidence and data – we selected the one that is approved by the lead organisation for online security reasons – however, there was a tendency for external partners to lose access for unclear reasons, so this was not always a perfect solution.

We reflected that GESI aspects could have been more explicitly embedded within our log-frame and activities so that the roles, aspirations and vulnerabilities of social groups (including women, youth, ethnic groups, elderly and disabled) were more completely understood at the outset. We experienced a significant growth in participation in youth and women representatives during the

project at both sites and this showed the value of deep engagement and facilitation with these groups.

Working across multiple organisations, with their own internal process and requirements, sometimes created a heavy bureaucratic burden. In future, we would consider the engagement of a dedicated project manager. Scheduling was sometimes challenging, taking into account different time zones, working with groups of people with high fieldwork/travel commitments and also misaligned cultural holidays, particularly in April directly ahead of reporting deadlines.

Despite some of the practical difficulties, we have been really inspired to work together towards this common goal, within a group where everyone is passionate and committed, and everybody has benefitted hugely from the sharing of skills and knowledge across the project.

## 7 Actions taken in response to Annual Report reviews

In each instance, full review reports have been shared with all partners and project participants via email and during meetings the key points have been summarised and the means for addressing feedback was discussed and co-agreed. The project team were also motivated by the many positive reflections we received in these reports, including the reflection that this is an important, timely and complex project – this feedback was valued because we were able to learn where our approaches were seen as successful and we were able to maintain these and improve in other areas with constructive feedback.

Each of reviews (following the Year 1 and Year 2 reports) asked that we address issues within the next reporting period (apart from financial adjustments). The key points of feedback primarily related to restoration type, species choices, knowledge associated to seed supply/propagation/nursery techniques and planting approaches, and the primary issues are summarised as follows:

1. Could the 'framework species method' (applied successfully in Thailand) be used in these sites, whereby a combination of species are planted simultaneously (including pioneers, species with high germination, growth and survival rates, and resilient climax and slow-growing species)?
2. Could different approaches to propagating pioneers be more successful? (e.g. the project might consider selecting seedlings that are < 20 cm tall, collecting in the wet season, growing in shade in containers on the nursery for six weeks or so, before hardening and planting out)
3. Is there potential to include more high value native forest species in these plantings in addition to the rare threatened and endangered species, to provide NTFPs and also enhance biodiversity? How are rare, threatened and endangered tree species selected; will their potential to enhance biodiversity will be considered? How much time is needed to study fruiting phenology, develop propagation protocols for these species, and trial their survival following transplantation?
4. Has the project considered contacting Kew, which might offer advice on issues related to seed supply, seed quality and protocols for forest restoration planning in the region?
5. What were the causes of variable survival rates across planted areas?

The framework species approach was mentioned in our Year 1 and Year 2 reviews. Our understanding of the framework species method is that a cohort of functionally diverse saplings are planted simultaneously to speed up the successional process. We agreed it is an interesting and promising approach for forest restoration, particularly where the objective is to return to a functional, diverse forest ecosystem. We also note that there have been examples of this being applied successfully in Indonesia (Elliott et al. 2023) and through follow-up conversations with Dr Kate Hardwick at Kew Gardens, a specialist in this method of restoration (January 2025) we are aware of new experiments in this field. Our judgement was that the framework species approach was not feasible or applicable for our sites at the time of conducting this project. Firstly, the target of our work was 'livelihood native forest' and 'agroforestry' under the scheme of forest types and land-uses presented in Di Sacco et al. (2021) [1] as opposed to 'restored native forest'. In our

community-led restoration contexts, social forestry permits are intended to target economic and livelihood improvement and the communities involved initially prioritised multi-purpose tree species where there was a good, known market. There is good understanding of the future benefits products from these species can bring, which incentivises members of the communities. Ecosystem service and conservation benefits of planting native forest species likely takes longer engagement and awareness raising. Secondly, the foundational knowledge and technical capacity was not available to us at the outset to be able to source and simultaneously plant the tree species with different successional niches – for example, we lacked relevant local species lists and their environmental niches, nursery and planting trials, phenology information and seed supply and collection systems and resources. We have identified an ongoing need with our project team and local collaborators and stakeholders to collate disparate knowledge and develop new knowledge in this area. We connected with another Darwin project specifically focussing on seed supply systems in SE Asia (DARCC-006) and have used this to co-develop a new project which will advance on the gaps that both Darwin projects have identified and the lessons learned.

Nonetheless, the project has looked for opportunities to bring greater native diversity in restoration and rehabilitation both in the immediate and longer terms. Engagement activities were undertaken to supplement agroforestry planting with additional native forest species. The engagement on this subject came earlier in our Aceh site because (i) the target of planting 20% RTE species was embedded in the project aims and (ii) protection and rehabilitation zones had already been defined, whereas in Bengkulu it was necessary to first secure community consensus around protection for remaining forest in the landscape. In our Aceh site, collecting seeds and wildings of pioneers and late-successionals, growing them in nurseries and planting them in the rehabilitation zone, formed part of the project activities. Local surveys of the vegetation supported identification of species for conservation and there was a particular focus on culturally important species (e.g. meudang jumpa has been used for timber for traditional houses, so was of local conservation interest). The lessons learned through the trialling can be used to upscale future activities. Through cross-learning within the project, the KKI Warsi team working in Bengkulu began engagement activities (Year 3) to raise awareness of native tree conservation. The community expressed a desire to initiate in situ conservation and propagation of the tenam tree (a dipterocarp tree considered to be *Anisoptera marginata,* based on Wiryono et al. 2019), which holds cultural significance as the tree from which the village derives its name. From January 2025, UNIB students attempted to grow harvested tenam wildings in a nursery in the village but unfortunately survival was very poor and additional nursery management techniques may be needed, including mycorrhizal inoculation (Annex 2.1g). Further vegetation survey work and ethnobotanical study can be used to identify other potential native forest species for planting. Furthermore, whilst the framework species approach (using mixed species planting) was not adopted, we identified opportunities for integrating native forest species into landscapes to support in situ plant conservation. Potential opportunities for the future included the use of native species as boundary markers (pinang used in this way in the Bengkulu site already); restoration in riparian corridors to support faunal movement and deliver ecosystem benefits including soil and water functions; development of local seed supply markets to deliver economic incentives for the labour. Further engagement and knowledge transfer would also be beneficial.

Causes of mortality are hard to definitively attribute, especially when it is not observed directly. However, variability in survival was deemed to have a number of sources. Firstly, there were instances of high mortality in the seedlings in the nursery in Aceh early in the project and this was attributed to low seed quality and/or disease in the batch of seedlings that were provided in-kind. Secondly, of the seedlings planted in the restoration area in Aceh, mortality was spatially variable and was attribute to several possible causes (i) land-owner time dedicated to maintenance, (ii) presence of grazing buffalo, (iii) possible environmental challenges (fluctuating water table; severe microclimate in open areas). Two land-owners, in particular, achieved high survival rates which demonstrates that more intensive maintenance and protection may be

required. Peer-to-peer learning amongst community members could help raise levels of success more broadly. The reviewers queried the difference in survival rates achieved between our sites in Aceh and Bengkulu. The Aceh site is less readily accessible to the land-owner communities so tending to seedlings requires an extra investment of effort, and secondly, the land-owners in Bengkulu were securing payments (via Jejakin) to maintain seedlings, meaning that overall the cost-benefit balance of seedling maintenance was more favourable in Bengkulu.

[1] Di Sacco et al. (2021) describe *livelihood native forest* as maximizing economic benefits to local communities while significantly increasing carbon sequestration, biodiversity and ecosystem services, compared with intensive monoculture plantations. Restoration and sustainable management of existing agricultural land, including through *agroforestry*, to provide a mix of carbon sequestration, biodiversity and livelihood benefits and reduce pressure on native forests.

## 8 Risk Management

A notable risk that emerged during the course of the project was the clearing for a new road to be constructed through the Air Tenam (Bengkulu) social forestry area which connects Air Tenam village to neighbouring villages and beyond to the main city in the subdistrict, Manna. Air Tenam villagers and the forest management unit (FMU) became concerned that this would significantly affect access to the surrounding land, potentially with new people entering the forest area, clearing and claiming customary land access. There were observations that this was indeed a growing pressure within the social forestry area. In response to this, project partner KKI Warsi and local villagers with support from the FMU established notices informing of the forest protection zones which have gained approval, following community engagement. Village patrols were established to alert any new clearance activity. With these mitigation measures in place, it is hoped this will act as a deterrent to any encroachment. The landcover map exercise serves as a baseline and can be repeated to demonstrate any changes. It is anticipated that previously cleared but now regenerating areas and secondary forest areas may be most at risk; new agroforestry plantings are less likely to be at risk because people observe the land to already have been claimed by another land-owner/user.

A known risk in restoration projects is the continued participation of community representatives and land-owners. In the Aceh site, the survival of seedlings was highly variable spatially, which may have arisen from a mix of ecological and social factors. Our project added further evidence that it is imperative that local participants drive the land-use decision making and are suitably incentivised and/or remunerated for the maintenance and monitoring in the medium to long term. Our project partner in Aceh also modified their approach in terms of securing land-owner commitment, and this will be useful for expansion of activities to new village areas. Being cognisant of potentially conflicting land uses (e.g. land being used for grazing and/or planting) is also critically important. In Bengkulu, the maintenance of the planted saplings has been supported and encouraged through additional payments. There have also been issues with seedling quality (low survival rates). These are common problems associated with restoration projects but warrant forward planning and mitigation approaches.

Seed source supply of native species, seed quality and high resource requirements are potential risks for raising the biodiversity value of the restored areas. There is a need to draw on province-level, in-country and international collaborative links to continue to develop and elaborate protocols for planning for the restoration zones, seed sourcing, nursery methods, planting, monitoring and maintenance. Market development for community nurseries could facilitate plant diversity conservation.

Ongoing free access to high resolution remotely sensed data had also been flagged as a risk and concern for reproducibility of landcover mapping for detailed habitat analyses and interventions planning.

## 9 Scalability and Durability

The core concept of our project was to develop a pipeline for community-led restoration activities, which centres on local decision-making and provides a flow of activities and tools to cover the full pathway of restoration from planning to delivery and accessing benefits. The tools that we

have developed are applicable beyond the two restoration areas that provided the context for development. The spatial prioritisation tool assists scaling of restoration activities by supporting provincial to national level decision-making around site selection for investments (e.g. Annex 1.2b,c), and there has already been NGO uptake (see Section 3, Output 1). Our project successfully delivered a reproducible workflow for landcover assessment used in land-use and intervention planning (Annex 1.4d) and could also be applied to landcover change assessments, and we identify the opportunity to further raise capacity in organisations in Indonesia using these remote sensing data and methods. We have applied for additional funding to apply these mapping methods across a broader landscape in Bengkulu which would connect the Air Tenam project area to other social forestry project areas within the Ulu Manna landscape. We have created a mobile monitoring app (TR3) which delivers an efficient solution to data capture and processing to support reporting for plant biodiversity and carbon in REDD+ and restoration projects. This has initially been created to be applicable to Indonesian projects beyond just our two case study sites, and with flexibility to accommodate different monitoring designs preferred by different NGOs and institutions. In the future, the app scope could be broadened as a pan-tropical project, for example, accommodating different species lists and languages. We have developed a restoration methodology (aligned to the PV Climate Standard) which provides a framework for projects globally to design and deliver GHG carbon removal projects via restoration approaches: having this accepted methodology allows project areas to consider a broader scope of activities, beyond the longer standing REDD+ approach, and will hopefully encourage scaling of these activities.

The two project sites have provided valuable exemplars to demonstrate the community-led restoration and rehabilitation approach and have highlighted areas where challenges may arise and where further knowledge, research and development would be beneficial. Showcasing the tools and exemplars to stakeholders has allowed them to visualise the benefits and scalability of the approach. Tangible evidence of this has been (i) vocalised support, communicated to higher levels of government, which helped to secure the attendance of officials at the national stakeholder meeting and (ii) support for the expansion of the approach to new social forestry areas and neighbouring villages. This scaling leverages the policy on expansion of social forestry areas (targeting c. 18 Million hectares under social forestry permits) and the emerging policy on the voluntary carbon market.

In discussions, stakeholders (government departments for watershed management and forest management) have expressed that they value the strengthened collaborative links between locally-acting NGOs, governmental departments and local communities, which has in part been supported through the activity of this Darwin Initiative project. Government departments often express a lack of resource to have locally-embedded community facilitators which are required to build relationships, trust and capacity in local communities and farmer groups. We believe that these local inter-institutional and cross-sectoral relationships will be sustained and that they are foundational to extending the spatial reach of the approach which has been developed.

Within the two project areas where the project activities (namely, Output 2 – Implementation) were conducted, project durability has been supported by the establishment of nurseries which can continue to be used to propagate trees to be planted within the landscapes. Capacity-building through restoration training and agricultural techniques should enable ongoing activities with less support, and through key advocates and peer-to-peer learning. Additional income-generation activities have been implemented which create further motivation (e.g. NTFP handicrafts; tree adoption scheme). If project areas progress through the Plan Vivo certification process (and the GoI legislation on the international allows), this will create a new income stream that requires long-term sustainability and commitment.

## 10 Darwin Initiative identity

The Darwin Initiative funding has been acknowledged throughout our work. In the first year's stakeholder meetings we included a slide in our introductory presentations to explain the nature and purpose of Darwin funding more broadly, to frame the context of our project objectives. In all presentations and stakeholder meetings, our slides have included the Darwin Initiative logo and reference made to the funding on acknowledgements slides (e.g. Annex CC_NS, stakeholder

meeting slides). For community-based events, printed banners have been sourced by FFI and KKI Warsi and these include the relevant logos; local community members with dedicated activities were also provided with Darwin branded uniform in Bengkulu. Similarly, presentations and posters at academic conferences have recognised the funding from Darwin Initiative with use of logos (see list below). PI (L Banin) incorporated the Darwin project as a case study within a Defra funded scoping study on monitoring biodiversity in low-middle income countries – Darwin funding was acknowledged with use of logos in two presentations and as a section with the written report.

Darwin Initiative is acknowledged within our online tools (spatial prioritisation; TR3 app). We also have project webpage hosted on the UKCEH website, which acknowledges Darwin funding support including the approved Darwin Initiative logo (https://www.ceh.ac.uk/our-science/projects/forest-restoration-indonesia) and we plan to update this webpage with latest outputs and links to tools.

The Darwin Initiative appears to be well known in Indonesia, especially in the third sector. The FCDO in Indonesia also coordinate the community interested in accessing Darwin funding – following a presentation to FCDO representatives the project lead was invited to contribute a presentation at an event to raise in-country capability to access Darwin funding but unfortunately was not able to attend due to clashing field schedules. A representative from FCDO joined our final national stakeholder meeting, offering opportunities for interaction between UK Government and other participating organisations and departments.

We did not ultimately pursue establishing a dedicated social media channel for the project. However, many of the project team members are active on various channels where field activities and stakeholder meetings were shared and we especially intend to share posts when our outputs become publicly available, at which point we will also link back to Darwin Initiative and BCF channels.

Finally, a photo taken during one of our field visits was selected as category winner in the British Ecological Society's photography competition, under the category Regenerative Agriculture (https://www.sciencefocus.com/nature/capturing-ecology-photo-24-winners) and proceeds shared back with community via the tree adoption scheme in Bengkulu.

**List of external presentations and publications where Darwin project is referenced/logo used**

*Raine EH, Purnama H, Primadona E, Yusuf F, Berry N, Olsen K, Struebig M, Banin LF*. High spatio-temporal resolution land cover mapping for community-led forest management in Sumatra. Poster presented at: *Trees for Climate Change, Biodiversity and People: British Ecological Society Conference*; 28*th* June 2023*;* University of Kent

*Struebig, MJ, Muenzel, D, Banin, LF, Budiharta S, Hutabarat J, Morgans C, Mumbunan S, Primadona E, Purnama H, Raine EH, Santika T, Voigt M, Winarni N, Supriatna J, Davies Z, Smith S.* Delivering on conservation, restoration and poverty alleviation goals in Indonesia's community forests. Talk presented at: *Trees for Climate Change, Biodiversity and People: British Ecological Society Conference*; 29*th* June 2023*;* University of Kent

Morag McCracken, Stephen Cavers, *Lindsay Banin*, Diana Bowler, Alex Bush, Helen Coskeran, France Gerard, Quentin Groom, Pete Henrys, Jane Hill, Maria Jarquin, Colin MacKechnie. Michael Pocock, Dan Read, Jill Thompson, Stephen Thackeray, Kelly Widdicks, Emily Williams, Helen Roy. Mapping and Monitoring Biodiversity for Low-Middle Income Countries, Part I: Scoping Exercise. Report to Defra, March 2024.

*Lindsay F Banin*, Strengthening community capacity for evidence-based forest restoration in Indonesia: Valuing Biodiversity in Restoration. Presentation at Mapping & Monitoring Biodiversity, Defra Scoping Study Workshop, Lancaster, March 2023.

*Lindsay F Banin*, Forest Restoration in SE Asia for biodiversity, climate and people: Lessons learned and future directions. 13th Chinese-German Workshop on Biodiversity and Ecosystem Services and 2nd Workshop for Young Researchers, Wuzhishan City, Hainan Province (online delivery), 7 November 2023.

*Lindsay F Banin*, Forest Restoration in SE Asia for biodiversity, climate and people: Lessons learned and future directions. IPB University, March 2024

*Lindsay F Banin*, Forest Restoration in SE Asia for biodiversity, climate and people: Lessons learned and future directions. University of Stirling Seminar Series, April 2024

*Lindsay F Banin,* Forest Restoration and Rehabilitation in SE Asia for biodiversity, climate and people. Invited Keynote, International Conference on Biology & Environmental Sciences (ICeBES): Aligning Biodiversity and Climate Initiatives for a Sustainable Future, November 2024

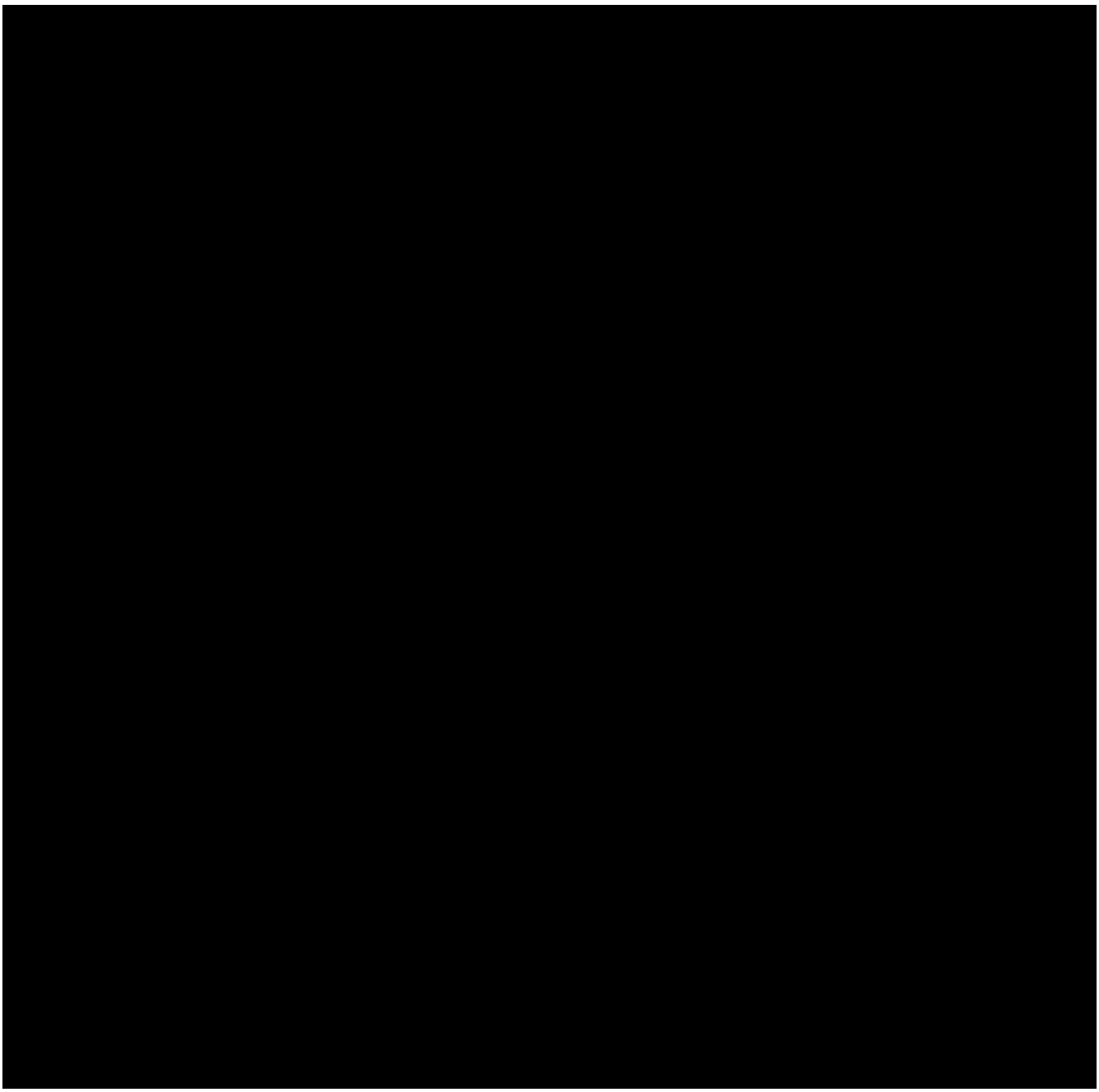
*Lindsay F Banin et al.* Strengthening community capacity for evidence-based forest restoration in Indonesia. British Ecological Society Conference; December 2024

*Liam J Hughes et al.* Assessing biodiversity in Sumatra's community-managed forests. British Ecological Society Conference; December 2024

*Liam J Hughes et al.* Assessing biodiversity in Sumatra's community-managed forests. International Congress for Conservation Biology (ICCB 2025); June 2025

*Struebig, MJ et al.* Delivering on conservation, restoration and poverty alleviation goals in Indonesia's community forests. International Congress for Conservation Biology (ICCB 2025); June 2025

## 11 Safeguarding



[redacted]

## 12 Finance and administration

### 12.1 Project expenditure

| Project spend (indicative) since last Annual Report | 2024/25 Grant (£) | 2024/25 Total actual Darwin Initiative Costs (£) | Variance % | Comments (please explain significant variances) |
|---|---|---|---|---|
| Staff costs (see below) | [redacted] | | | |
| Consultancy costs | | | | |
| Overhead Costs | | | | |
| Travel and subsistence | | | | |

| | | | | |
|---|---|---|---|---|
| Operating Costs | [redacted] | | | |
| Capital items (see below) | | | | |
| Others (see below) | | | | |
| **TOTAL** | **170,410.40** | **164,123.58** | | |

| **Staff employed (Name and position)** | **Cost (£)** |
|---|---|
| Lindsay Banin,UKCEH Project leader and lead for O3 | [redacted] |
| Beth Raine,UKCEH Spatial and biodiversity data analyst | |
| Financial Assistant, UKCEH Financial assistance | |
| Megan Williams,UKCEH Interdisciplinary scientist (app development) | |
| Eva Schoof,Project Manager & Restoration Standard CoordinatorPlan Vivo Foundation | |
| Caroline Stillman,Project Officer - Social Impact, Plan Vivo Foundation | |
| Matthew Struebig, Spatial Planning Coordinator, DICE, University of Kent | |
| M Roddini ,Project officer, KKI WARSI | |
| Hastina Purnama, Local facilitator, KKI WARSI | |
| Desrizal Alira, Agriculture specialistKKI WARSI | |
| Youngky Edwin, GIS and data base specialist, KKI WARSI | |
| Sri Hidayati, Gender specialist, KKI WARSI | |
| Dedi Kiswayadi, Aceh Project Manager, Fauna & Flora Intenational | |
| Radinal, Aceh Biodiversity and Restoration Senior Officer, Fauna & Flora Intenational | |
| Mahlizar, Aceh Community Development Officer, Fauna & Flora Intenational | |
| Teuku Boyhaqie, Aceh Restoration Project Officer, Fauna & Flora Intenational | |
| Anziani, Aceh Accountant, Fauna & Flora Intenational | |
| Nona Rajna, Aceh Admin Officer, Fauna & Flora Intenational | |
| Joseph Adiguna Hutabarat, Climate and Sustainable Financing Sr. Advisor, Fauna & Flora Intenational | |

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|---|---|
| Arief Hamidi,ID Nursery / Propagation ExpertFauna & Flora Intenational | [redacted] |
| Nindo Iqbal,ID MEL OfficerFauna & Flora Intenational | |
| Cahyo Nugroho,ID Country DirectorFauna & Flora Intenational | |
| Tita Mutia,ID Grant OfficerFauna & Flora Intenational | |
| Gareth Goldthorpe, UK Technical Specialist, Terrestrial, Asia Pacific, Fauna & Flora Intenational | |
| **TOTAL** | |

| Capital items – description | Capital items – cost (£) |
|---|---|
| NA | |
| **TOTAL** | 0 |

| Other items – description | Other items – cost (£) |
|---|---|
| UKCEH - two staff visas to travel to Indonesia<br>Kent - PhD stipend contribution (Kent-CEH via ARIES DTP)<br>Kent - PhD additional research cost contribution (Kent-CEH via ARIES DTP)<br>Warsi - Consumables (stationary, computer supplies, etc)<br>FFI - Communication | [redacted] |
| **TOTAL** | |

### 12.2 Additional funds or in-kind contributions secured

| Yr 3 Matched funding leveraged by the partners to deliver the project | Total (£) |
|---|---|
| Staff labour costs, Plan Vivo | [redacted] |
| Staff labour costs, BRIN | |
| Financial audit ([redacted]) | |
| Overheads co-funding, UKCEH | |
| Monitoring and Evaluation, KKI Warsi | |
| Overheads co-funding, Plan Vivo | |
| Overheads co-funding, University of Kent | |

| | |
|---|---|
| National travel, Plan Vivo | [redacted] |
| Travel, subsistence, fieldwork and visas, Uni of Kent | |
| Nursery costs, FFI | |
| PhD stipend, Uni of Kent | |
| **TOTAL** | |

| **Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project** | **Total (£)** |
|---|---|
| Mapping and Monitoring Biodiversity for Low-Middle Income Countries, funded by Defra, led by UKCEH | [redacted] |
| BREL-Borneo: Benefits of Biodiverse Restoration for Ecosystem and Livelihoods in Borneo, funded by Global Centre on Biodiversity for Climate, led by Royal Botanic Gardens Edinburgh, LFB role deputy PI. https://www.gcbc.org.uk/project/brel-borneo-benefits-of-biodiverse-restoration-for-ecosystems-and-livelihoods-in-borneo/ | |
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| | |
| | |
| **TOTAL** | |

### 12.3 Value for Money

Our project sought to be economical in several ways. Staff costs and overheads are more costly in the UK – through a roughly equitable division of the budget, we ensured good value for money. The project governance and division of roles and responsibilities allowed in-country partners to deliver much of the site-based work, reducing the requirement for international travel and subsistence for UK team members. Teams in both landscapes (Aceh and Bengkulu) employed staff to stay locally to the field sites to maximise interaction and engagement with local communities and minimise national travel. The field activities also benefitted from local stakeholder engagement to gain support by way of seedling provision. Local community participation was also integral to the project. The UK team travelled to Indonesia three times during the project; the Darwin project achieved economical and carbon-footprint efficiency when the project team were travelling to the SE Asia region to meet objectives of multiple projects during a single trip and international travel was covered by other budgets. We also maximised our activities and achievements during these trips because our itinerary enabled us to meet multiple objectives, including (i) visiting both field sites (ii) holding provincial stakeholder meetings and (iii) holding national-level stakeholder meetings and meetings to generate new collaborative interactions. We also benefitted from in-kind contributions, including involvement of UNIB and student participation in Bengkulu and through in-kind staff participation from BRIN.

We believe our project has demonstrated economic efficiency in terms of converting inputs to outputs. Our previous report reviews graded the project ‘on track to deliver’, demonstrating we have progressed the project in a timely way and in-line with plans. Through our own assessment against our log-frame (Section 3) we have largely delivered against all our objectives and our completion of the outputs are contributing to achievement of the stipulated outcome. In addition, there is very high potential for scaling up and replicating – the delivery of all the tools within our activity and output plans and pro-active engagement with externalities (e.g. carbon finance policy; systematic planning for restoration; Section 3) creates a legacy for the project and our work should support the expansion of other restoration activities. With development of tools now in place, future impact-focused projects could have a lower cost-per-beneficiary meaning larger projects could be feasible. KKI Warsi have developed another project in Bengkulu drawing on organisational learning from Darwin project, and engagement with other communities in both

landscapes has evidenced local interest and potential to scale. We have also sought opportunities to share learning and disseminate tools further, as described in Section 3. This Darwin-funded project offers good additionality - to our knowledge there are limited funding sources available that allow a projects which simultaneously fund research and development (required for developing tools, methods and ecological insight) whilst also delivering on the ground impact, and having the two elements facilitate and inform eachother.

Through our project, team members have greatly enhanced our stakeholder network with comparison to beginning of project, generating future opportunities to develop his work further. A notable example of this has been establishing a link with another Darwin project focussing on seed supply chains in SE Asia (project code DARCC-006).

The explicit GESI focus used in the Darwin project approach enabled the engagement of women and youth community groups and they expressed the additional positive impacts that had accrued to them as a result of the project, including raised capacity, confidence and in some cases roles that may not be typical of their gender (e.g. tree planting and tending).

## 13 Other comments on progress not covered elsewhere

## 14 OPTIONAL: Outstanding achievements of your project (300-400 words maximum). This section may be used for publicity purposes.

I agree for the Biodiversity Challenge Funds to edit and use the following for various promotional purposes (please leave this line in to indicate your agreement to use any material you provide here).

Intact tropical forests are carbon-rich, productive and diverse. Land-use change and resource extraction have degraded these functions in many parts of the tropics while large areas of forest have been lost completely, with consequences for native plant diversity and wildlife habitat. Forest restoration and rehabilitation presents an opportunity for the ‘triple-win’ – positive outcomes for biodiversity, climate change mitigation and people and this has been encapsulated in the UN Decade on Restoration and the targets of the Kunming-Montreal Global Biodiversity Framework.

However, restoration outcomes can strongly diverge, with many projects hindered by short funding cycles, insufficient long-term planning and challenges around delivering the monitoring to verify their success. Notably, projects that fail to empower local communities in their own land governance often fail to secure long-term success in restoration, particularly where local residents cannot derive or access benefits. Forest-dependent peoples make up a notable proportion of Indonesia’s population, and thus forest condition and human well-being are tightly connected. In Indonesia, there is a policy to scale-up land under social forestry permits, which enables community governance over resources. By facilitating restoration with income generation potential, social forestry project areas can contribute to conservation outside of existing protected areas (OECMs).

Our project developed tools and methods to support upscaling of community-led sustainable land management, rehabilitation and restoration. The project focussed on two implementation sites, one in Aceh Province and one in Bengkulu Province on the island of Sumatra. Our project considered the whole pathway, from restoration area planning, to implementation, monitoring and income generation, providing a model approach which could be applied in other locations elsewhere in Indonesia and worldwide. Specifically, we built an online tool to support multi-objective spatial prioritisation for determining new restoration project areas. To support with more local decision-making, we created a high-resolution mapping approach to guide community interventions planning. We built a new mobile app to make forest-based monitoring more accessible and efficient, particularly to local community users, by streamlining calculations for

monitoring, reporting and verification. Our project also developed a new Plan Vivo Restoration Methodology, to allow projects to access PES-based income from greenhouse gas removals associated with restoration.

The project was designed to be self-sustaining by formulating a process through which local communities can derive livelihood, well-being and economic benefits. Local land-users selected economically important tree species to deliver both ecosystem and livelihoods benefits but they also trialled propagation of native forest species, with a focus on culturally important species, and integrating these into the landscape by using them to mark customary land boundaries. Future Payments for Ecosystem Services (PES) may allow land-users to diversify the species planted and access another revenue stream, bringing economic resilience and stability, whilst allowing for more biodiverse tree communities.

*Options for high quality photographs and images on request.

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## Annex 1 Report of progress and achievements against logframe for the life of the project

| Project summary | Progress and achievements |
|---|---|
| **Impact**<br><br>Forest restoration in Indonesia achieves 'the triple win' of sustainable biodiversity conservation, carbon sequestration and enhanced livelihoods and governance outcomes. | The project has created a full pathway for delivering restoration in Indonesia, from planning to implementation, monitoring and income generation, using two exemplar sites, which serve as models that can be applied to other sites and used to scale up forest protection, restoration and rehabilitation activity in Indonesia and elsewhere. The tools and methods produced will facilitate this scaling, ensuring lasting impact of the project.<br><br>The project has identified several important opportunities for income generation in community managed forests and lands, whilst applying sustainable land management practices including forest protection and restoration in two exemplar landscapes. The project has created steps towards potential layered income generation from multi-purpose tree species production, non-timber forest products, community nurseries and Payments for Ecosystem Services (PES). Such progress will help enable community participation in implementing Target 2 of the KM-GBF and ensure that local community and indigenous people's needs are simultaneously met. |
| **Outcome**<br><br>High-quality and sustainable ecosystem restoration is delivered on social forestry and degraded forest land in Aceh Province and Bengkulu Province delivering climate, biodiversity and socio-economic co-benefits | |
| Outcome indicator 0.1: In 2 community forest areas in Sumatra, at least 130 hectares of land have received sustainable land management practices (ICF KPI 17) and tree cover (stem density) is enhanced[1] with at least 5000 surviving trees as a result of multi-objective restoration activities by end of project, and with 4 additional villages committed to sustainable management practices/rehabilitation at the close of the project. | Two community forest areas, in Aceh and Bengkulu provinces, were the focus of the project. 370 hectares received sustainable land management practices (Section 3.2 details our assessment against ICF KPI 17). Within these areas, over 61 hectares included the intervention of tree planting and 13,592 surviving trees were added between the two landscapes (evidence provided in Section 3.2; Annexes 2.1-2.2). In Aceh, there are opportunities to extend the beneficiary areas to 3 additional village forest areas (Mane, Blang Dalam and Turue Cut) who have already been engaged, with community consent and commitment co-agreed as part of Output 4's process (Annex 4.5a) and with a broader area for project extension (Pidie; Pidie Jaya). In Bengkulu, engagement activities were held with an additional 4 villages with social forestry permits within the Ulu Manna landscape (referenced as the broader project area in Annex 4.5b) and the team have applied for some additional funding to continue this engagement. |

| | |
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| Outcome indicator 0.2: Well-being of smallholders and forest-dwelling communities (8624 people) in at least 2 community forest areas will be similar or improved relative to baseline, as a result of multi-objective restoration activities and access to community-based restoration payment for ecosystem services (PES) by end of project, with a remaining 4 villages engaged to participate at the close of the project. | Endline wellbeing assessment was completed in each partner village through Participatory Wellbeing Assessments (March 2025; Annexes 0.2a,b). Levels of wellbeing were reported to have increased or remained similar across the 4 villages at the end of the project. In Aceh, the proportion of the population considered to have moderate and 'capable' wellbeing were reported at 20-55% in Aceh in 2025 compared with 20-23% in 2022. The proportion of people considered 'poor' and 'extremely poor' was reported as 77-80% in 2022 compared with 45-80% in 2025. In Air Tenam, qualitative assessments indicated that although poverty levels remained high, the project had helped participants to feel empowered and improved skills levels as a result of inclusion in project activities, participatory approaches and regular engagement with the community facilitator. In both project areas, the process of undertaking the PWB assessment was an opportunity for people to think more deeply about the factors that made them feel relatively more poor or 'capable'. In all villages, the criteria and thresholds were amended between the baseline and endline assessment to some extent to reflect this understanding and self-reflection (Annexes 0.2a,b; Section 3.2 and Poverty Alleviation section; additional villages to participate are described under Outcome 0.1 above). Key interventions to alleviate poverty in the medium-to-longer term have included (i) improved governance arrangements, (ii) MPTS planting for future harvesting, (iii) handicraft production, (iv) raised skill and capacity, (v) tree adoption and tree planting finance schemes and (vi) process initiated for PES certification. |
| Outcome indicator 0.3: Increasing abundance of at least 3 species of each (i) native forest (or RTE) and (ii) native economically-important tree species across at least 130 hectares, contributing to improved plant biodiversity by end of the project in 2 community forest areas. Opportunities identified for future protection and enhancement of native flora and fauna. | The project activities increased the abundance of 3 genera (at least 3 species) of native forest species (*Beilschmedia, Shorea* and *Dipterocarpus*). Activities included locating and observing 34 mother trees and using forest patrols to survey for wildings; harvesting wildlings and raising them in nurseries and out-planting (Annexes 2.1d;2.1_2b). The project also increased the abundance of four native economically-important species – *Durio zibethinus* (durian); *Archidendron pauciflorum* (jengkol); *Parkia speciosa* (petai) and *Areca catechu* (pinang). (See Section 3.1, 3.2 and Annexes 2.1-2.2). The planting happened in an area exceeding 85 ha (see Section 3.2 for details).<br><br>The project identified opportunities for incorporating greater diversity into restoration through (i) identifying culturally important and useful species, (ii) incorporating native forest trees as boundaries and green fences, (iii) restoring in riparian corridors as land-owners recognised the importance of protecting against soil erosion, landslides and protecting water quality, (iv) identifying income streams (e.g. tree adoption schemes and community nurseries). |
| Outcome indicator 0.4: Viable model[3] for income generation from multi-objective restoration, developed in collaboration with stakeholders, and piloted in Aceh Province and Bengkulu Province. | The project has explored and provided alternative routes to finance through restoration and sustainable forest management activities, supporting planting of economically valuable tree species on community-managed land, and working closely with the Government of Indonesia to deliver a functioning VCM process |

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| | that is applicable to social forestry designated land in Indonesia, and delivers a route to equitable community finance. Indications are that the VCM for Social Forestry will be launched in coming months and that the Plan Vivo Standard will be approved as part of that – allowing the focal landscapes of this Darwin-supported project to benefit from the high integrity carbon market. Project documentation towards achieving Plan Vivo certification has also progressed with an approved PIN for Aceh (May 2025) and an approved PIN, and first draft PDD (June 2025) for Bengkulu (Annexes 4.5a-c). Certified projects will be able to issue and sell carbon credits on the voluntary carbon market. Additional sources of income have been identified under Outcome 0.2 above. |
| **Output 1. Restoration planning**: Coproduced spatial prioritisation and community land management & intervention plans for two project areas and improved local capability for delivering restoration with multiple objectives | |
| Output indicator 1.1 Two province-level participatory stakeholder workshops held where engagement with participants resulted in defining restoration objectives and identification of data needs for spatial prioritisation (yr1) | Provincial stakeholder meetings were held in year 1 of the project, generating new knowledge for the project team as to how restoration and rehabilitation is planned, financed and actioned through different interacting agencies and organisations (see Section 3.1 Output 1; Annexes 1.1a, b yr1). |
| Output indicator 1.2 Spatial prioritisation framework developed, databases collated and priority areas for restoration identified on community and government land in Bengkulu and Aceh Provinces (yr1) | Data sources were assembled and tool developed and made available online at https://darwinforestrestoration.shinyapps.io/Sumatra/ (overviews given in Annexes 1.2a,c,b and details given in draft paper Annex 1.2b). The tool has been disseminated through a series of provincial and national stakeholder meetings and via small group meetings with end-user NGOs. |
| Output indicator 1.3 Community consent achieved through at least four participatory community workshops and focus group discussions to identify restoration objectives, representing the view of women, men, cultural and age groups and where at least 30% of the participants are women (yr1) | Continued engagement with communities in Bengkulu and Aceh identified priority areas and species for restoration (including RTE and MPTS) species (Annexes 1.3a-e; 2.1a,b,c). Efforts have been made to extend benefits and involve more members of the communities at both sites, and to engage new villages by sharing the project activities and outcomes. In Bengkulu, priorities of women and youth have been integrated into project design through specific interventions. In Aceh, the project continues to promote participation of women, with 40% women involved in monitoring activities (although <30% in other meetings as landholders are predominantly men). Further local stakeholder and participant engagement occurred to prepare the PINs and draft PDD (see also Output 4; Annexes 4.5a,b) |
| Output indicator 1.4 Community land management plan objectives reflect socio-economic, biodiversity and long-term restoration benefits and prioritise | The Warsi team (Bengkulu landscape) worked with the local community to identify customary land parcel ownership and usage, identified drivers for shifting cultivation, and facilitated the agreement of establishing 'protection zones' (Annexes 1.3d,e; 1.4; referred to in 4.5c), supported by remote sensing |

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| interventions at the project-site scale and including at least 20% RTE (rare, threatened, endangered) species (yr 1) | analyses on forest condition (Annex 1.4a-d). The Bengkulu PIN (Annex 4.5b) details the project interventions and objectives linked to forest protection and restoration (including planting, maintenance, monitoring and patrols), as well as supporting socio-economic benefits through processing MPTS products (a priority for women), ecotourism (a priority for youth) and tree adoption – with the aim of bringing PES benefits. In Aceh, local scale restoration planning required checking through drone survey, ground-based spot checks (Annex 1.4a) and discussions with the local communities to understand current land-use, to inform decisions as to appropriate interventions. Local stakeholder and participant engagement occurred to prepare the PINs, draft PDD (Bengkulu) and to secure longer-term management plans (Aceh) (see also Output 4; Annexes 4.5a,b) |
| Output indicator 1.5 At least 50 community and government representatives attend two-day training workshop in restoration management (25 in year 1, 25 in year 2) | In Aceh, in year 1, 33 women and 21 men received nursery management training and in year 2, 22 people attended a training workshop on tree planting and maintenance and pest control including landowners and representatives from village and mukim government. The training included practical sessions on tree maintenance such as clearing grass around trees, applying fertilizer, and checking for pests and diseases (Annex 1.5a-c). In Bengkulu, in year 2, 5 women and 26 men received trying in mobile applications relevant to restoration activities (KARLON and AVENZA). 3 men received training in coffee cultivation and 15 women and 1 man received training on developing organic fertiliser (Annex 1.5b). In the third year, 14 women and 5 men received training on resam weaving (non-timber forest product) (Annex 1.5c). |
| **Output 2. Restoration action:** two project areas with seedlings planted, protected and/or maintained | |
| Output indicator 2.1 At least two nurseries established to process c. 10,000 seedlings with at least 20% RTE species (the remainder are multipurpose tree species) (yr1-2) | Six nurseries were established and stocked with four native multi-purpose tree species and non-native coffee and avocado (Pulo Kawa, Lutueng, Blang Dalam, Mane and Turue Cut in Aceh and Air Tenam in Bengkulu) (Annexes 2.1-2.2).<br><br>In Aceh, 34 potential mother trees (RTE species) were regularly surveyed and additional patrol-work was used to survey for wild seedlings to enhance diversity in restoration areas. 400 meudang puteh trees were raised in nurseries of which 300 survived and were planted to restoration sites; a further 70 seedlings (mixed RTE species) were collected to be nurtured in the nursery prior to transplanting. In the final year of the project a further 168 surviving RTE trees (Shorea, Dipterocarpus and Beilschmiedia spp) were planted into restoration areas (Annex 2.1_2b). In Bengkulu, attempts were made to raise wildlings of Anisoptera marginata in village nursery but were not successful (Annex 2.1g). |

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| Output indicator 2.2 At least 130 ha planted, weeded and protected in two case study areas (yr2-3). More than 500 ha allocated to ongoing and future restoration activities (yr3) | Seedlings were planted, maintained and monitored, adding in excess of 13,592 trees to the landscapes within an area exceeding 85 ha (detailed under Outcomes 0.1 & 0.3).<br><br>The approved PIN documents (Annexes 4.5a,b) refer to the broader landscapes and social forestry permit areas where it is hoped protection and restoration activities will be extended. 3 villages in Aceh and 4 villages in Bengkulu have been engaged. The social forestry permit areas across both landscapes exceed 10,000 hectares, but only some of this area will be appropriate for restoration activities, since some will fall into protection zone. |
| **Output 3. Restoration monitoring:** mobile-based application enabling robust and efficient monitoring of restoration objectives, developed for use in community-managed forests | |
| Output indicator 3.1 One multi-stakeholder needs assessment to inform design of restoration monitoring tool (yr1) | Online survey disseminated to project partners/stakeholders and results analysed to inform basic app requirements. Consultation meetings held to inform design (using digital mock-up) and co-design process ensured calculations and reporting tools within the app would be suitable for carbon-based project MRV applications. |
| Output indicator 3.2 Restoration monitoring tool developed in collaboration with stakeholders through two codesign workshops (yr1-2) | Beta version of the app is available at https://tr3.app.flumens.io and detailed in Section 3.2, Output 3. |
| Output indicator 3.3 Training of at least 50 community forest monitoring team members provided where at least 30% of the participants are women (yr2) | In Aceh the F&F team conducted training with local community members to support them in planting, monitoring and maintaining planted seedlings in September 2023 (Annex 1.5a; 3.3). A further 10 youths (40% women) received training in on tree measurement and data sheet completion in November 2023.<br><br>Online training for the camera trap data analysis was conducted in September 2023, delivered by the University of Kent team and attended by 5 of the KKI Warsi staff. |
| Output indicator 3.4 Baseline assessment (yr1-2), and annual monitoring and replacement re-planting conducted (yr3) | Plot-based monitoring in Aceh covered baseline and endline assessments with the rehabilitation zone in Lutueng, with random sampling plots established in planted areas and natural regeneration areas. Pioneer tree species were most abundant in both areas with some changes in the most abundant species and due to the planting of MPTS (Annexes 3.4a-d). Plot-based monitoring in Bengkulu was delivered in yr 3, producing a new baseline, relevant to the ongoing (after project end) carbon-based project and improved knowledge of the tree species of conservation interest in the protected zones of the social |

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| | forestry area (Annex 3.4f). Sampling design in both landscapes was facilitated by drone and remote sensing analyses conducted under indicator 1.4.<br><br>Monitoring of planted trees was conducted approximately annually in both project areas and contributed to adaptive management approaches and reporting under Output 2. |
| Output indicator 3.5 Baseline assessment of vertebrate fauna (mammals, birds), including species of conservation concern, via ground surveys and remote-sensing technologies (camera trapping) conducted (yr 2-3) covering at least 10,000 hectares across two study landscapes. | Camera traps were deployed (March-November 2024) on a 1 km grid, covering social forestry project areas and adjacent intact forest (Annexes 3.5a-c yr3) to survey mammalian fauna covering an area of 10,100 ha (4,000 ha in Bengkulu and 6,100 ha in Aceh). Additional data were supplied from the protected forest area in Aceh, raising the observation area to 16,000 ha, providing a new faunal biodiversity baseline survey for these areas. 31 mammal species were detected overall, with 3 species unique to social forestry areas and 4 species unique to protected forest areas. Bird surveys (ground transects and acoustic monitoring) will be analysed as part of the ongoing PhD work affiliated to the project. |
| **Output 4. Restoration income generation:** Model to incentivise communities through income generation from restoration is developed and available to community-managed forest PES projects | |
| Output indicator 4.1 Cost-benefit analysis of community managed restoration (considering benefits from restoration planting over time, payments for ecosystem services (PES) models, and optimisation of ecosystem restoration) demonstrates short, medium and long-term income from restoration at two community forestry sites in Aceh and Bengkulu Provinces (yr 1) | A cost-benefit analysis was reported in year 1 to assess potential for community managed restoration projects to benefit under PES schemes (Annex 4.1 yr1). It revealed that requirements for social and biodiversity outcomes within project plans help to ensure efficacy, and these factors need to be incorporated in the fair setting of prices. Lack of publicly available data was a recognised constraint in full quantification of costs. |
| Output indicator 4.2 Market analysis of multiple PES for restoration options in Indonesia undertaken and provides options for design of PES model (yr1) | A market analysis was reported in year 1 to assess market potential across a range of PES schemes (Annex 4.2 yr1). At the time of project delivery against this indicator, biodiversity credit market was still incredibly novel. It is still rapidly evolving, with few case studies of active biodiversity credit projects in Indonesia. As such, knowledge around the market is still developing. Plan Vivo launched their biodiversity credit methodology whilst this project has been live. UK's FCDO in Indonesia has engaged with our project via several meetings and email exchanges as Indonesia's interest in the biodiversity credit approach gains pace and there may be future associated policy. In addition, within the framework of this project, the Plan Vivo team have shared method and benefit comparisons between the PV Climate (carbon focus) and PV Nature |

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| | (biodiversity focus) methodologies to enable local facilitators to take informed decisions. |
| Output indicator 4.3 One stakeholder consultation (involving Indonesian and Plan Vivo global stakeholders) to inform design of adapted Plan Vivo 'restoration' Standard (yr1) | As per Plan Vivo procedures, a concept note for the revised restoration module was submitted to the Plan Vivo secretariat and Technical Advisory Committee and reviewed by the Plan Vivo Technical Review Panel in Q4 of 2023. A Working Group meeting was held in Jan 2024 to discuss a revised version of PU001 to address issues raised related to estimating woody biomass. The Working Group provided feedback, and final changes were incorporated into a final version which was submitted to Plan Vivo for review and approval by mid-May 2024. |
| Output indicator 4.4 Adapted Plan Vivo 'restoration' Standard to secure payments for ecosystem services from demonstrated restoration impact drafted and quality assured (yr2) | The restoration standard passed through Plan Vivo's internal and external review process and revisions were undertaken to respond to queries and approved. The methodology is now publicly available online and ready for uptake by projects seeking to take a 'GHG removals' approach to PV Climate projects (Annex 4.4). Teach-in sessions have been delivered through online meetings to support project partners in applying the methodology. |
| Output indicator 4.5 Access to PES extended to at least 250 small holders and/ or forest-dwelling community members in Aceh and Bengkulu Provinces with at least 2,500 planned beneficiaries from equitable benefit sharing mechanism (yr 3) | The Project Idea Notes (PINs) submitted, reviewed and approved through Plan Vivo's process outlines 9085 beneficiaries (2341 households) across three villages in Aceh and 473 beneficiaries within the HTR and HKm social forestry management groups (intersecting with 180 people and 50 households within Air Tenam village) in Bengkulu. As such, it is estimated that the two PES projects could benefit at least 9558 participants. The PINs also outline project development opportunities which extend activities into a broader portion of the landscape, incorporating additional households and beneficiaries. |

## Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed)

| Project Summary | SMART Indicators | Means of Verification | Important Assumptions |
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| **Impact:** Forest restoration in Indonesia achieves 'the triple win' of sustainable biodiversity conservation, carbon sequestration and enhanced livelihoods and governance outcomes. (Max 30 words) | | | |
| **Outcome:**<br>(Max 30 words)<br>High-quality and sustainable ecosystem restoration is delivered on social forestry and degraded forest land in Aceh Province and Bengkulu Province delivering climate, biodiversity and socio-economic co-benefits | 0.1 In 2 community forest areas in Sumatra, at least 130 hectares of land have received sustainable land management practices (ICF KPI 17) and tree cover (stem density) is enhanced[1] with at least 5000 surviving trees as a result of multi-objective restoration activities by end of project, and with 4 additional villages committed to sustainable management practices/rehabilitation at the close of the project. | 0.1 Land-use change assessment; baseline and annual monitoring of vegetation recovery | Indonesia remains committed to its stated goals on poverty alleviation, restoration,<br>community-managed land and addressing climate change.<br>Ongoing support from key government institutions (Ministry of Environment and Forestry; Ministry of Land Use and Spatial<br>Planning) for involving influential thinkers among their staff at national and local levels in our sequential workshop in spatial planning consultation processes.<br>There will not be any large-scale mortality events (e.g. severe drought, fire) which affect ecological restoration |
| | 0.2 Well-being of smallholders and forest-dwelling communities (8624 people) in at least 2 community forest areas will be similar or improved relative to baseline, as a result of multi-objective restoration activities and access to community-based restoration payment for ecosystem services (PES) by end of project, with a remaining 4 villages engaged to participate at the close of the project. | 0.2 Baseline and end-of-project surveys of socio-economic benefits, including context-specific<br>wellbeing indicators<br>(disaggregated by gender). Indicators and success criteria developed in collaboration with community partners in year 1 following a participatory wellbeing assessment approach. | |
| | 0.3 Increasing abundance of at least 3 species of each (i) native forest (or RTE) and (ii) native economically-important tree species across at least 130 hectares, contributing to improved plant biodiversity by end of the project in 2 community forest areas. Opportunities identified for | 0.3 Baseline and annual rehabilitation monitoring reports, baseline biodiversity assessments.<br>Foundational and knowledge generating activities around reference plant communities, collection and | |

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| | future protection and enhancement of native flora and fauna. | propagation established for future planting and *baseline faunal assessments*. | |
| | 0.4 Viable model[3] for income generation from multi-objective restoration, developed in collaboration with stakeholders, and piloted in Aceh Province and Bengkulu Province. (Value of ecosystem services generated or protected – aligned with ICF KPI 10). | 0.4 Plan Vivo Restoration (PES) Standard, enabling PES income for community managed restoration, is produced and piloted within Indonesia. Cost benefit analysis and market analysis. | |
| **Outputs:**<br>**1**. **Restoration planning**: Coproduced spatial prioritisation and community land management & intervention plans for two project areas and improved local capability for delivering restoration with multiple objectives | 1.1 Two province-level participatory stakeholder workshops held where engagement with participants resulted in defining restoration objectives and identification of data needs for spatial prioritisation (yr1) | 1.1 Stakeholder workshop proceedings (Q2, yr 1) | Multiple stakeholders continue to see value in the process<br><br>Agreement reached on multi-objectives and management<br><br>Community forestry representatives and government extension workers available to attend training |
| | 1.2 Spatial prioritisation framework developed, databases collated and priority areas for restoration identified on community and government land in Bengkulu and Aceh Provinces (yr1) | 1.2 Maps of priority areas for restoration activities; scientific publication of spatial modelling (Q2, yr 1) | |
| | 1.3 Community consent achieved through at least four participatory community workshops and focus group discussions to identify restoration objectives, representing the view of women, men, cultural and age groups and where at least 30% of the participants are women (yr1) | 1.3 Community workshop proceedings and statement of intent (FPIC), with participants list disaggregated by gender and cultural groups (Q3, yr 1) | |
| | 1.4 Community land management plan objectives reflect socio-economic, biodiversity and long-term restoration benefits and prioritise interventions at the project-site scale and including at least 20% RTE (rare, | 1.4 Community and government management plans, reflecting needs of women and men, for two restoration implementation landscapes (Q4, yr 1) | |

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| | threatened, endangered) species (yr 1) | | |
| | 1.5 At least 50 community and government representatives attend two-day training workshop in restoration management (25 in year 1, 25 in year 2) | 1.5 Training attendance and attendee feedback,<br>disaggregated by gender (Q2, yr 2) | |
| **2. Restoration action:** two project areas with seedlings planted, protected and/or maintained | 2.1 At least two nurseries established to process c. 10,000 seedlings with at least 20% RTE species (the remainder are multipurpose tree species) (yr1-2) | 2.1 Project activity reports (including nursery photographs; reports on seedling provision/<br>wildling collection) (Q2, yr 2) | Selected seedlings/restoration materials available.<br><br>Activities are not interrupted by major natural hazards (e.g. El Niño drought) |
| | 2.2 At least 130 ha planted, weeded and protected in two case study areas (yr2-3). More than 500 ha allocated to ongoing and future restoration activities (yr3) | 2.2 Project area maps; land management plans; bi-annual<br>monitoring records to document planted trees (Q3, yr3). Minutes from community meetings. | |
| **3. Restoration monitoring:** mobile-based application enabling robust and efficient monitoring of restoration objectives, developed for use in community-managed forests | 3.1 One multi-stakeholder needs assessment to inform design of restoration monitoring tool (yr1) | 3.1 Restoration monitoring needs<br>assessment report (Q2, yr 1) | Multiple stakeholders continue to see value in the process<br><br>Community forest representatives and government extension workers available to<br>attend training |
| | 3.2 Restoration monitoring tool developed in collaboration with stakeholders through two codesign workshops (yr1-2) | 3.2 Co-design workshop proceedings (Q4, yr1) and delivery of open-source monitoring tool (Q4, yr 3) and accompanying documentation and leaflet | |
| | 3.3 Training of at least 50 community forest monitoring team members provided where at least 30% of the participants are women (yr2) | 3.3 Training attendance and assessment disaggregated by<br>gender (Q2, yr 2) | |
| | 3.4 Baseline assessment (yr1-2), and annual monitoring and replacement re-planting conducted (yr3). | 3.4 Monitoring reports to show changes in vegetation structure relative to baseline (Q2 yr 2; Q3 yr 3) | |
| | 3.5 Baseline assessment of vertebrate fauna (mammals, birds), including species of conservation concern, via ground surveys and remote-sensing technologies (camera trapping) conducted (yr 2-3) covering | 3.5 Survey report, draft manuscript for peer review, database | |

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| | at least 10,000 hectares across two study landscapes. | | |
| **4. Restoration income generation:** Model to incentivise communities through income generation from restoration is developed and available to community-managed forest PES projects | 4.1 Cost-benefit analysis of community managed restoration (considering benefits from restoration planting over time, payments for ecosystem services (PES) models, and optimisation of ecosystem restoration) demonstrates short, medium and long-term income from restoration at two community forestry sites in Aceh and Bengkulu Provinces (yr 1) | 4.1 Cost-benefit analysis report for community managed restoration, including gender analysis (Q3, yr 1) | Multiple stakeholders continue to see value in the process, supported by the cost-benefit analysis<br><br>Co-benefits from nature-based PES certification schemes continue to command high market prices and demand for high quality PES credits (including from restoration in Indonesia) continues to grow. |
| | 4.2 Market analysis of multiple PES for restoration options in Indonesia undertaken and provides options for design of PES model (yr1) | 4.2 Market analysis report and recommendations for PES model (Q3, yr 1) | |
| | 4.3 One stakeholder consultation (involving Indonesian and Plan Vivo global stakeholders) to inform design of adapted Plan Vivo 'restoration' Standard (yr1) | 4.3 Stakeholder consultation records and design document (Q4, yr 1) | |
| | 4.4 Adapted Plan Vivo 'restoration' Standard to secure payments for ecosystem services from demonstrated restoration impact drafted and quality assured (yr2) | 4.4 Draft Plan Vivo 'restoration' Standard peer and reviewed and approved by the Plan Vivo Technical Committee (Q4, yr 2). | |
| | 4.5 Access to PES extended to at least 250 small holders and/ or forest-dwelling community members in Aceh and Bengkulu Provinces with at least 2,500 planned beneficiaries from equitable benefit sharing mechanism (yr 3) | 4.5 Project Idea Note (PIN) submitted (Q1, yr3) and draft Project Design Documents (PDDs) detailing beneficiaries and co-developed equitable benefit sharing mechanism prepared (Q4, yr3) for at least two community forests in Aceh and Bengkulu Provinces. | |
| **Activities** (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1) | | | |

**Output 1: Restoration planning**

Activity 1.1: Workshops and stakeholder engagement to define restoration objectives and data needs for spatial prioritisation (yr1).

Workshops will be held in each of the two provinces to maximise stakeholder engagement.

Activity 1.2: Collation of appropriate datasets, produce a spatial prioritisation workflow and conduct multi-objective spatial prioritisation analysis to assess synergies and trad-offs

Activity 1.3/4: Focus Group Discussions and village meetings to confirm community consent and to develop community land management plan applying the 'intervention continuum approach' and guiding principles for supporting diversity, as well as local and traditional knowledges, including at least 20% RTE (rare, threatened, endangered) species (yr 1-2)

Activity 1.5: Training workshops to ensure sustained capacity in restoration activity management within two case study landscapes.

**Output 2: Restoration action**

Activity 2.1: Constructing two tree nurseries in the targeted villages (yr2)

Activity 2.2: Tree planting, weeding, protection and maintenance including re-planting to replace lost stems (yr 2)

**Output 3: Restoration monitoring**

Activity 3.1: Conduct a user needs assessment and review of existing tools, involving the project partnership team, consultants and relevant stakeholders, in alignment with Activities 1.4 (land management plan), 4.3 and 4.4 (development of the restoration standard)

Activity 3.2: Hold co-design workshops with relevant stakeholders and community representatives to develop app features in detail (yr1-2).

App development undertaken in collaboration with consultant, Flumens Ltd.Activity

Activity 3.3: Undertake training to build capacity with community membership to understand and use the forest monitoring tool and supply feedback to make improvements to the tool (yr2)

Activity 3.4: Baseline assessment, including survey of naturally regenerating seedlings and mother trees to support recovery of native species and diversity within project areas, and annual monitoring conducted in years 2 and 3.

Activity 3.5: Baseline biodiversity surveys in both landscapes

Activity 3.6: Mobile app dissemination and feedback

**Output 4: Restoration income generation**

Activity 4.1: Cost benefit analysis, including diverse restoration income sources from restoration activities and PES markets, to inform design of PES model in Indonesia

Activity 4.2: Market analysis, in Indonesia and globally, to inform design of PES model

Activity 4.3: Stakeholder consultation to inform design and quality assurance of the Restoration Standard.

[1] Tree cover (as quantified by mutually agreed vegetation metrics) is greater than baseline.

[2] Socio-economic benefits will be increased relative to baseline (indicators and success criteria will be agreed with community partners). Key benefits will include economic (income and employment), socio-political (knowledge and skills gained, as well as increased voice, agency and inclusion), and ecological (restoration and sustainable use of natural resources).
[3] A viable model is one that (a) ensures that income from PES and multi-objective restoration covers project operational costs and delivers tangible livelihood benefits, and (b) is commercially viable. This will be measured through the cost benefit analysis and market analysis.

# Annex 3 Standard Indicators

## Table 1 Project Standard Indicators

Note that selection and monitoring of DI Standard Indicators was based on Version 1.0. As far as possible we have reduced these to be compatible with the Version 2.1 provided in the current guidelines.

| DI Indicator number | Name of indicator | Project Indicator (if relevant) | Units | Disaggregation | Year 1 Total | Year 2 Total | Year 3 Total | Total achieved | Total planned |
|---|---|---|---|---|---|---|---|---|---|
| DI-A03 | Number of local organisations with enhanced capability and capacity | 1.4 | Number of organisations | Indonesia | 4 | Ongoing | Ongoing | 4 | 4 |
| DI-A03 | Number of national organisations with enhanced capability and capacity | 0.1, 0.2, 0.3, 0.4 | Number of organisations | Indonesia | 2 | Ongoing | Ongoing | 2 | 2 |
| DI-A04 | Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training. | 0.1, 0.2, 0.3, 0.4, 2.1, 2.2 | Number of people | Indonesia, Women, IPLC | 35 | 9 | 20 | 58 | 25 |
| DI-A04 | Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training. | 0.1, 0.2, 0.3, 0.4, 2.1, 2.2 | Number of people | Indonesia, Men, IPLC | 35 | 51 | 45 | 51 | 25 |

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| DI-A04 | Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training. | 0.1, 0.2, 0.3, 0.4, 2.1, 2.2 | Number of people | Indonesia, Youth, IPLC | 0 | 4 | 7 | 7 | 0 |
| DI-A04 | Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training. | 0.1, 0.2, 0.3, 0.4, 2.1, 2.2 | Number of people | Indonesia, Women, Non-IPLC | 7 | 9 | 11 | 11 | 5 |
| DI-A04 | Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training. | 0.1, 0.2, 0.3, 0.4, 2.1, 2.2 | Number of people | Indonesia, Men, Non-IPLC | 7 | 5 | 10 | 12 | 5 |
| DI-B03 | Number of new or improved community management plans available and endorsed [by a third party] | 4.5 | Number | Indonesia, New | 0 | 0 | 2 | 2 | 2 |
| DI-B05 | Number of people with increased participation in governance[1] | 4.5 | Number of people | Indonesia, Women, IPLC, New | 0 | 0 | 4,945 | 4,945 | 4,312 |

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| DI-B05 | Number of people with increased participation in governance | 4.5 | Number of people | Indonesia, Men, IPLC, New | 0 | 0 | 4,793 | 4,945 | 4,312 |
| DI-C04 | New assessments of community use of biodiversity resources published. | 4.5 | Number | Indonesia | 0 | 0 | 2 | 2 | 2 |
| DI-C10 | Number of decision-makers attending briefing events | n/a | Number of people | Indonesia, Women, IPLC | 0 | 0 | 1 | 1 | n/a |
| DI-C10 | Number of decision-makers attending briefing events | n/a | Number of people | Indonesia, Men, IPLC | 4 | 4 | 8 | 8 | n/a |
| DI-C10 | Number of decision-makers attending briefing events | n/a | Number of people | Indonesia, Women, non-IPLC | 0 | 0 | 6 | 6 | n/a |
| DI-C10 | Number of decision-makers attending briefing events | n/a | Number of people | Indonesia, Men, non-IPLC | | 5 | 18 | 18 | n/a |
| DI-D01 | Area of land or sea under ecological management (a) area under sustainable management practices, and (b) area improved through restoration | 0.1, 0.3 | Number of hectares | Indonesia, Tropical-subtropical forests, Forest Management | | | | a) 370ha<br>b) 85 ha | a) 370 ha<br>b) 85 ha |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DI-D04 | Number of people with enhanced wellbeing[2] | 0.2 | Number of people | Women, IPLC | 936 | No data | 462 | 1397 | ≥936 |
| DI-D04 | Number of people with enhanced wellbeing[3] | 0.2 | Number of people | Men, IPLC | 900 | No data | 465 | 1366 | ≥900 |

[1] Number of participants detailed in the PIN and PDD documentation – these are people who will benefit from and participate in the design of sustainable forest management interventions under a Plan Vivo certified carbon project.

[2] We report the number of people that consider themselves to have a 'moderate' and 'capable or well-off' level of wellbeing. For context this is a higher level of wellbeing compared to 'extremely poor or pauper' and 'poor'. This data was not disaggregated as required by the Darwin Initiative Standard Indicators version 2.1, as this was not available at the project start. Instead, wellbeing has been determined on the basis of a participatory wellbeing assessment within each partner village. Criteria of wellbeing was established through a participatory process and included (but is not limited to): type of home, land and livestock ownership, employment, health, education and income.

[3] As above

## Table 2 Publications

| **Title** | **Type** (e.g. journals, manual, CDs) | **Detail** (authors, year) | **Gender of Lead Author** | **Nationality of Lead Author** | **Publishers** (name, city) | **Available from** (e.g. weblink or publisher if not available online) |
|---|---|---|---|---|---|---|
| Priorities for social forestry implementation in Sumatra for biodiversity, forest, and socioeconomic well-being | Online shiny tool | Muenzel et al, 2025 | M | UK | | https://darwinforestrestoration.shinyapps.io/Sumatra/ |

| Title | Type (e.g. journals, manual, CDs) | Detail (authors, year) | Gender of Lead Author | Nationality of Lead Author | Publishers (name, city) | Available from (e.g. weblink or publisher if not available online) |
|---|---|---|---|---|---|---|
| TR3: Tracking Restoration & Regeneration Results | Android mobile app | Banin, Kazlauskis et al., 2025 | F | UK | | Soon to be made available on Google playstore; currently available to view as beta version (see Section 3, Output 3) |
| Forest Restoration in Indonesia | Webpage | Banin, 2023 | F | UK | UKCEH corporate website | https://www.ceh.ac.uk/our-science/projects/forest-restoration-indonesia |
| Estimation of baseline and project GHG removals by carbon pools in Plan Vivo projects | Plan Vivo Restoration Methodology | Berry et al. (2025) including Banin | M | UK (based in Kenya) | Plan Vivo Foundation website | https://www.planvivo.org/pu001 |
| Forest restoration in Air Tenam: Enhancing benefit for both biodiversity and people; Air Tenam Village, Ulu Manna District | Bengkulu PIN | Primadona et al. (2025) | F | Indonesia | Plan Vivo Foundation website | https://www.planvivo.org/pv-climate-pipeline |
| Community-based Forest Protection and Restoration through Village Forest Management; | Aceh PIN | Radinal et al. (2025) | M | Indonesia | Plan Vivo Foundation website | https://www.planvivo.org/pv-climate-pipeline |

| Title | Type (e.g. journals, manual, CDs) | Detail (authors, year) | Gender of Lead Author | Nationality of Lead Author | Publishers (name, city) | Available from (e.g. weblink or publisher if not available online) |
|---|---|---|---|---|---|---|
| Mane Sub-district, Pidie District, Aceh Province, Indonesia | | | | | | |
| Harnessing opportunities to upscale forest landscape restoration in Indonesia | Journal article | Budiharta & Holl, 2025 | M | Indonesia | Trees, Forests and People | https://www.sciencedirect.com/science/article/pii/S2666719325001438 |
| Opportunities and challenges for monitoring terrestrial biodiversity in the robotics age | Journal article | Pringle et al. (including partners Banin and Struebig), 2025 | M | UK | Nature Ecology & Evolution | https://www.nature.com/articles/s41559-025-02704-9 |

## Checklist for submission

| | Check |
|---|---|
| Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the **correct template** (checking fund, scheme, type of report (i.e. Annual or Final), and year) and **deleted the blue guidance text** before submission? | y |
| **Is the report less than 10MB?** If so, please email to BCF-Reports@niras.com putting the project number in the Subject line. | |
| **Is your report more than 10MB?** If so, please consider the best way to submit. One zipped file, or a download option, is recommended. We can work with most online options and will be in touch if we have a problem accessing material. If unsure, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line. | Annexes sent as a separate link |
| If you are submitting photos for publicity purposes, **do these meet the outlined requirements** (see section 14)? | |
| **Have you included means of verification?** You should not submit every project document, but the main outputs and a selection of the others would strengthen the report. | y |
| **Have you provided an updated risk register?** If you have an existing risk register you should provide an updated version alongside your report. If your project was funded prior to this being a requirement, you are encouraged to develop a risk register. | y |
| Have you involved your partners in preparation of the report and named the main contributors | y |
| Have you completed the Project Expenditure table fully? | y |
| Do not include claim forms or other communications with this report. | |