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

Scheme (Main or Extra)	Main
Project reference	30-015
Project title	Protecting Biodiversity by improving community wellbeing in Southeast Madagascar
Country(ies)	Madagascar
Lead Organisation	Health In Harmony
Project partner(s)	Madagascar Biodiversity Center (MBC)
Darwin Initiative grant value	£486,018.00
Start/end dates of project	April 1, 2023 - June 30, 2025
Project Leader name	Sakib Burza
Project website/blog/social media	Website: healthinharmony.org Instagram: @healthinharmonyngo Facebook: @healthinharmonyngo LinkedIn: @healthinharmony YouTube: @healthinharmonyngo
Report author(s) and date	Farah Nabil, 29/08/2025

1   Project Summary

The project sought to address the interconnected crises of biodiversity loss, poverty, and malnutrition in southeastern Madagascar, one of the world's most biologically rich yet socioeconomically vulnerable regions.

The Manombo Special Reserve and surrounding landscapes host unique and highly threatened species, including several endemic lemurs. However, pressures from deforestation, slash-and-burn agriculture, forest fires, and unsustainable land use have caused severe habitat loss and fragmentation. Without intervention, the capacity of these forests to sustain biodiversity, provide ecosystem services, and support community livelihoods will continue to decline.

Local communities around Manombo face high poverty rates, food insecurity, and malnutrition. Inadequate access to protein, limited agricultural productivity, and lack of alternative livelihoods force households into unsustainable resource use, further degrading the forest. Child malnutrition rates are persistently high, while livelihood opportunities remain scarce and climate shocks (such as cyclones and drought) compound vulnerability.

These issues are particularly acute for smallholder farmers and their families living adjacent to the reserve. Women are disproportionately affected, bearing responsibility for food preparation and childcare while also contributing to agricultural labor. Youth face few alternatives beyond subsistence farming, increasing the risk of continued forest degradation as they search for income.

Through Health In Harmony's Radical Listening methodology, communities themselves identified the need for both ecological restoration and new livelihood strategies. They pointed to the destruction of the Manombo forest as a root cause of declining rainfall and agricultural yields, and to protein scarcity as a driver of poor health and nutrition. The project was therefore designed to:

- Reforest degraded lemur habitat and strengthen fire prevention.
- Introduce agroforestry systems to diversify crops and increase resilience.
- Test Black Soldier Fly (BSF)–based farming as an innovative solution for nutrition, fertilizer, and income.
- Improve community wellbeing by linking conservation directly to livelihoods and malnutrition reduction.

The project builds on Health In Harmony's proven approaches in Indonesia and Brazil, where linking healthcare, livelihoods, and forest protection has successfully reduced deforestation while improving community wellbeing. In Madagascar, the project tested new models such as insect farming and frass fertilization, contributing evidence for scaling innovative, community-led solutions to other regions facing similar challenges.

The project was implemented in 31 communities surrounding the Manombo Special Reserve in southeastern Madagascar (Farafangana District, Atsimo-Atsinanana Region). Activities spanned
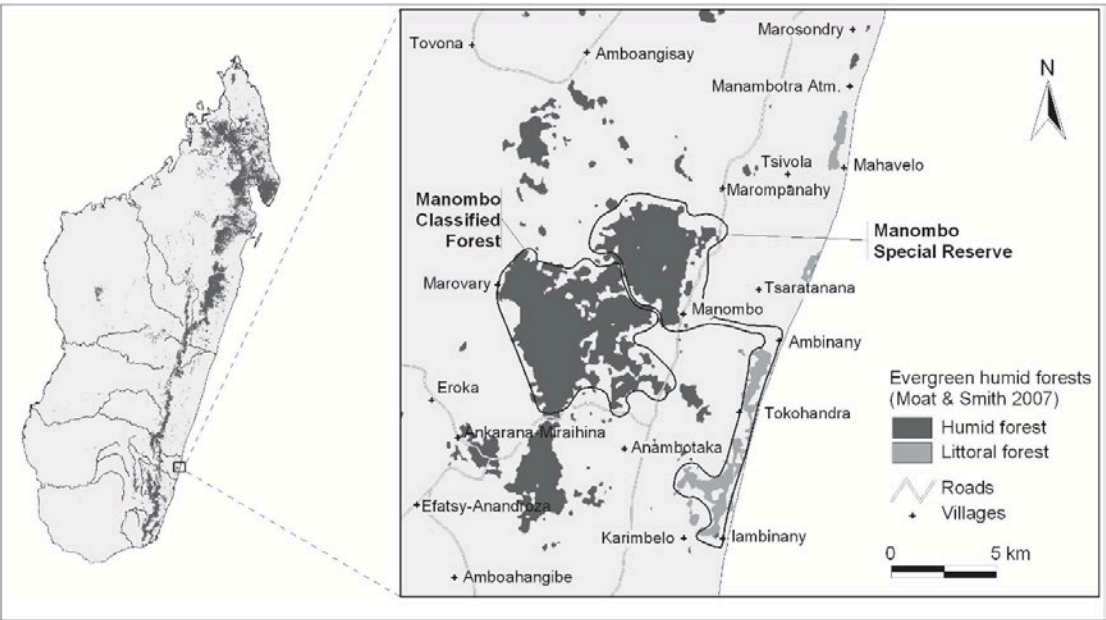
reforestation plots, agroforestry sites, and community-based BSF farms across littoral and inland sites.

2 Project Partnerships

The project was rooted in collaboration between Health In Harmony (HIH) as the lead organization and the Madagascar Biodiversity Center (MBC) as the primary in-country partner, with strong engagement from local communities and other technical stakeholders.

Partnerships were established in direct response to community-identified needs through HIH's Radical Listening approach, which consistently showed that local households perceived forest degradation and protein scarcity as key drivers of poverty and poor health. The project design therefore emerged from local demand, with MBC and community leaders actively contributing to planning and monitoring from the outset.

Roles of partners:

- HIH coordinated the overall project, managed grant compliance, and provided technical leadership on integrated health–conservation approaches and innovative livelihood pilots such as BSF farming.
- MBC led the implementation of the BSF farms providing technical expertise, as well as conducted research trials, including frass fertilizer experiments and reforestation assessments, while also contributing to dissemination through peer-reviewed publications.
- Community members were central partners: they staffed nurseries, implemented reforestation and firebreak activities, and piloted agroforestry and insect-farming systems. Women in particular played leadership roles in BSF farming and food security initiatives.
- International collaborators provided technical support on entomology and agronomy and contributed to the analysis and drafting of scientific outputs.

HIH has led on the writing of this report and MBC has actively contributed to its preparation, with community monitoring data forming the backbone of the evidence presented.

The partnership will produce multiple peer-reviewed publications (currently under peer review), expanded reforestation and agroforestry to 76 hectares and 47 farms, and successfully introduced insect farming as a novel livelihood and nutrition strategy. Key strengths included MBC's ecological expertise, HIH's experience in linking human wellbeing to conservation, and the strong ownership demonstrated by local communities.

Challenges included developing solutions for pest control (rats and ants) that threatened BSF farms, and ensuring equitable participation of women and marginalized groups. These were addressed by adaptive management, for example, community-led solutions such as adoption of castrated cats from nearby villages for rat control, and women-focused BSF cooking classes to normalize insect-based foods.

The collaboration between HIH and MBC has strengthened throughout the project and will continue after project closure, with shared interest in scaling BSF farming and sustaining reforestation work. Community institutions, such as nurseries, Forest Guardians, and farmer groups, are already functioning semi-independently and will provide continuity.

While no formal role was played by the British Embassy during the grant period, local authorities and technical specialists were engaged in permitting, trial design, and monitoring, and the ambassador was informed on the project and its developments. Communities were engaged through training sessions, participatory monitoring, and dissemination of trial results via workshops and cooking demonstrations. Understanding of the biodiversity–poverty link was strengthened through direct experience (e.g. communities linking forest restoration to BSF feeding trials improving poultry growth and household nutrition). Evidence of comprehension comes from the high survival rates of tree plantings, the continued replication of BSF farms, and the expressed interest of neighboring villages (90% report community interest).

3   Project Achievements

3.1   Outputs

The project set out to achieve five main Outputs as per the logframe, each linked to biodiversity conservation, food security, and poverty reduction.

Output 1: Reforestation of 30 hectares (36,000 seedlings) over two years

The project significantly exceeded its reforestation targets. A total of 76 hectares of degraded forest in the Manombo Special Reserve were reforested between 2023–2025, compared to the planned 30 hectares. Communities planted over 102,000 seedlings of native species using conventional planting, assisted natural regeneration (ANR), and Muvuca techniques. Seedling survival rates consistently exceeded expectations, with 80–85% survival measured at 18–24 months, compared to the 70% target. Additionally, from 2023–2025, communities constructed 30 km of new firebreaks (8 km in 2023, 12 km in 2024, 10 km in June 2025) and maintained 5.5 km of existing firebreaks, helping to mitigate the primary threat of wildfires. These achievements were supported by the establishment of nurseries in multiple villages and the active engagement of over 1,600 community members, particularly women.

Output 2: Fertilizer trials using insect frass

The project successfully designed and implemented controlled trials on vegetables (zucchini, beans, pak choi) and tree seedlings across two sites. Results demonstrated that insect frass improved both yield and seedling survival compared to controls and conventional fertilizers. Findings were prepared for publication in Agronomy for Sustainable Development and have been shared nationally. This Output is fully achieved, contributing new evidence to climate-resilient agriculture in Madagascar through two submitted peer review publications (see Annex)

Output 3: Community acceptability of insect-based nutritional supplements

A mixed-methods study was completed in seven villages with 127 participants, testing insect larvae in dried, powdered, and cracker forms. While initial aversion was noted, especially to whole larvae, acceptance improved significantly after tasting sessions, with processed forms strongly preferred. Children in particular showed high acceptance, suggesting a key pathway for addressing protein deficiency. Results were disseminated nationally and submitted to PLOS One. This Output is achieved, with potential for scale-up.

Output 4: Establishment of insect farms

The project far exceeded its target of 7 farms by supporting the establishment of 52 BSF farms in 9 villages, with 47 operational farms at project close. A total of 89 people (65% women) were trained and are actively managing farms. By May 2025, at least 36 farms (78%) had reached stable production cycles, surpassing the 75% capacity target. Four community cooking classes further increased acceptance and integration of BSF into diets. However, pest issues (rats, ants) posed challenges. These were partly resolved through innovative community-led solutions (e.g. adoption of cats combined with HIH's castration program to mitigate biodiversity risks). Endline July 2025 data show that children in BSF households experienced a ~4% increase in MUAC (mid-upper arm circumference) values compared to baseline, whereas controls experienced a ~19% decline. Importantly, no BSF-fed children fell into acute malnutrition (MUAC <125 mm), compared to three cases among controls. These results suggest a protective effect of BSF participation against declining nutritional status, though the sample size (46 BSF-fed children vs. 92 controls) limits statistical power. In addition, it recently came to our knowledge that several households reported sharing BSF larvae with their non-relative neighbors (who are non-BSF households), especially during the hunger season, which could have influenced the results by masking the difference. Given that it is expected that nutrition outcomes take longer to manifest with statistical significance at the population level, the 23% difference found among the two groups suggests that this Output is therefore on the way to being fully achieved in the coming years, providing early evidence that BSF adoption supports household nutrition. However, more research is needed with a bigger sample size to assure it.

Output 5: Implementation of 10 hectares of agroforestry and training of 2,000 farmers

The project exceeded its land conversion target, establishing 40 hectares of agroforestry plots across 10 sites with 14 cash and food species (including cinnamon, coffee, clove, lychee, and papaya). A total of 1,784 farmers (58% women) were trained in agroforestry techniques, close to the 2,000 target. However, as expected, trees have not yet reached productive maturity; most crops will take 3–8 years before yielding. Communities continue to rely on short-cycle farming and BSF farming for immediate income and nutrition.

3.2 Outcome

The intended outcome was that 31 Manombo communities would reforest 30 ha, convert 10 ha to agroforestry, and test insect-based nutrition, fertilization, and farming programs, improving malnutrition, poverty, and biodiversity protection.

The Outcome has been achieved and in many respects exceeded:

- Reforestation: 76 ha restored (target 30 ha), with >80% seedling survival rates and broad community participation (1,600+ people).
- Agroforestry: 40 ha converted (target 10 ha), with 1,784 trained farmers. Crops are not yet yielding but provide long-term sustainability.
- BSF adoption: 52 farms operational (target 7), with evidence of improved poultry and fish growth, higher fertilizer effectiveness, and increased household nutrition.
- Community acceptance: significant positive shift toward BSF products; children and women are early adopters.
- Nutrition outcomes: Preliminary July 2025 results show that BSF households avoided malnutrition cases and maintained/improved MUAC, while controls declined and registered cases of acute malnutrition. These findings, though limited in statistical power, strongly suggest a protective effect of BSF participation.

Overall, the Outcome has been effectively achieved, with nutrition results providing encouraging confirmation of the project's theory of change.

3.3 Monitoring of assumptions

Key risks and assumptions were actively monitored.

Wildfires remained a major threat, but firebreak construction (30 km) and monthly fire patrols significantly reduced losses.

Pests posed an unexpected challenge to BSF farms, particularly rats displaced by forest fires. This was addressed by promoting household cat adoption coupled with HIH veterinary support.

Community participation remained high, with >90% reporting interest in replicating project interventions.

Climate shocks (cyclones, irregular rainfall) posed ongoing risks, but communities linked reforestation to improved rainfall, reinforcing motivation for forest protection.

The overall pathway to change, improving community wellbeing to reduce deforestation, held true, supported by evidence of behavior change and strong community ownership.

3.4 Impact

The project contributed meaningfully to both biodiversity conservation and poverty reduction.

Biodiversity impact: Restoration of 76 hectares of lemur habitat has improved forest cover and survival of native species. Communities engaged in firebreak construction and monitoring, helping to protect the Manombo Reserve. Local behavior toward forest protection improved, with awareness that restored forests increase rainfall and agricultural productivity.

Human wellbeing and poverty reduction: The project strengthened food security and income generation through BSF farming, poultry and fish production, and agroforestry. Farmers reported improved access to protein and fertilizers, while women in particular gained new income streams from BSF products. Temporary jobs created through nursery maintenance, tree planting, and firebreak construction provided additional livelihood support. BSF farming not only improved access to income and protein but also appeared to protected children from acute malnutrition during the reporting period. Women gained disproportionately from new income streams, and farmers benefited from improved poultry/fish production and fertilizer alternatives. Sustainable sources of protein reduce pressure on rainforest dwelling bushmeat, both protecting biodiversity and reducing spillover risk.

Together, these contributions demonstrate that integrated approaches linking biodiversity and livelihoods can generate lasting impact.

4 Contribution to Darwin Initiative Programme Objectives

4.1 Project support to the Conventions, Treaties or Agreements

The project supported Madagascar's commitments under the Convention on Biological Diversity (CBD) and the Post-2020 Global Biodiversity Framework by restoring 76 hectares of degraded habitat in the Manombo Special Reserve, exceeding the national NBSAP target for reforestation in priority lemur habitats. Community firebreaks (30 km) reduced wildfire threats, directly supporting CBD Targets 2 (ecosystem restoration) and 4 (sustainable management).

On climate, project activities support Madagascar's Nationally Determined Contribution (NDC) through afforestation and agroforestry, which both sequester carbon and strengthen community resilience to climate shocks. Agroforestry adoption on 40 hectares across 10 sites aligns with the country's National Adaptation Plan (NAP) by diversifying income sources and improving ecosystem services.

Research on insect-based nutrition was submitted to PLOS One to support reporting on SDG 2 (Zero Hunger).

The project did not submit formal reports to convention focal points during this reporting period, but evidence will be shared with relevant ministries through national platforms and stakeholder consultations by the end of 2025.

4.2   Project support for multidimensional poverty reduction

The project has contributed to poverty reduction by improving food security, nutrition, and income opportunities. Evidence includes:

- Nutrition: Endline data (July 2025) showed that children in BSF households recorded a ~4% increase in MUAC, while controls declined by ~19%, with three cases of acute malnutrition in control villages and none in BSF households. This demonstrates a protective effect against child malnutrition, one of the most acute dimensions of poverty.
-
- Income: 52 BSF farms were established (target 7), with 78% achieving stable production cycles. Women gained new income streams from BSF products and agroforestry crops. Short-term employment (nurseries, firebreaks, planting) provided additional livelihood support.
- Food security: BSF protein supported poultry and fish production, improving household diets. Agroforestry plots introduced 14 food and cash crops for long-term income stability.
- Ecosystem services: Communities linked forest restoration to improved rainfall, reinforcing local incentives for conservation and sustainable agriculture.
- Beneficiaries included 1,784 farmers trained (58% women), 89 BSF farm operators (65% women), and >1,600 community members engaged in reforestation. These contributions address multiple dimensions of poverty: nutrition, health, income, and resilience to climate stress.

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 assets, resources and capabilities for women and marginalised groups	**X**
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	

The project went beyond sensitivity by actively increasing equal access to resources and capabilities for women and marginalized groups:

- Participation: Women represented 65% of BSF farmers and 58% of agroforestry trainees, ensuring access to both immediate and long-term income opportunities.
- Resources & roles: BSF farming, designed as low-input and home-based, addressed women's time and mobility constraints. Agroforestry plots incorporated crops chosen by both men and women.
- Representation: Women and youth were central in cooking classes and nutrition studies, shaping culturally acceptable ways of integrating BSF into diets.
- Rights & environment: Veterinary programs (castration of cats used for pest control) reduced biodiversity risks while respecting community practices.
- Notable achievement: Nutrition trials showed children, particularly girls, benefiting directly from BSF integration, supporting intergenerational equity.
- Challenges: Persistent cultural aversion to whole insect consumption required sustained sensitization. Lessons learned highlight the importance of participatory cooking demonstrations to shift norms.

4.4 Transfer of knowledge

The project generated and disseminated new knowledge through multiple pathways:

- Scientific outputs: Three papers submitted for publication in high-impact scientific journals - (1) BSF Acceptability for human consumption across seven villages in Southeast Madagascar, submitted to PLOS One; (2) Cricket frass fertilizer promotes the survival, growth, and yield of zucchini submitted to the Agronomy for Sustainable Development; and (3) BSF frass fertilizer on maize growth and yield under field conditions submitted to the Frontiers in Sustainable Food Systems (see annexes).
- Policy engagement: Findings shared nationally with ministries of Agriculture and Health, feeding into evidence bases for NBSAP and nutrition programming.
- Community knowledge transfer: >1,700 farmers trained in agroforestry, 180 in BSF farming, with peer-to-peer diffusion encouraged.
- Platforms: Results presented at national workshops on sustainable agriculture and community nutrition.

Knowledge transfer ensures that BSF adoption and reforestation practices are replicable and scalable both within Madagascar and globally.

4.5   Capacity building

Capacity building was a core project achievement.

1,784 farmers and 180 BSF producers from the community developed technical capacity to implement agroforestry and insect farming.

Women accounted for the majority of trained BSF producers, enhancing their visibility and decision-making power within village economies.

The BSF project funded the frass trials that where part of a PhD Research Project (Clarcky Andrianorosoa Ony, at the Université d'Antananarivo). It was also showcased at the 2025 IPS Conference in Madagascar as a Planetary Health solution for rainforest communites. In addition, MBC and HIH staff have been invited to attending the 2025 International Agriculture Fair in Antananarivo to showcase the successful BSF project in Manombo.

Project staff were invited to share results with regional conservation and development platforms, raising the status of in-country partners.

5   Monitoring and evaluation

The M&E framework was designed around the project logframe and proved practical in guiding adaptive management. Monitoring data were collected regularly by Malagasy field teams, with technical backstopping from Health In Harmony and MBC.

- Data collection: Household surveys, BSF farm records, reforestation survival counts, and nutritional assessments were carried out on agreed schedules. The use of digital tablets improved data accuracy and timeliness.
- Shared responsibility: M&E work was distributed among partners. Malagasy researchers led baseline/endline studies and field monitoring; HIH provided analysis support; MBC guided publication preparation. This structure ensured capacity building and ownership.
- Information sharing: Quarterly review meetings and joint workshops provided opportunities to review results with local communities, government partners, and NGOs. Findings were translated into Malagasy for community-level dissemination.
- Evaluations: An internal mid-term review (2024) identified two areas for adjustment: (i) stronger pest management in BSF farms, and (ii) increasing community cooking demonstrations to address food aversion. Both recommendations were integrated and contributed to higher adoption rates.

Overall, the M&E system was both practical and useful, enabling adaptive course corrections and strengthening partner collaboration.

6   Lessons learnt

What worked well

- Community demand-driven design: Interventions (BSF farming, agroforestry) aligned with community priorities, resulting in high participation (>1,600 people in reforestation, 1,784 farmers in agroforestry).
- Integrated approach: Linking biodiversity, food security, and livelihoods created reinforcing incentives for conservation.
- Gender participation: Women's involvement was higher than expected (65% in BSF, 58% in agroforestry), showing the value of low-input, home-based innovations.
- Adaptive M&E: Adjustments based on mid-term findings (pest management, cooking demonstrations) improved outcomes.

What didn't work well

- Pest control: Rats being attracted to BSF farms, especially after forest fires, required unexpected interventions (cat adoption), highlighting the need to anticipate ecological knock-on effects.
- Timing of nutrition impact: Anthropometric outcomes required longer measurement periods than the project timeline initially allowed; final results extend beyond project close.
- Communication: Scientific results took time to process and publish, delaying policy uptake.

If repeated, we would:

- Include a pest risk assessment from the start for all novel farming interventions.
- Budget more time for nutrition trials, ensuring results are available before project closure.
- Increase early investment in national policy engagement to accelerate uptake of findings.

Recommendations for similar projects:

- Design for community-led innovation, not just technology transfer.
- Use participatory cooking classes and culturally sensitive entry points for novel foods.
- Anticipate ecological interactions (e.g. forest restoration displacing rats into farms).
- Plan for longer timelines when measuring nutrition or poverty impacts.

7   Actions taken in response to Annual Report reviews

All review feedback was addressed in a timely manner:

- Requests for clearer indicators of poverty reduction were met by integrating nutrition baselines and endlines into the logframe.
- Concerns about sustainability were addressed by demonstrating high BSF farm survival (78%) and strong community ownership of reforestation.
- Feedback was discussed with all partners through coordination meetings, ensuring collective understanding and response.

No outstanding issues remain.

8 Risk Management

New risks (last 12 months):

- Cyclones and irregular rainfall impacted planting schedules. Mitigation: use of assisted natural regeneration (ANR) and diversified planting strategies.
- Market acceptance risks of BSF products. Mitigation: repeated community cooking classes and child-focused interventions.

Adaptations:

- Project design was adapted to explicitly integrate pest control into BSF training modules.
- Agroforestry expansion (40 ha vs. 10 ha planned) was accelerated to reduce climate and livelihood risks.
- Firebreak maintenance and monthly patrols were institutionalized as community responsibilities to reduce wildfire risk.

Overall, risks were actively monitored and addressed, with adaptations strengthening project resilience and sustainability.

9 Scalability and Durability

Project stakeholders learned about the project through a combination of community-level engagement, training workshops, cooking demonstrations, and national dissemination events. Over 1,600 community members directly participated in reforestation, 1,784 in agroforestry, and 89 in BSF farming, creating a large pool of early adopters. At the national level, results will be shared in the coming months with government partners and published in scientific journals, creating credibility and visibility.

Evidence of attractiveness to adopters includes:

- High uptake of BSF farming: 52 farms established (vs. 7 planned), with 78% sustaining production cycles.
- Strong survival rates in reforestation: >80% after 18–24 months, reinforcing community belief in forest recovery.
- Community nutrition acceptance: processed BSF products were well received, especially by children.
- Economic viability: women reported BSF farming as low-input, income-generating work that could be managed from home.

The project aligned community incentives with biodiversity outcomes: communities saw a direct link between forest protection and rainfall stability, and between BSF farming and access to protein/fertilizer.

At the policy level:

- Reforestation and agroforestry activities are aligned with Madagascar's National Biodiversity Strategy and Action Plan (NBSAP), NDC commitments, and national goals on forest restoration.
- The project provided new agricultural evidence on insect frass as fertilizer contributing to ongoing discussions on sustainable inputs.
- Engagement with district health offices around the nutrition study has opened pathways for linking BSF to child malnutrition strategies.

The project created visible shifts in social norms and behaviours:

- Forest use: Communities increasingly see themselves as guardians of restored forest, with 30 km of firebreaks now maintained annually by local patrols.
- Nutrition: Initial aversion to BSF was replaced with acceptance, especially when incorporated into culturally appropriate foods (e.g. crackers, porridge).
- Women's participation: Women have become key drivers of BSF adoption, influencing household decisions about food and income.
- Children's role: Children acted as "champions" for BSF products, encouraging household-level acceptance.

Exit Strategy and Durability of Results

The original exit plan focused on:

- Community ownership of BSF farms and nurseries – achieved: >75% of BSF farms are self-sustaining, and nurseries are managed locally.

- Integration into local governance – achieved: community committees now oversee firebreak patrols, tree planting, and BSF troubleshooting.
- Evidence base for scale-up – in progress: three scientific manuscripts submitted (Agronomy for Sustainable Development; PLOS One) and national dissemination workshops held.
- Policy linkages – partially achieved: results have been shared with ministries, though uptake into formal strategies is ongoing.

Additional durability measures include:

- Partnerships with local NGOs for ongoing training.
- Integration of veterinary support (for pest-control cats) into HIH's existing animal health program, ensuring sustainability.
- Establishment of agroforestry plots that will yield income for years after project closure (cinnamon, coffee, clove).

The most durable achievements are:

- Reforestation and agroforestry: 116 ha of restored or converted land with high survival rates will provide long-term biodiversity and livelihood benefits.
- Community firebreak patrols: institutionalized as a local practice.
- BSF farming: 47 operational farms, most likely to continue due to profitability and women's leadership.
- Shift in social norms: growing acceptance of insects as food and fertilizer creates long-term behavioural change.

Legacy and Staff Resources

- Staff transition: Malagasy field staff trained under the project will continue as part of HIH Madagascar's broader conservation and livelihoods programming. Several have been invited to join national expert panels on reforestation and alternative protein.
- Resources: Community nurseries, BSF starter kits, and agroforestry plots remain in place. Local committees have assumed responsibility for maintenance.
- Institutional legacy: The project created both scientific outputs and community models that can be scaled nationally with future investment.

10 Darwin Initiative identity

A comprehensive communications plan has been developed to publicise our project and its support from the Darwin Initiative. This plan includes several specific, committed activities that are being scheduled into our content calendar:

Peer-Reviewed Publication & Press Release: Upon acceptance of each manuscript, a press release will be drafted and launched in collaboration with the Darwin Initiative to announce the findings.

Website Blog/Article: A feature article detailing the project's research results will be published on the Health in Harmony (HIH) blog.

Social Media Campaign: A targeted campaign will be rolled out across our channels, including two dedicated posts on LinkedIn and one main post plus two stories on Instagram.

Direct Communications & Reporting: The project will be featured in the HIH newsletter and is planned for inclusion in our annual Impact Report.

In all instances, the Darwin Initiative logo and a formal acknowledgement of funding from the UK Government will be prominently featured.

The Darwin Initiative funding is fully integrated into a larger, comprehensive Health in Harmony programme. Our communications strategy focuses on showcasing this holistic approach. Within this framework, dedicated communications such as the planned press release and the multi-platform social media campaign will specifically spotlight the outcomes and successes of the Darwin Initiative-funded components, ensuring its unique contribution is clearly visible.

Building awareness of the Darwin Initiative within the host country is a primary objective of our communications plan. The planned press release, which will be circulated to national and regional media upon publication of our research, will be a key tool for increasing understanding and visibility of the Darwin Initiative among national stakeholders, academic institutions, and the media.

Health in Harmony will utilize its effective communication channels, including LinkedIn and Instagram, to highlight this project. All content created as part of our social media plan will explicitly acknowledge the Darwin Initiative and will include direct links back to the Darwin Initiative's relevant social media channels to maximize reach, engagement, and cross-promotion.

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)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Others (see below)				
TOTAL	**£242,848.00**	**£242,848.00**		

Staff employed (Name and position)	Cost
Partnerships Associate, Evan Davis	
Chief Health & Innovation Officer, Sakib Burza	
Program Director, Noor Trienekens	
Program Manager, Mahardika Putra Purba	
Research Program Manager, Nina Finley	
Alternative Livelihood Coordinator, Sedera Ramaromanana	
Driver Admin, Philibert Razafindrakoto	
Drivers, Lahatriniaina Raherimantsoa	
Drivers, Rakotondramanana Johana Tahina	
Deputy Director, Lovasoa Samson Rakotovelo	
Forest Guardian Coordinator, Fanampy Fidy Razafindralambo	
Program Director, Dr. Andriantiana Tsirimanana	
Reforestation coordinator, Rakotomalala Sergio	
Technicians, Franckestenny Dhennys Mack Mahaleovoninahitra	
Technical Advisor, Tahiry Adello Randriamanana	
TOTAL	

Capital items – description	Capital items – cost (£)
N/A	N/A
TOTAL	

Other items – description	Other items – cost (£)
Grant Audit	
TOTAL	

12.2 Additional funds or in-kind contributions secured

Matched funding leveraged by the partners to deliver the project	Total
Sense Foundation	███████
Vanguard Charitable	
Reed Jules Oppenheimer Foundation	
Madelon Global Health Fund	
London School of Hygiene and Tropical Medicine	
University of Saarland	
Duke University	
TOTAL	

Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project	Total (£)
Private individuals (restricted and unrestricted funding to continue supporting staff salaries)	███████
Private individuals (restricted and unrestricted funding to continue supporting BSF farms)	
TOTAL	

12.3 Value for Money

Overall, this project had very high value for money. Health In Harmony's approach to hiring and procurement has always included policies and practices for resourcing locally, which increases the quality and efficacy of the project, but also positively affects the efficiency and total cost.

Further, this pilot proved a very low cost but effective method of increasing several long-term benefits across health, livelihoods, and environmental protection. The project improves health through a long-term nutritional benefit, increases livelihood opportunities for vulnerable populations, and reduces extraction of protein sources from the forest, which increases environmental quality and reduces spillover risk.

Through this project, we have already established a critical mass of training, gathered key knowledge, and standardized the cost at about $100 per new farm, making this project easier to replicate at scale, so that as more projects begin through internal community decisions and external funding, they will come online even more cost effectively.

13 Other comments on progress not covered elsewhere

Yes, community members learn from the farmers over time. When they get their own farm set up, it soon gets upgraded, based on the learnings from others over time. The new farms are getting more investment from the early stages, such as well-built structures around them.

We're learning from the farmers and community members in general. They have come up with several recipes to incorporate BSF larvae, such as bread and other dishes.

No additional difficulties not already mentioned/described.

No.

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).

As of May 2025, the project has directly impacted 630 household members across 90 implemented BSF farms. The majority of farm managers are adult women (35%), followed by adult men (33%). Women dedicate between 1–5 hours per week to farm labor, while most men spend less than an hour weekly. Currently, the dropout rate stands at 14%, representing 7 farmers from the initial 50 well-established farms. It's worth noting that an additional 40 farms were recently created and have not yet completed their first harvest cycle.

Perceived benefits are high: 38% of farmers report BSF as "very beneficial" and 62% as "beneficial." Specific improvements include poultry growth (85.3% agree) and vegetable fertilization through frass (46.3% strongly agree). Farmer satisfaction has risen from 35.7% in February to 75.6% in August, 2025.

Food security perceptions improved across all key indicators, including livelihoods, nutrition, food availability, and access to protein. Despite a drop in average monthly income in May (24,833 Ar → 8,111 Ar), the numbers increased again in August. Similarly, average investment decreased (51,083 Ar → 30,773 Ar), but increased again in August.

Community interest is strong: 90% of respondents reported that neighbors and community members expressed a desire to adopt BSF farming after observing its benefits. This demonstrates significant potential for wider uptake and long-term sustainability.

Together, these results highlight both the tangible livelihood benefits of BSF farming and the growing community demand, while also underscoring the importance of ongoing technical support to ensure durability and scale.

File Type (Image / Video / Graphic)	File Name or File Location	Caption, country and credit	Online accounts to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)
Image	1. Air table (link) 2. Air table (link) **Community reforestation**	1. Seedlings planted during community reforestation activity in Manombo, Madagascar 2. Community reforestation activity in Manombo, Madagascar **Country:** Madagascar **Credit:** Nantenaina Claret Mahefantsoa		Yes
Image	3. Air table (link) 4. Air table (link) **HIH conservation and reforestation staff**	3. Health In Harmony team reforestation activity in East Manararano, Madagascar 4. Health In Harmony team reforestation activity in East Manararano, Madagascar **Country:** Madagascar **Credit:** Nantenaina Claret Mahefantsoa		Yes
Image	5. Air table (link) 6. Air table (link) **BSF consumption**	5. Fried BSF larvae, Sahamahitsy, Madagascar. 6. BSF larvae sauce and fried BSF larvae with cassava, Sahamahitsy, Madagascar. **Country:** Madagascar		Yes

Image	7. Air table ([link](#)) 8. Air table ([link](#)) **BSF farm training**	7. Visit to BSF farms in Anivorano with research team 8. BSF farming training by HIH and MBC in in Anivorano, Madagascar. **Country:** Madagascar **Credit:** Nantenaina Claret Mahefantsoa		Yes
Image	9. Air table ([link](#)) 10. Air table ([link](#)) **Agroforestry**	9. Monitoring growth rate of seedlings with BSF frass as fertilizer. 10. Field monitoring of reforestation sites in Morafeno Village, Manombo. **Country:** Madagascar **Credit:** Sedera Ramaromanana		Yes
Image	11. Air table ([link](#)) 12. Air table ([link](#)) **BSF farm training**	11. Training session for the implementation of new farms. Women are leading the project and remain as main managers of the farms. 12. Training session for the implementation of new farms. **Country:** Madagascar **Credit:** Nantenaina Claret Mahefantsoa		

| | | **Credit:** Nantenaina Claret Mahefantsoa | | |

Image	13. Air table (link)	13. Poultry enjoying BSF larvae		
	14. Air table (link)	14. Chickens feeding on BSF larvae		
	BSF larvae as animal feed	**Country:** Madagascar **Credit:** Nantenaina Claret Mahefantsoa		

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

Project summary	Progress and achievements
Impact Insert agreed project Impact statement Improved livelihoods, reforestation, and malnutrition strategies are implemented in southeastern Madagascar; nutritional and economic poverty will improve and capacity for biodiversity protection, specifically of endemic lemur, will increase.	(Report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity e.g. steps towards sustainable use or equitable sharing of costs or benefits) A few years ago, HIH began supporting the conservation of the Manombo Farafangana Special Reserve. HIH works in many areas to help protect the Manombo forest. One of these is forest restoration through tree planting. This planting has been particularly appealing to the communities living around Manombo, as it has created temporary jobs that contribute to their income, such as: - maintaining nurseries, - transporting trees to the planting area, - digging holes and planting. - After planting, people are also responsible for monitoring and maintaining the planted trees. - And finally, the installation of firebreaks, which is very labor-intensive, extends over several kilometers and is done by hand with shovels. Those with skills in basket weaving make organic pots to keep the young plants in the nurseries. This becomes a source of income for them as these organic pots are purchased by HIH. The forest restoration work has not only contributed to the communities' income, but has also gradually restored the rainfall necessary for their agriculture and livestock farming. As a result, their behavior has gradually changed and they have become more involved in forest protection and restoration.
Outcome (Insert **agreed** project Outcome statement) 31 Manombo communities will reforest 30 hectares of lemur habitat, convert 10 hectares of agroforestry plots, and test insect-based nutrition, fertilization, and farming programs, improving malnutrition, poverty, and biodiversity protection.	(Report progress against indicators, and reference where evidence is provided e.g. Evidence provided in section 3.2 of report and Annex X). This should be a **condensed summary** of your reporting in section 3.2 of the report)
Outcome indicator 0.1.	New ha reforested in Manombo - 32 ha in 2025 including agroforestry

Number of total hectares reforested in Manombo Rainforest will increase by 15 hectares annually, starting in Year One of project implementation.	In 2023, 27 hectares of land were reforested using three techniques: "Conventional Planting" (CP), "Assisted Natural Regeneration" (ANR), and Muvuca. The goal is both to test and find the right reforestation technique to achieve good results. 418 people, including 198 women, participated in these planting activities. In 2024, a new 30-hectare area was reforested using the "Conventional Planting" (CP) technique, which resulted in higher survival rates compared to the other techniques. The survival rate is over 75%. 813 people, including 465 women, participated in these planting activities. In 2025, a new area of 19 hectares was reforested, continuing to use the "conventional planting" (CP) technique. A total of 417 people, including 197 women, from neighboring communities participated in these plantings.
Outcome indicator 0.2. Mixed-methods study for the acceptability of three insect powder nutritional formulations completed and disseminated at the national level and in a peer reviewed journal.	Completed. The study included three BSF products (dry larvae, powder, and crackers) conducted in 7 villages, with a total of 127 participants. The direct exposure to BSF products dramatically shifted negative perceptions, reducing feelings of disgust and concerns. The transformative power of sensory experience in overcoming neophobia highlights the importance of facilitated exposure in adoption strategies. A clear hierarchy of acceptability emerged when processed BSF products were highly preferred compared to the whole larvae, which faced considerable rejection due to sensory aversions at first. But children displayed a higher acceptance across all BSF product forms, positioning them as a key target demographic for future interventions.
Outcome indicator 0.3. Insect frass fertilizer trials developed and conducted in 12 total reforestation, agroforestry, and agriculture test plots.	Experiment on vegetables: · 2 sites: littoral site (Tsaratanàna), inland site (Namohora) · 3 species in both sites: Zucchini , pack choi (pe-tsai), beans o Zucchini: - One experiment during one season in both sites - Experimental dispositif: Randomized Complete Block Design (RCBD)

| | - 7 treatments: control (unfertilized soil), cattle manure, NPK, ¼ x cricket frass fertilizer (1/4 x CFF), CFF baseline, 2 x CFF, CFF + CM baseline
- 21 plots (3 replicates (plots) x 7 treatment)
- 1260 seedlings (30 seedlings x 21 plots x 2 sites)
o Beans:
  - One experiment during one season in both sites
  - Experimental dispositif: Randomized Complete Block Design (RCBD)
  - 7 treatments: control (unfertilized soil), cattle manure, NPK, ¼ x cricket frass fertilizer (1/4 x CFF), CFF baseline, 2 x CFF, CFF + CM baseline
  - 3 replicates
  - 21 plots (3 replicates (plots) x 7 treatment)
  - 1260 seedlings (30 seedlings x 21 plots x 2 sites)
o Pack choi (pe-tsai):
  - 2 experiments during one season in both sites
  - Experimental dispositif: Randomized Complete Block Design (RCBD)
  - 7 treatments: control (unfertilized soil), cattle manure, NPK, ¼ x cricket frass fertilizer (1/4 x CFF), CFF baseline, 2 x CFF, CFF + CM baseline
  - 21 plots (3 replicates (plots) x 7 treatment)
  - 1260 seedlings (15 seedlings x 21 plots x 2 sites x 2 experiments)
o Maize:
  - One experiment in one site
  - Randomized Complete Block Design (RCBD) with 3 replicates, 24 plants each.
  - 4 treatments: control (no fertilizer), CBSFF, FBSFF, and CM equivalent to 43 kg of total N per hectare
  - 12 plots (3 replicates x 4 treatments)
  - 288 seedlings (24 per replicate x 12 plots)

Experiment on species for reforestation
· 2 sites: littoral site (Tsaratanàna), inland site (Namohora)
· 6 species:
  o For Tsaratanàna: *Ocotea cymose, Uapaka littoralis, Anthostema madagascariensis* |

	o For Namohora: *Humbertia madagascariensis, Diospyros spp., Oncostemom sp*. · Experiment in pot in a nursery · 6 treatments: control (unfertilized soil), cattle manure, ¼ x cricket frass fertilizer (1/4 x CFF), CFF baseline, 2 x CFF, CFF + CM baseline · 1260 seedlings (35 seedlings x 6 treatments x 6 species)
Outcome indicator 0.4. 70 people (70% female) will be trained and actively managing 7 insect farms by end of Year Two for continued production of frass and powder.	89 people (65% women) are trained and actively managing 47 insect farms in Manombo region (9 villages), for continued production of frass and fresh BSF.
Outcome 0.5. 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques	# of unique farming training participants 2023: 513 (total no gender breakdown) 2024: 1368 (52.5% female) 2025 Q1-Q2: 46 (no gender breakdown)
Outcome 0.6. Prevalence of global acute malnutrition in the beneficiary population aged 6- 59 months decreases by 25% between year one and the end of year two	Prevalence of global acute malnutrition in beneficiary population (children 6–59 months) decreases by 25% between Year One and end of Year Two. Baseline (Feb 2024): 46 children in BSF households screened; 0 cases of acute malnutrition. Midline (July 2025): MUAC data show no cases of acute malnutrition detected in BSF households, in addition to a 4% improvement of MUAC measures in the group; controls show a 19% relative decline in nutritional status. Interpretation: Because baseline prevalence was already zero, the target of a 25% reduction was not measurable. However, stability in BSF households compared with deterioration in controls represents a relative ~23% improvement (see annexes). Evidence: Health Guardian screenings linked with BSF household IDs (Feb 2024 & Jul 2025).

Output 1 (Insert **agreed** Outputs with indicators relevant to that Outputs in lines below). Reforest 30 ha (36,000 seedlings) over two years	
Output indicator 1.1. (Insert original Output level indicators) Number of total hectares reforested in Manombo Rainforest will increase by 15 hectares annually, starting in Year One of project implementation (Baseline: 36 hectares reforested)	(Report progress against indicators, and reference where evidence is provided e.g. Evidence provided in section 3.1 of report and Annex Y). This should be a **condensed summary** of your reporting in section 3.1 of the report) New hectares reforested in Manombo - For 2023, 27 hectares of land have been reforested, including 6 hectares using the "Assisted Natural Regeneration" technique, 20 hectares using the "conventional planting" technique, and 1 hectare using the MUVUCA technique. 9 planting sessions have been carried out, including one enrichment planting and eight initial plantings. A total of 418 people, including 198 women, participated in these plantings. - For the year 2024, 30 hectares of land have been reforested using conventional planting techniques. 813 people, including 465 women, participated in these planting efforts. - .By 2025, 19 hectares of land have been reforested using the "Conventional Planting" technique. Seven planting sessions have been carried out, including one enrichment planting and six initial plantings. 417 people, including 197 women, from neighboring communities participated in these plantings. A total of 76 hectares of land will be reforested between 2023 and 2025. Community participation in planting includes handling the seedlings from the nursery to the planting site, digging holes, and planting.
Output indicator 1.2. Number of total seedlings planted in Manombo reforestation plots will increase by 18,000 seedlings annually, starting in Year One of project implementation (Baseline: 43,200 seedlings planted)	In 2023, 41807 seedlings planted, including : - 8,388 seedlings comprising five species planted using the assisted natural regeneration (ANR) technique. - 32,126 seedlings of 15 species are planted using the "Conventional Planting" technique. - 1,293 seedlings of six species are planted using the MUVUCA technique. In 2024, 36,425 seedlings of 14 different species were planted.

	Since the beginning of 2025, 23,000 seedlings of 17 different species have been planted.
	These seedlings are all native plants. They are collected from the forest as wild seedlings (with two leaves). They are then potted in nurseries for at least three months. Once they reach a height of 20 to 30 cm, they are transplanted to reforestation sites.
	11 Nurseries maintained within 11 villages in 2023
	6 climate-resilient nurseries built in 2024
Output indicator 1.3. Seedlings planted will achieve a survival rate of 70% after 18 and 24 months of project implementation (Baseline: 60% survival rate, Target: 70% survival rate)	Plant growth is monitored every six months after planting. In 2024, monitoring the growth of seedlings planted in 2023 showed that the survival rate was between 80% and 85%. And in 2025, the survival rate of seedlings planted in 2024 is 80%. After each plant growth monitoring, maintenance work is always carried out on the plantations. Maintenance consists of replacing plants that have not survived. Stories from the field: *"Fire is the number one enemy of reforestation efforts. Almost every two years, fires come out of nowhere and wreak havoc on reforestation sites. Communities are helpless in the face of the violence and spread of fire, as the tree plantations they have been cultivating for so long are at risk of being destroyed once again. However, thanks to the awareness-raising efforts and determination of the Health in Harmony technicians who are supporting them in restoring the forest, they continue to show determination and hope to resume and continue the planting work."* 2024: 80-85% 2025 Q1: 80%; Q2: 80%
Output indicator 1.4.	2023: 5.5 km of existing firebreaks maintained and serviced. 2023: 8 km of additional firebreaks newly constructed

Total kilometers of firebreaks constructed will increase by 6 km annually, starting in Year One of project implementation (Baseline: 5 km of firebreaks existing, Target: 17 km of firebreaks)	2024: 12 km of additional firebreaks newly constructed June 2025: 10 km of newly constructed firebreaks These firewalls are maintained twice a year. In addition to the firewalls, fire patrols are conducted once a month. The objective is to reduce or prevent damage caused by fire.
Output 2. (Insert **agreed** Output) Insect frass fertilized trials developed and conducted in reforestation, agroforestry, and agriculture test plots (4 species in each plot), and evaluated for potential long-term production in insect farms in communities	
Output indicator 2.1. Protocol developed and study equipment/material sourced within 2 months of Year One of project implementation.	Done
Output indicator 2.2. Study initiated at all identified plots and all study team appointed and in place within 4 months of Year One of project implementation	Done
Output indicator 2.3. Study completed successfully by 20 months of project implementation	Completed.
Output indicator 2.4. Results disseminated at the national level and in a peer reviewed journal by end of Year Two	The paper was submitted and is currently under review in the Agronomy for Sustainable Development journal.
Output indicator 3. Seven village communities evaluate and identify the most acceptable formulation cricket powder based nutritional supplements	
Output indicator 3.1. Develop mixed-methods protocol for the acceptability study within 4 months of project implementation	Completed. This study employed a mixed-methods approach, integrating quantitative and qualitative data collection, to assess the acceptability and feasibility of incorporating Black Soldier Fly (BSF) larvae products into household diets. The quantitative phase utilized structured questionnaires, while the

	qualitative phase involved gender-segregated focus group discussions (FGDs) with adults.
Output indicator 3.2. Procure all three cricket formulations (powder/porridge/rice cake) within 6 months of project implementation	Completed
Output indicator 3.3. Study conducted in all 7 villages within 8 months of project implementation	Completed. The study was conducted in seven communities surrounding the Manombo Special Reserve (MSR) in southeastern Madagascar: Sahamahitsy, Madiorano, Andrafia, Maropanahy, Manombo, Morafeno, and Anivorano. These sites were selected based on convenience and the interest of communities.
Output indicator 3.4. Study results disseminated at the national level and in a peer reviewed journal within 13 months of project implementation	Completed. The scientific paper has been submitted to Plos One and is currently under review.
Output 4. Create successful self-sustaining cricket farms in 7 village communities	
Output indicator 4.1. At least 70 total people (70% female) will be trained on developing and managing a cricket farm by end of year Two.	In total, 89 people (65% women) are trained on developing and managing a BSF farm in Manombo region (9 villages). 52 BSF new farms are set up and 47 are running. All the farmers live with Small scale agriculture.
Output indicator 4.2. Starting in Year Two, the number of cricket farms producing cricket powder and frass in Manombo will increase from zero to seven by the end of the project.	Since the beginning of the project, the number of BSF farms producing fresh and dried BSF and frass increase from zero to fifty two in Manombo area.
Output indicator 4.3. At least 75% of cricket farms (5 farms) are functioning to the expected capacity by 6 months into Year Two.	As of May-June (8-10 months after implementation), 22 farms are in the first production cycle, while 9 are in the second cycle and 3 are emerging into the third cycle. The rest are newly implemented farms still undergoing their fist cycle in the upcoming weeks. These 36 successful farms represent 78% of the total number of implemented farms (46).

Output indicator 4.4. Over 75% of the beneficiary population of each farm consumes the pre-defined amount of cricket powder daily by the beginning of Year Two.	Thanks to four BSF cooking classes organized in Manombo region: In total, up to 130 people (65% women) participated and tasted BSF meals (fried and sauce), and now eat BSF regularly and have more nutritious food in their diet. It increased the acceptance of BSF as food in the area.
Output indicator 4.5. The prevalence of global acute malnutrition in the beneficiary population aged 6- 59 months of each farm reduces by 25% during Year Two.	Prevalence of global acute malnutrition in the beneficiary population (children 6–59 months) reduces by 25% during Year Two. Baseline (Feb 2024): 46 children screened in BSF households; 0 cases of malnutrition: 0% Prevalence. Control households: 92 children screened, 3 cases: 3.2% Prevalence Midline (July 2025): MUAC trends show +4% improvement in BSF households vs –19% decline in controls (relative difference ~23%). Evidence: Health Guardian screening data, matched with BSF household IDs (Feb 2024 & Jul 2025). The follow up will continue for the coming years, since change in nutrition status at the population level is expected to take time to show statistically significant changes. See full report in the annexes.

Output 5. Implementation of 10 ha of agroforestry on community land, training 2,000 community members in agroforestry techniques	
Output indicator 5.1. The total amount of land converted to agroforestry in Manombo will increase by 5 ha annually, starting in Year One of project implementation (Baseline: 9.41 ha of agroforestry plots).	2023: 15 hectares of agroforestry have been established 2024: 20 hectares of agroforestry have been established 2025: 5 hectares of agroforestry have been established **There are 14 species across the Ten agroforestry sites:** 500 *Cinnamomum verum*, 8 *Cocos nucifera*, 1820 *Litchi chinensis*, 120 *Citrus reticulata*, 1460 *Gliricidia maculata*, 2840 *Coffea canephora*, 1900 *Syzygium aromaticum*, 1046 *Artocarpus heterophyllus*, 940 *Carica papaya*, 440 *Piper nigrum*, 1340 cloves, 1600 jackfruit, 400 *Albizia lebbeck*, 300 *Musa paradisiaca*
Output indicator 5.2.	# of unique farming training participants 2023: 397 people, including 230 women. 2024: 1236 people, including 696 women.

By the end of Year Two of the project, 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques.	2025 : 151 people, including 104 women 1,784 members of the Manombo community, including 1,030 women (57.73%), have been trained in conventional agroforestry techniques.
Output indicator 5.3 Beginning six months into Year One, designated agroforestry crops will yield 3-5 tons every year after planting (Baseline: not currently measured; Target based on average production calculations of current crops/ha/year).	Agroforestry cash crops planted since 2023, such as cinnamon, coconut, lychee, mandarin, coffee, star anise, papaya, cloves, jackfruit, and sugar apple, have not yet yielded any products. However, we can estimate the number of years needed to **obtain harvests** for each plant. **Cinnamon** : Bark can be harvested after 2–3 years, but optimal yield is achieved after 8–10 years. **Coconut:** Begins producing around 6 years, peak production around 15–20 years. **Lychee:** up to 8–10 years **Mandarin :** 3 to 5 years **Coffee :** 3 to 4 years **Star anise:** 6 to 8 years **Papaye :** 1 year **Cloves** : 6 to 8 years **Jackfruit :** 3 to 4 years **Cinnamon apple** : 2 to 3 years

- **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
Impact: Improved livelihoods, reforestation, and malnutrition strategies are implemented in southeastern Madagascar; nutritional and economic poverty will improve and capacity for biodiversity protection, specifically of endemic lemur, will increase.			
Outcome: 31 Manombo communities will reforest 30 hectares of lemur habitat, convert 10 hectares of agroforestry plots, and test cricket-based nutrition, fertilization, and farming programs, improving malnutrition, poverty, and biodiversity protection.	0.1 - Number of total hectares reforested in Manombo Rainforest will increase by 15 hectares annually, starting in Year One of project implementation 0.2 - Mixed-methods study for the acceptability of three cricket powder nutritional formulations completed and disseminated at the national level and in a peer reviewed journal 0.3 - Cricket frass fertilizer trials developed and conducted in 12 total reforestation, agroforestry, and agriculture test plots 0.4 - 70 people (70% female) will be trained and actively managing 7 cricket farms by end of Year Two for continued production of frass and powder 0.5 - 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques	0.1 - Online reforestation database - updated quarterly to track ha reforested and number of seedlings planted 0.1 - Polygons of areas reforested included in public mapping platforms for ongoing monitoring 0.2 - Program reports and acceptability study team updates produced quarterly; financial reports produced annually 0.3 - Program reports and fertilizer study team updates produced quarterly, financial reports produced annually 0.4 - Training participation logs, kept in online database 0.5 - Training participation logs, kept in online database 0.6 - Routinely collected data from mobile clinics and health services	Climate events/shocks (i.e. cyclones) do not impact reforestation progress Acceptability study demonstrates willingness and acceptance of cricket powder formulations Wildfire patrolling and community education on preventing fire usage in land management will continue alongside reforestation work Species chosen for agroforestry may change according to community feedback, affecting crop yield potential At least 50% of community members who have engaged in training will implement and continue to apply

	0.6 - Prevalence of global acute malnutrition in the beneficiary population aged 6- 59 months decreases by 25% between year one and the end of year two		techniques to achieve the best yields
Outputs: **1**. Reforest 30 ha (36,000 seedlings) over two years	1.1 - Number of total hectares reforested in Manombo Rainforest will increase by 15 hectares annually, starting in Year One of project implementation (Baseline: 36 hectares reforested) 1.2 - Number of total seedlings planted in Manombo reforestation plots will increase by 18,000 seedlings annually, starting in Year One of project implementation (Baseline: 43,200 seedlings planted) 1.3 - Seedlings planted will achieve a survival rate of 70% after 18 and 24 months of project implementation (Baseline: 60% survival rate, Target: 70% survival rate) 1.4 - Total kilometers of firebreaks constructed will increase by 6 km annually, starting in Year One of project implementation (Baseline: 5 km of firebreaks existing, Target: 17 km of firebreaks)	1.1 - Online reforestation database - updated quarterly to track ha reforested and number of seedlings reforested 1.1 - Polygons of areas reforested included in public mapping platforms for ongoing monitoring 1.2 - Online reforestation database - updated quarterly to track ha reforested and number of seedlings reforested 1.3 - Monitoring using reforestation protocol three times per year (outlined in Activity Table) 1.4 - Online reforestation database - updated quarterly to track km of firebreaks constructed	1.1 - Five climate-resilient seedling nurseries on-site are constructed to accommodate seedlings needed for reforestation goal 1.2 - Climate events/shocks (i.e. cyclones) do not impact reforestation progress 1.3 - Wildfire patrolling and community education on preventing fire usage in land management will continue alongside reforestation work
2. Cricket frass fertilizer (CFF) trials developed and conducted in reforestation, agroforestry, and agriculture test plots (4 species in each plot), and evaluated for potential	2.1 - Protocol developed and study equipment/material sourced within 2	2.1 - Study protocol uploaded to OSF repository; confirmation of all materials received on site.	Study area is not disrupted by climate shocks such as cyclones

long-term production in cricket farms in communities	months of Year One of project implementation. 2.2 - Study initiated at all identified plots and all study team appointed and in place within 4 months of Year One of project implementation 2.3 - Study completed successfully by 20 months of project implementation 2.4 - Results disseminated at the national level and in a peer reviewed journal by end of Year Two	2.2 - Program reports and study team updates produced quarterly, financial reports produced annually. 2.3 - Program reports and study team updates produced quarterly, financial reports produced annually. 2.4 Publication in open access journal available	
3. Seven village communities evaluate and identify the most acceptable formulation cricket powder based nutritional supplements	3.1 Develop mixed-methods protocol for the acceptability study within 4 months of project implementation 3.2 Procure all three cricket formulations (powder/porridge/rice cake) within 6 months of project implementation 3.3 Study conducted in all 7 villages within 8 months of project implementation 3.4 Study results disseminated at the national level and in a peer reviewed journal within 13 months of project implementation	3.1 - Study protocol uploaded to OSF repository; confirmation of all materials received on site. 3.2 & 3.3 Program reports and study team updates, financial reports. 3.4 Publication in open access journal available	

| 4. Create successful self-sustaining cricket farms in 7 village communities | 4.1 - At least 70 total people (70% female) will be trained on developing and managing a cricket farm by end of year Two.

4.2 - Starting in Year Two, the number of cricket farms producing cricket powder and frass in Manombo will increase from zero to seven by the end of the project

4.3 - At least 75% of cricket farms (5 farms) are functioning to the expected capacity by 6 months into Year Two

4.4 - Over 75% of the beneficiary population of each farm consumes the pre-defined amount of cricket powder daily by the beginning of Year Two

4.5 - The prevalence of global acute malnutrition in the beneficiary population aged 6- 59 months of each farm reduces by 25% during Year Two. | 4.1 & 4.2- Project monitoring reports

4.3 & 4.4 - External evaluation of project by MBC, project and monitoring reports

4.5 Routinely collected data from mobile clinics and health services | Acceptability study demonstrates willingness and acceptance of cricket powder formulations

Project is not affected by major climate shocks (cyclones, etc). |
| 5. Implementation of 10 ha of agroforestry on community land, training 2,000 community members in agroforestry techniques | 5.1 - The total amount of land converted to agroforestry in Manombo will increase by 5 ha annually, starting in Year One of project implementation (Baseline: 9.41 ha of agroforestry plots)

5.2 - By the end of Year Two of the project, 2,000 Manombo community members (60% female) will be trained | 5.1 - Polygons of areas reforested included in public mapping platforms for ongoing monitoring

5.2 - Training participation logs, kept in online database

5.3 - Monitoring using agroforestry protocol three times per year (Photo | 5.1 Communities will engage with agroforestry trainings and Radical Listening to decide preferred species to plant for agroforestry

5.2 - At least 50% of community members who have engaged in training will implement and |

	in conventional agroforestry techniques 5.3 - Beginning six months into Year One, designated agroforestry crops will yield 3-5 tons every year after planting (Baseline: not currently measured; Target based on average production calculations of current crops/ha/year)	monitoring pre-planting in Year One and then once annually; seedling survival rate and general observations twice annually in Year Two)	continue to apply techniques to achieve the best yields 5.3 - Climate events/shocks (i.e. cyclones, extended dry or rainy seasons) do not impact agroforestry progress 5.4 - Soil nutrients through available organic fertilizers will be sufficient to support crops and trees 5.5 - Wildfire patrolling and community education on preventing fire usage in land management will continue alongside agroforestry work 5.6 - Projections used for crop yield are correct (mitigated by monitoring, evaluation, and target adjustment)

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. Each activity should start on a new line and be no more than approximately 25 words.)

1.1 - Prepare for planting by preparing seedlings (many collected as non-cash healthcare payments from communities), identifying and preparing plots, conducting Radical Listening with communities
1.2 - Maintain and build seedling nurseries to prepare and store seedlings for planting (also house agroforestry seedlings)
1.3 - Transport seedlings from nurseries to plots, creating holes of the proper depth and width to maximize seedling survival, and planting seedlings
1.4 - Reforestation staff and community members conduct photo-monitoring of seedlings once annually before planting, and conduct monitoring of planted seedling survival rate and height twice annually
1.5 - Forest Guardians and community members lead the construction and monitoring of firebreaks alongside reforestation staff once per month

2.1 - Identify the scientific team to develop the protocol, permissions received from local authority, stockpile fertilizers
2.2 - Identify and prepare the plot sites, engagement with the local community, selection of plant species
2.3 - Soil preparation, harmonization and tailoring pH to fertilizers, calibration of fertilizer dosage
2.4 - Quality analysis of measurements over time, collation of datasets into database and data cleaning
2.5 - Data analysis and preparation for publication, submission, dissemination

3.1 - Identify the scientific team to develop the protocol, permissions received from local authority and ethical review board
3.2 - Procurement of three products for identified beneficiaries in communities, sensitization of communities
3.3 - Conducting interviews, observations and feedback loops, codify data, identify thematics
3.4 - Data analysis and preparation for publication, submission, dissemination

4.1 Identify community participants in each of the seven villages
4.2. Construct or modify existing structures for cricket farms, distribution of cricket farming manuals
4.3. Hold community workshops in each village to learn farming techniques and powder processing
4.4 Monitor farming and production and modify SOP based on feedback from community successes.

5.1 Organize and plan quarterly trainings for 1,000 community members per year in agroforestry management protocols
5.2 Conservation director and team work with community to identify land and plant seedlings
5.3 Conduct participatory monitoring to collect community observations and refine protocol post-planting
5.4 Monitor crop yield of food-producing trees and interplanted agriculture every six months to ensure 60 tons of yield by the end of Year 2
5.5 Agroforestry staff and trained community members monitor seedling survival rate, tree health, flowering and fruiting, and conduct enrichment plantings twice annually

Table 1   Project Standard Indicators

Please see the Standard Indicator Guidance for more information on how to report in this section, including appropriate disaggregation. N.B. The annual total is not cumulative. For each year, only include the results achieved in that year. The total achieved should be the sum of the annual totals.

DI Indicator number	Name of indicator	If this links directly to a project indicator(s), please note the indicator number here	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total achieved	Total planned
E.g. DI-A01	E.g. Number of people in eligible countries who have completed structured and relevant training	1.2	People	Men	20	10	30	60	60
E.g. DI-A01	E.g. Number of people in eligible countries who have completed structured and relevant training	1.2	People	Women	30	0	10	40	30
E.g. DI-B01	E.g. Number of new or improved habitat management plans available and endorsed	0.3	Number	New	1	0	1	2	2
E.g. DI-B01	E.g. Number of new or improved habitat management plans available and endorsed	0.3	Number	Improved	1	0	2	3	3

In addition to reporting any information on publications under relevant standard indicators, in Table 2, provide full details of all publications and material produced over the last year that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Mark with an asterisk (*) all publications and other material that you have included with this report.

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)
Community Acceptance of Black Soldier Fly (BSF) Larvae-Based Products in Rural	Peer-reviewed scientific paper	Vonimihaingo Ramaroson, Sabrina Simon, Herizo Randrianandrasana,	Female	Madagascar	Plos One	https://plos.org/

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)
South-East Madagascar		Brian Fisher, Sakib Burza				
Cricket frass fertilizer promotes the survival, growth, and yield of zucchini (*Cucurbita pepo*)	Peer-reviewed scientific paper	Clarcky Andrianorosoa Ony, Cédrique Lova Solofondranohatra, Tanjona Ramiadantsoa, Andrianjaka Ravelomanana, Tantely Maminiaina Razafimbelo, Andry Andriamananjara, Sabrina Simon, Mahardika Putra Purba, Sakib Burza, Brian L. Fisher	Male	Madagascar	Agronomy for Sustainable Development	https://link.springer.com/journal/13593
Effects of black soldier fly frass fertilizer on maize (*Zea mays* L.) growth and yield under field conditions in southeastern Madagascar	Peer-reviewed scientific paper	Cédrique L. Solofondranohatra; Clarcky Andrianorosoa Ony; Sakib Burza; Brian L. Fisher	Female	Madagascar	Frontiers in Sustainable Food Systems	https://www.frontiersin.org/journals/sustainable-food-systems

- **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?	x
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	x
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.	
If you are submitting photos for publicity purposes, **do these meet the outlined requirements** (see section 14)?	x
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.	x
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.	x
Have you involved your partners in preparation of the report and named the main contributors	x
Have you completed the Project Expenditure table fully?	x
Do not include claim forms or other communications with this report.	