Department for Environment Food & Rural Affairs





Darwin Initiative Main: Annual 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: 30th April 2024

Submit to: <u>BCF-Reports@niras.com</u> including your project ref in the subject line

Darwin Initiative Project Information

Project reference	30-015
Project title	Protecting Biodiversity by improving community wellbeing in Southeast Madagascar
Country/ies	Madagascar
Lead Partner	Health In Harmony (HIH)
Project partner(s)	Madagascar Biodiversity Center (MBC)
Darwin Initiative grant value	£486,018.00
Start/end dates of project	April 1, 2023 - March 31, 2025
Reporting period (e.g. Apr 2023 – Mar 2024) and number (e.g. Annual Report 1, 2, 3)	April 1, 2023 - March 31, 2024 / Annual Report 1
Project Leader name	Sakib Burza
Project website/blog/social	Website: healthinharmony.org
media	Instagram: @healthinharmonyngo
	X: @hihngo
	Facebook: @healthinharmonyngo
	LinkedIn: @healthinharmony
	YouTube: @healthinharmonyngo
Report author(s) and date	Evan Davis/April 30, 2024

1. Project summary

This project addresses systemic poverty and lack of livelihood opportunities threatening communities and biodiversity in Southeastern Madagascar's Manombo Rainforest region.

Madagascar is a global biodiversity hotspot and conservation priority. Covering only 0.5% of Earth's land, it contains 5% of Earth's species, and 80% of its species live nowhere else.¹ 85% of Madagascar's plants, 90% of mammals and reptiles, and all lemurs, the island's iconic primate, are endemic.² Until 2018, Madagascar's Manombo Rainforest was shrinking rapidly,

¹ USAID. Madagascar: Environment and Climate Change. 5 Jan. 2021,

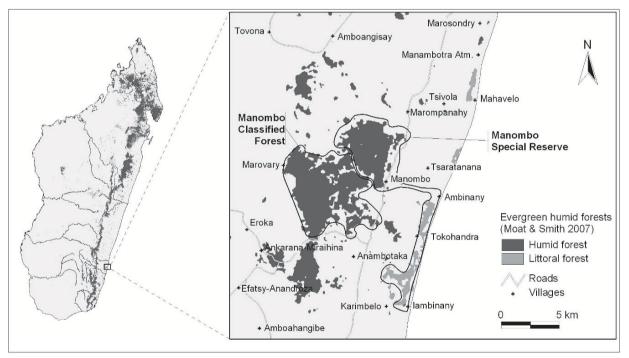
https://www.usaid.gov/madagascar/environment.

² Harper, Grady J., Marc K. Steininger, Compton J. Tucker, Daniel Juhn, and Frank Hawkins. "FiftyYears of Deforestation and Forest Fragmentation in Madagascar."

threatening its biodiversity, including several species endemic to Madagascar, and the people who live around it. Drivers of deforestation include substantial nutritional and economic poverty of local communities and lack of alternatives to swidden agriculture.

Health In Harmony (HIH) practices an innovative methodology called Radical Listening, which was used to identify the intersectional problems addressed in this project. This approach involves not only listening to Indigenous Peoples and local communities (IPs & LCs), but also investing precisely in their solutions that lead to rainforest stabilization, restoration, and community well-being. As those closest to the problem, IPs & LCs can best identify and implement climate solutions. During Radical Listening conducted around the Manombo Rainforest, communities identified a need for regenerative agriculture and agroforestry training, reforestation to protect forest biodiversity, and access to healthcare. These programs and practices introduce additional sources of income and food to increase human and biodiversity resilience to climate change. This project will address community poverty and deforestation through agroforestry, reforestation, and testing acceptability of insect-based nutrition and agriculture initiatives, increasing community well-being and reducing the need to degrade Madagascar's biodiversity for resources.

Manombo Rainforest, the geographic focal point of this project, is centered at the coordinates - 23.000852, 47.714608. It is located in the district of Midongy-Atsimo in the region of Atsimo-Atsinanana in Southeastern Madagascar. Health In Harmony works with thirty-one communities within a 2 km buffer of the Manombo Rainforest.



2. Project stakeholders/ partners

The primary stakeholders in this project are the 12,260 local community members living in 31 communities within 2 km of Manombo Rainforest. These 31 rural farming communities are comprised of Indigenous Antaisaka, Antaifasy, and Betsileo ethnic groups and are incredibly vulnerable to the effects of climate change. HIH uses Radical Listening, a community-design approach, to identify, monitor, and evaluate programs implemented during this project - reforestation, agroforestry, and insect frass, farming, and acceptability research. HIH staff use Radical Listening iteratively to gather community opinion and response to ongoing projects, like agroforestry training. The Radical Listening methodology prioritizes community expertise on living in balance with the forest, facilitating ongoing community leadership of the project.

Environmental Conservation 34, no. 04 (December 2007). https://doi.org/10.1017/S0376892907004262.

The primary project partner is the Madagascar Biodiversity Center (MBC). This partnership was formalized through HIH's first Darwin Partnership Project and continues to be mutually beneficial. MBC's project support focuses on planning and implementing the three-pronged insect research project: 1. Insect Frass Study, 2. Insect Acceptability Study, 3. Community-led Insect Farms. Based on their years of experience in insect-based solutions to human and biodiversity well-being, MBC offers subject matter expertise in each element of this project's insect research, filling a critical gap in HIH's experience and ability.

Various members of the MBC team meet formally with HIH staff at least every other week to collaborate on insect research. In Madagascar, MBC team members and local HIH staff collaborate more frequently, overseeing the daily implementation of insect research, such as the insect frass trials (Annex 4.5), and identification of villages that will participate in the acceptability study and insect farming (Annex 4.11). This international team must work across time zones, language barriers, and cultural differences to achieve impact in this project.

The Missouri Botanical Garden (MBG) seeks to protect and conserve plants and their ecosystems. MBG is a critical conservation partner of HIH, engaging in exchange visits, shared training sessions, and ongoing collaboration. In the last year, HIH's Forest Guardians (local community members that monitor the Manombo Rainforest using a set of forest disturbance indicators) and HIH conservation staff engaged in an exchange visit with MBG, learning techniques and best practices for reforestation. Additionally, HIH staff participated in MBG's World Biodiversity Day event. Partnership with MBG hones and refines HIH's reforestation practices, directly influencing the practices reflected in HIH's reforestation handbook (Annex 4.2)

Centre ValBio (CVB), an international research station situated on the edge of Madagascar's Ranomafana National Park, is an ongoing collaborative partner with HIH. HIH staff has engaged in exchange visits with CVB during year one of this project, sharpening our abilities to implement intersectional, community-designed projects by sharing best practices. Historic and continuous partnership with CVB has increased HIH's research capacity through skill-building, laying the foundation for the research projects included in this Darwin Initiative project (Outputs 2, 3, and 4).

3. Project progress

3.1 Progress in carrying out project Activities

During the reporting period, HIH collaborated closely with local communities to prepare seedlings for the reforestation of 23 hectares of the Manombo Rainforest, as outlined in Activity 1.1. This involved collecting seedlings from various sources, including non-cash payments for healthcare services, harvesting wildlings from the forest floor at 10-20 centimeters tall, and purchasing seedlings from local associations. Seedlings then undergo an acclimatization process (detailed in section 11) overseen by local community members. Annex 4.17 contains a list of seedling species used in reforestation. Through ongoing Radical Listening sessions, HIH's reforestation staff engaged with communities to identify suitable land parcels for planting, ensuring alignment with local needs. This integrated approach emphasizes community involvement and transparent communication, laying the groundwork for a sustainable reforestation initiative to preserve and restore the Manombo Rainforest's biodiversity.

During the reporting period, HIH managed 13 seedling nurseries surrounding the Manombo Rainforest, as outlined in Activity 1.2. Each nursery is overseen by local community members as managers and has a capacity of 5,000 seedlings. Combined, HIH can store a total of 65,000 seedlings. This highly localized approach ensures efficient seedling and nursery stewardship and fosters community ownership of the reforestation program.

Ensuring the survival of seedlings during transportation from nurseries to reforestation sites is paramount, as highlighted in Activity 1.3. HIH endeavors to maintain seedling viability throughout transit, watering seedlings upon arrival at the designated planting locations. Each seedling is planted 1.8 meters apart and marked by an upright bamboo stick, a practice aimed

at facilitating systematic monitoring and maintenance. For comprehensive insights into the planting procedure, reference Annex 4.2.

In collaboration with local community members, HIH's reforestation staff conducts thorough photo-monitoring of reforestation seedlings, as outlined in Activity 1.4. This collaborative effort underscores the organization's commitment to fostering community involvement in monitoring and preserving the reforestation efforts. Evidence of the photo-monitoring process can be found in Annex 4.3, accompanied by comprehensive procedures outlined in Annex 4.2. During the reporting period, HIH staff conducted photo and sapling monitoring twice, resulting in an initial seedling survival rate of approximately 75%, as documented in Annex 4.1.

Activity 1.5 involved a collaborative effort between HIH conservation staff, Forest Guardians (local community members employed by HIH for forest monitoring), and other local community members to construct eight kilometers of firebreaks around the Manombo Rainforest. This endeavor, detailed in Annex 4.1, underscores HIH's proactive approach to forest management and degradation prevention. The firebreak creation process is documented in Annex 4.2, providing comprehensive insights into the planning and execution of this critical aspect of forest conservation. By engaging local stakeholders in firebreak construction, HIH demonstrates its commitment to fostering community participation in safeguarding the ecological integrity of the Manombo Rainforest.

In alignment with Activity 2.1, the insect frass study team was established during the reporting period, comprising a diverse group of individuals, including Ony Clarky, Malagasy PhD student; Cédrique Solofondranohatra, MBC logistics coordinator; Tanjona Ramiadantsoa, MBC Director of Sciences; Sedera Ramaromanana, HIH Madagascar Conservation Manager; Mahardika Putra Purba, HIH Global Conservation Manager; Brian Fisher, California Academy of Sciences and MBC Founder; and Dr. Sakib Burza, HIH Chief Health and Research Officer. With the necessary permissions secured from local authorities, the frass study progressed as planned, involving the collection, stockpiling, and utilization of appropriate fertilizers. These activities are evidenced in Annexes 4.4, 4.5, and 4.6.

Activity 2.2 involved an insect frass study conducted in Tsaratanàna and Namohora, focusing on crops like Brassica rapa, Cucurbita pepo var cylindrica, Beta vulgaris, and Phaseolus vulgaris to evaluate frass as a fertilizer, evidenced in Annex 4.4. Led by Malagasy PhD student Ony Clarky, with support from HIH conservation staff, the study engaged local communities, sensitizing them to the research and involving them where appropriate, as demonstrated in Annex 4.5. This inclusive approach fosters collaboration and knowledge exchange, underlining the team's commitment to advancing agricultural knowledge and community involvement in sustainable practices in the region.

The frass study detailed in Activity 2.3 was initially conducted in the fall of 2023 and encountered challenges such as inconsistent watering, poor crop growth, and excessive fertilizer application, offering valuable lessons for the team regarding tailored soil preparation and fertilizer use, as evidenced in Annex 4.6. A second frass fertilizer trial is underway, applying these lessons learned to optimize crop growth. This iterative approach demonstrates the team's commitment to adaptive management and evidence-based practices in agricultural research, aiming for sustainable crop production in the region.

Ony Clarky and the MBC team collaborate closely with HIH members of the insect frass study to collect and compile data from the frass study, as outlined in Activity 2.4 and the Frass Study Protocol provided in Annex 4.4. This collaborative effort aims to gather comprehensive datasets and databases essential for publication, highlighting the team's commitment to rigorous scientific research and knowledge dissemination.

Once the frass study is complete, the insect frass as fertilizer study team will thoroughly analyze the data collected, write the results into a formal paper, and submit the product for publication, disseminating the data and lessons learned to a global audience.

The study team for the insect acceptability study, outlined in Activity 3.1, comprises a diverse group of professionals, including Dr. Sakib Burza (Health In Harmony), Dr. Vonimihaingo Ramaroson, Kirsten Dodroe (Health In Harmony), Brian Fisher (Madagascar Biodiversity Center), Maminiaina Randrianirina (Madagascar Biodiversity Center), Laurent Raveloson

(Health In Harmony), and Andry Tsirimanana (Health In Harmony), evidenced in Annex 4.7. Despite encountering a significant delay due to ethical approval processes, the team received approval on April 2, 2024, as documented in Annex 4.8, marking a crucial milestone in the progress of the study.

The procurement of three products for testing— insect larvae, insect powder, and biscuits containing insect powder—outlined in Activity 3.2 is scheduled for completion by April 2024. These products were chosen based on their ease of production and the established cultural acceptability of similar foods. The products will be transported to Farafangana from Antananarivo during the first quarter of the second year of the project (April - June 2024), with Dr. Voni, the study's newly appointed research coordinator, overseeing the logistics.

To progress Activity 3.3, HIH engaged Dr. Vonimihaingo Ramaroson to oversee the data collection process in Farafangana, leveraging her extensive expertise in entomophagy studies in Madagascar to uphold best practices within the field. Collaborating with HIH and MBC, Dr. Vonimihaingo contributed to the development of the study protocol (referenced in Annex 4.7), the design of survey instruments (outlined in Annex 4.15), and the preparation of documentation for submission to the national Ethics Review Board (ERB), evidenced in Annex 4.8. She also defended these documents before the ERB and coordinated responses to the Board's feedback, setting rigorous ethical standards for the study process. Data collection is scheduled for May - June 2024, facilitated by five enumerators recruited from the local university. Led by Dr. Vonimihaingo and the HIH Research team, data collection and analysis are slated for the first quarter of year two of the project (April - June 2024), ensuring comprehensive and systematic research execution.

Data collected during the acceptability study, outlined in Activity 3.4, will undergo thorough analysis before being submitted for publication and dissemination. Data analysis will be written into a formal paper and submitted during the fourth quarter of the second year of the project (January to March 2025), sharing data, findings, and lessons learned from the insect acceptability study with a global audience.

During the reporting period, seven villages were identified as locations for self-sustaining insect farms, as described in Activity 4.1 and evidenced in Annex 4.11. The subsequent phase, slated for year two of the project, involves the identification of community participants to engage in the initiative, marking a pivotal step toward establishing sustainable insect farming practices within these communities.

Activities 4.2, 4.3, and 4.4 are all slated for implementation during year two of the project, representing key milestones in increasing nutritional supplements available to local communities and reducing community-level malnutrition and hunger.

As outlined in Activity 5.1, HIH's conservation staff plays a pivotal role in regularly training local community members on the significance and practical application of agroforestry principles and techniques. Throughout the reporting period, these efforts resulted in the training of 1,109 community members, as documented in Annex 4.9, highlighting HIH's commitment to building community capacity for sustainable development practices within the local community.

During the reporting period, HIH and local communities collaborated to plant 29.41 hectares of agroforestry on community land, as planned in Activity 5.2 and documented in Annex 4.9. This land was generously donated by community members and cultivated in partnership with them under the supervision of HIH's conservation team. Community-led agroforestry fosters community engagement in sustainable land management practices.

As outlined in Activity 5.3, HIH's conservation team conducted photo-monitoring of agroforestry plots during the reporting period, evidenced in Annex 4.10. This monitoring process is crucial for assessing the progress and health of the seedlings over time. Detailed protocols for agroforestry plantation establishment and monitoring can be found in Annex 4.2.

During the reporting period, HIH focused on acquiring the necessary equipment to facilitate the measurement of agroforestry crop harvest described in Activity 5.4. Gathering the necessary tools and resources for harvest monitoring ensures timely implementation in year two of the project.

Activity 5.5 involved HIH conservation staff collaborating with trained local community members to regularly monitor agroforestry sites and conduct enrichment plantings to enhance the vitality of these areas. Regular monitoring engages local communities in the stewardship of agroforestry plots and ensures their long-term sustainability and success. Evidence of this monitoring effort is available in Annex 4.10.

3.2 Progress towards project Outputs

Output 1 aims to reforest 30 hectares (36,000 seedlings) over the two years of the project. With a baseline of 36 hectares reforested, by project end, HIH will have reforested 66 hectares of Manombo Rainforest, amounting to 30 hectares reforested during the project period. During the reporting period, HIH collaborated with community members to plant 40,579 seedlings on 23 hectares (Indicator 1.1, 1.2, and Annex 4.1), meaning that by the end of year one of the project, 59 hectares of Manombo Rainforest have been reforested, increasing wildlife habitat and forest carbon storage. HIH has already exceeded the number of seedlings planned during the project period - 79,200 seedlings were planned, and 83,799 have been planted. To protect these reforestation sites and Manombo Rainforest, HIH collaborated with community members to create eight kilometers of fire breaks (Indicator 1.4 and Annex 4.1), adding to the established baseline of 5 kilometers for a total of 13 kilometers of firebreaks. With 13 kilometers created in year 1, we are on track to meet this goal. Based on progress to date, Health In Harmony is highly likely to achieve Output 1 and all its activities and indicators by the end of the project in 2025.

Output 2 focuses on Insect Frass Fertilizer trials, evaluating its potential for long-term effectiveness and production. Since this study is new, there is no baseline for Output 2 or its indicators. During the reporting period, the study team convened bi-weekly to plan and roll out this study. A protocol has been drafted, a trial run and failed, and a second trial mounted and underway. Annex 4.4 offers evidence of the frass as fertilizer study procedure, Annex 4.5 offers evidence of field activities conducted, and Annex 4.6 offers insights into the lessons learned in the first trial, which have been incorporated into the second trial. Given the progress to date, it is highly likely that Output 2 and its indicators will be achieved by the end of the project in 2025.

Output 3 evaluates various edible formulations of insect-based powder as nutritional supplements in communities surrounding Manombo Rainforest. Since this is a new study, there is no baseline. During the reporting period, a protocol for the study was created, including identifying the study team (Annex 4.7). Ethical approval is mandatory prior to the initiation of data collection, and it was delayed due to slow processing times and an initial rejection, which necessitated a second application. Our first ethical approval application was submitted to a health-focused Ethical Review Board (ERB) and was rejected on the grounds that a more scientific ERB review and approval was needed for this project. Our project received approval to move forward with this acceptability study in quarter four of year one, setting us up to carry out the study in quarter one of year two (Annex 4.8). Despite the delay, it is likely that this output and its indicators will be achieved by the end of the project in 2025.

Output 4 focuses on the creation and establishment of seven self-sustaining insect farms in seven villages that surround the Manombo Rainforest. Since the activities involved in this output are new, there is no baseline. Output 3 is set to begin and end in the second year of the project. To date, seven villages have been identified as sites for insect farms. Details on these villages can be found in Annex 4.11. This output remains on schedule and should be complete by the end of the project in 2025.

Output 5 aims to plant ten hectares of agroforestry on community land and train 2,000 local community members in agroforestry techniques. With a baseline of 9.41 hectares of agroforestry, HIH plans to reforest 19.41 hectares of agroforestry by the end of the project, amounting to ten hectares planted during the project period. During the reporting period, HIH collaborated with community members to plant 20 hectares of agroforestry (Indicator 5.1, Annex 4.9), exceeding the project goal by ten hectares. During the reporting period, HIH trained 1,109 local community members in agroforestry techniques (Indicator 5.2, Annex 4.9), teaching

the agroforestry principles detailed in Annex 4.2. Additionally, during the reporting period, HIH prepared to track the harvest of crops from agroforestry plots. Despite agroforestry being a new program to HIH and local communities, the significant need and readiness for it (demonstrated by the high number of hectares planted in year one, Indicator 1.1), indicates that the output and its indicators will be achieved by the end of the project in 2025.

3.3 Progress towards the project Outcome

In the first year of our project, significant progress has been made towards achieving the desired outcomes, which include reforesting 30 hectares of lemur habitat, converting 10 hectares into agroforestry plots, and implementing insect-based nutrition, fertilization, and farming programs to improve malnutrition, poverty, and biodiversity protection.

To date, HIH, in partnership with the Madagascar Biodiversity Center and local communities, has successfully reforested 23 hectares of lemur habitat, exceeding our initial target by 13 hectares (Indicator 1.1). Additionally, we have transformed 20 hectares of degraded land into productive agroforestry, doubling the goal for this project phase (Indicator 5.1). During the reporting period, the project has also made significant strides in insect-based fertilization and nutrition programs (Outputs 2 and 3), which are integral to sustainable agriculture and food security strategies.

Our outcomes are measured using well-defined indicators that align with the overarching goals of biodiversity conservation, community engagement, and sustainable development. These indicators include the extent of land reforested, the area converted to agroforestry, and the adoption of innovative agricultural techniques. The creation of firebreaks under Indicator 1.4, aimed at protecting reforested land from wildfires, further ensures the sustainability of our habitat restoration efforts. Community involvement across all project facets—from reforestation and agroforestry to the development of insect-based agricultural solutions—has fostered local support and enhanced our interventions' effectiveness and sustainability. This active participation is pivotal in achieving improvements in malnutrition rates, economic conditions, and environmental stewardship within the 31 Manombo communities.

Given the substantial progress made in the first year, it is highly likely that the project will achieve its intended outcomes by the end of the funding period.

3.4 Monitoring of assumptions

Assumption 1: Climate events/shocks (i.e. cyclones) do not impact project activities. Comments: Climate events are common and intense in Madagascar, often manifesting as destructive cyclones but also manifesting in other ways, such as drought and flooding. This assumption still holds true and is important to the project. During year 1 of the project, despite cyclones hitting Madagascar, they did not hit the Manombo area, and therefore no climate shocks negatively impacted the project.

Assumption 2: Acceptability study demonstrates willingness and acceptance of insect powder formulations.

Comments: This remains an accurate and important assumption of the project. It remains to be determined if this assumption is correct.

Assumption 3: Wildfire patrolling and community education on preventing fire usage in land management will continue alongside reforestation and agroforestry work. Comments: This assumption remains true; HIH conservation staff frequently educate local communities on fire prevention through mobile clinics, Forest Guardian outreach, and other training.

Assumption 4: Species chosen for agroforestry may change according to community feedback, affecting crop yield potential.

Comments: In year one of the project, we did submit a change request (N0186B) to adjust the crop yield planned during this project.

Assumption 5: At least 50% of community members who have engaged in training will implement and continue to apply techniques to achieve the best yields Comments: This assumption remains true for the project.

Assumption 6: Five climate-resilient seedling nurseries on-site are constructed to accommodate seedlings needed for the reforestation goal.

Comments: This assumption is no longer relevant as HIH's 13 seedling nurseries offer sufficient seedling capacity (65,000 seedlings) for this project.

Assumption 7: Communities will engage with agroforestry trainings and Radical Listening to decide on preferred species to plant for agroforestry.

Comments: This assumption remains valid and important for the project. Local communities are willing to participate in Radical Listening with HIH, identifying species to plant in agroforestry, and have continued to engage in agroforestry training.

Assumption 8: Soil nutrients through available organic fertilizers will be sufficient to support crops and trees.

Comments: This assumption remains valid and essential for the project.

Assumption 9: Projections used for crop yield are correct (mitigated by monitoring, evaluation, and target adjustment).

Comments: In year one of the project, we did submit a change request (N0186B) to adjust the crop yield planned during this project.

3.5 Impact: achievement of positive impact on biodiversity and poverty reduction

The impact of this project as written in the project application, is as follows: "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." This project improves livelihood opportunities available to local communities surrounding the Manombo Rainforest by training them in agroforestry techniques, offering tangible skills that can simultaneously generate income and feed their families and communities (Indicator 5.2). The plantation of 29.41 hectares of agroforestry on community land (Indicator 5.1) and the training of 1,109 local community members in agroforestry (Indicator 5.2) demonstrate significant strides toward increasing local community members' abilities to generate sustainable income. This project improves Manombo Rainforest reforestation by reforesting 30 hectares of Manombo Rainforest (Indicator 1.1) with at least 79,200 seedlings (Indicator 1.2). The project goes further than simply reforesting Manombo Rainforest and also takes strides to ensure newly planted seedlings survive (Indicators 1.3 and 1.4). This project improves malnutrition strategies in Southeast Madagascar by testing insect-based solutions, including insect frass as fertilizer and insect powder as a nutritional supplement. Using insect frass as fertilizer (Output 2) can improve agricultural crop growth, increasing food production and combatting high malnutrition rates. Further, insect powder as a nutritional supplement (Output 3) has the potential to dramatically reduce malnutrition by offering an easy, affordable way for community members, especially children, to consume the necessary protein and nutrients. Finally, agroforestry training and plantation (Output 5) can decrease high malnutrition rates by increasing the amount of nutrient-rich food available to local community members.

Nutritional poverty in Southeast Madagascar, maintained by limited resources and nutrient-poor foods, is improved by increasing food sources, quality, and abundance. Outputs 2, 3, 4, and 5 all reduce nutritional poverty in Southeast Madagascar.

Economic poverty is improved by providing local communities more opportunities and skills to generate income. Indicator 5.2, the number of participants trained in agroforestry, directly

supports alleviating economic poverty. Indicator 4.1, the number of people trained in insect farming, also directly contributes to alleviating economic poverty.

This project holistically supports biodiversity protection by reducing local community reliance on forest resources for survival. By improving nutritional poverty (Outputs 2, 3, 4, and 5) and improving economic poverty (Outputs 4 and 5), local communities no longer rely on Manombo Rainforest for income and food, decreasing community degradation of Manombo Rainforest. Additionally, Outputs 1 and 2 directly contribute to the regeneration of the Manombo Rainforest, creating a more viable habitat for wildlife, including endemic lemur species.

The achievable outputs that form this project's foundation stand to significantly impact biodiversity protection and poverty reduction in Southeastern Madagascar, offering climate benefits to the entire world.

4. Project support to the Conventions, Treaties or Agreements

As detailed in the application form, this project remains aligned with the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), and the Global Goals for Sustainable Development (SDGs). In the reporting period, this project resulted in the reforestation of 23 hectares of tropical rainforest (Indicator 1.1) and the plantation of more than 29 hectares of agroforestry (Indicator 5.1). Both reforestation and agroforestry increase forest carbon storage, impacting not only Manombo Rainforest and the people that live around it but also offering climate benefits to the entire world, aligning with the goal of UNFCCC to stabilize greenhouse gas concentrations. Reforestation and agroforestry also both benefit the wildlife that finds habitat in the Manombo Rainforest. So far, this project has increased wildlife habitat by approximately 52 hectares through reforestation and agroforestry, improving the well-being of wildlife like the aye-aye, Jolly's mouse lemur, southern bamboo lemur, Manombo woolly lemur, greater dwarf lemur, and brown mouse lemur—all endemic to Madagascar and threatened with extinction.

During the reporting period, this project contributed tangibly to many intersectional SDGs. Training 1,109 local community members in agroforestry (Indicator 5.2) and insect powder nutritional options (Output 3) support Goal 2 (Zero Hunger) by improving food security. Agroforestry, insect farming, and fertilizer programs support Goal 1 (No Poverty), Goal 8 (Decent Work and Economic Growth), and Goal 5 (Gender Equality) by providing sustainable income opportunities and prioritizing women-led enterprises. HIH's Radical Listening methodology also prioritizes Gender equality (Goal 5), ensuring that women have equal opportunity to speak and influence program design. Together, these programs are powerful actions for Goal 13 (Climate Action) and Goal 15 (Life on Land) by addressing the drivers of deforestation, preventing multiple extinctions of endemic biodiversity, avoiding carbon emissions from rainforest burning, and sequestering carbon through reforestation.

Actions taken during this project and reporting period also bolster numerous national policies, plans, and regulations in Madagascar. By protecting forests (reforestation and agroforestry Indicators 1.1 and 5.1) and promoting sustainable development (Indicators 5.1 and 4.2) the project supports the National Environmental Action Plan and National Biodiversity Strategy and Action Plan. As the project is located in the Manombo Rainforest, a protected area, it also supports Madagascar's Protected Areas Network and Forest regulations. Additionally, as the activities of this project drive adaptation to climate change, the project supports Madagascar's Climate Change Adaptation and Mitigation Strategies.

5. Project support for multidimensional poverty reduction

The expected beneficiaries are the 12,260 local community members living in 31 communities within 2 km of Manombo Rainforest. Madagascar's local communities appreciate the value of the rainforest surrounding them, recognizing that its condition impacts their health, livelihoods, and well-being. Additionally, community members enact a traditional understanding of how to live in balance with their richly biodiverse landscape by sustainably harvesting the intact rainforest. These communities are a powerful barrier, protecting the rainforest from outside loggers and poachers who would deforest the land and push critically endangered wildlife toward extinction. Yet, poverty forces community members to degrade the rainforest and allow

access to outsiders to secure basic income, food, and healthcare. This project will protect the Manombo Rainforest by helping vulnerable communities overcome poverty without having to destroy their ecosystem. Project activities will introduce and test innovative solutions to reduce nutritional and economic poverty and protect critical biodiversity. Cheap and climate-friendly to produce and high in vitamins, fat, and protein, insect-supplemented food mixtures present opportunities to address nutritional poverty and provide alternatives to hunting in the rainforest. This research will allow Manombo communities to choose formulations that are both nutritionally sound and accepted by community members of all ages, addressing the broadest range of nutritional poverty. Following the expertise of rainforest communities, our theory of change recognizes that rainforest and human well-being are intertwined, meaning outputs protecting biodiversity in Manombo Rainforest must also address poverty and malnutrition, affecting the health of communities and driving deforestation. More details on poverty reduction can be found in Question 3.5.

6. Gender Equality and Social Inclusion (GESI)

Please quantify the proportion of women on the Project Board ³ .	43%
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women ⁴ .	100%

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	
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	X

As previously mentioned in sections 2 and 4, Health In Harmony's Radical Listening methodology is the foundation of this project, guiding all outputs, indicators, and activities. See Annex 4.12 for more information on the Radical Listening methodology. This community-design

³ A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

⁴ Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

methodology offers a practical strategy for inclusion, placing those most marginalized in leadership positions. Diverse representation and gender equity are central to the Radical Listening methodology, and the process ensures that women have equal opportunities to speak. If an individual or demographic does not participate actively, break-out groups are utilized to elicit input directly from members uncomfortable speaking in larger group settings; this is often an important tactic to include women in Radical Listening. HIH also prioritizes training and deployment of female Radical Listeners, as we have found that men continue to voice their ideas no matter the gender of the Radical Listener, and women are more likely to attend and voice their ideas to female Radical Listeners. This process results in an equitable power structure that counteracts traditional unequal power dynamics, making the designers and leaders of programs those from the most marginalized groups, especially women.

This project further facilitates female leadership by ensuring that at least 50% of individuals trained in agroforestry are women (Indicator 5.2). During the reporting period, of the 1,109 individuals trained in agroforestry techniques, 618, or 55%, of them were women (Indicator 5.2, Annex 4.9). Additionally, women will be prioritized as managers of insect farms in year 2 of the project (Indicator 4.1).

7. Monitoring and evaluation

As previously described in questions 2, 4, and 6, Radical Listening is the foundation of this project. See Annex 4.12 for information on the process of Radical Listening. Radical Listening ensures that both the activities carried out in this project meet the needs of local communities and that local communities are actively engaged in project activities. Community ownership and leadership of project activities are crucial to their long-term success.

Data collected by HIH's Madagascar conservation staff contribute to our ability to measure the progress and success of Outputs 1 and 5 and demonstrate progress toward our project Outcome. Conservation staff collect data such as the number of seedlings, reforestation and agroforestry site locations, seedling species, seedling survival, community participants (including gender), lengths of fire breaks, and crop harvest weight. Study teams, comprised of HIH and MBC staff, collect technical data that allows us to measure Outputs 2, 3, and 4 and demonstrate their direct contributions to our project's Outcome. Study activity reports and data analysis enable us to track our progress toward achievement of Outputs 2, 3, and 4.

The monitoring and evaluation plan has not changed; however, HIH is in the process of transitioning to a new data collection tool. Staff have historically collected data using a hardware-based SQL database and Google Sheets. In 2023, HIH began transitioning from our current system to CommCare by Dimagi, an offline-enabled data collection app for Android devices and an SQL database stored in the AWS cloud, linked to data visualizations using Tableau Cloud. CommCare will enable us to track data intersections more clearly, further demonstrating how project outputs and activities contribute to our project outcome and impact a number of outcomes. For example, agroforestry training increases forest and biodiversity protection while also increasing livelihood options and building economic resilience in local community members. CommCare will allow Health In Harmony to link programmatic data to multiple programs, accurately reflecting intersectional impacts.

8. Lessons learnt

One important lesson learned in year one of project implementation is that our initial estimates of potential agroforestry harvest needed to be more accurate and feasible. Because agroforestry is a new program for HIH, our initial forecast reflected potential harvest from fully mature fruit trees and crops. However, agroforestry planted during this project will not reach maturity during the project as it takes approximately five years for it to mature. Thus, we submitted a change request (N0186B) to reduce the target harvest to a more realistic number– 3-5 tons.

Another important lesson came from Output 2 - the study of using insect frass as fertilizer. The Insect Frass study team conducted an initial trial in August and September of 2023 (Indicator

2.2), which failed due to poor community education, poor watering, crop seasonality, and overfertilization (Annex 4.6). These are all important lessons that we would apply if we could start over. Due to the failure of the first trial, the Insect Frass study team is now conducting a second trial applying these key lessons learned. We are hopeful for a more successful outcome.

The second insect study (Output 3) offered an additional critical lesson learned while seeking Ethical Review Board (ERB) approval. Our first application was denied on the grounds that our study was a better fit for a different review board. If we were able to do this over again, we would apply to the correct review board right away to allow the Insect powder acceptability study to proceed without significant delay. As it is, the Insect Acceptability study has been significantly delayed but will be possible by the end of the project. See Annexes 4.8 and 4.16 for evidence.

At this time, we do not plan to submit any additional change requests.

9. Actions taken in response to previous reviews (if applicable)

Upon receiving approval for this grant, the Darwin Initiative instructed us to reduce the audit costs allocated in our budget to align with the maximum allowed claim for an audit cost - £3,000. We submitted that change request and received approval, CR22-172.

Additionally, when reviewing our project application, the Darwin Expert Committee identified some areas in which our application could have been stronger. These points and our bi-annual commentary on them are detailed in Annex 4.13.

11. 10. Risk Management

Yes, new risks arose during year one of the project implementation. First, staff changes had the potential to threaten project success because implementation staff hold critical knowledge of the specifics of the project. While the HIH staff did experience some staff turnover, project implementation has remained steady due to strong training and programmatic protocols.

Additionally, several issues have occurred during year one of project implementation. We have submitted change requests to accommodate many of these issues, including:

- Audit Cost Adjustment reducing budgeted audit costs to align with Darwin Initiative standards
- Staff Changes adjusting staff titles and names in the project budget to reflect staff departures, promotions, and reallocations
- Agroforestry Tonnes Harvested reducing the planned tonnes harvested during agroforestry activities during the project period to a feasible amount
- Research budget adjustment shifting budget from year one of the project into year two to align with research activities and studies
- Capital Expense Change Request adjusting the budget to purchase two cars rather than one to support HIH's reforestation and agroforestry programs
- Hand Tractor budget adjustment shifting the budget for hand tractors into general reforestation supplies as hand tractors no longer aligned with community-identified need
- Changing Cricket Study to Insect Study to align with the strategic choice of our project partner Madagascar Biodiversity Center (MBC) we shifted our narrative and objectives to focus on insects, rather than only crickets, to include Black Soldier Fly (BSF) farming.

Additional issues include:

- Frass Study Failure as detailed in responses to questions 3.1, 3.2, and 8, our first trial of Frass as fertilizer failed.
- ERB Approval Delay as detailed in responses to questions 3.2 and 8, our first application to an ERB was unsuccessful, but following their feedback, our Insect Acceptability team reapplied and received approval, enabling the insect acceptability study to launch in quarter one of year two of project implementation.

Our project's complete and updated risk register can be found in Annex 4.14.

10. Sustainability and legacy

This project focuses on 31 local communities surrounding the Manombo Rainforest in Southeastern Madagascar, delivering insights into and evidence of the efficacy of communitydesigned climate solutions to a global audience. Based on our project's open access plan, the primary stakeholders who need to display interest and engagement in our project during the project period are local community members and project partners, specifically the Madagascar Biodiversity Center. During the reporting period, local community members have engaged in project activities, participating in agroforestry training and planting (Indicators 5.1 and 5.2) and reforestation efforts (see Annex 4.1). Local communities demonstrate curiosity and interest in insect-based product research (see Annex 4.5). MBC continues to collaborate frequently and well with HIH staff and local communities, meeting biweekly with HIH and working with HIH to ensure positive community relations. Holistic and ongoing project engagement demonstrates that the project team is successfully making the project activities and findings open access.

The project outlined in the application remains valid now that the project has begun. This project addresses community poverty and deforestation through agroforestry, reforestation, and testing of insect-based nutrition and agriculture initiatives, increasing community well-being and reducing the need to degrade Madagascar's biodiversity for resources.

11. Darwin Initiative identity

The Darwin Initiative is a published funder on Health In Harmony's website. To date, Health In Harmony has not used the Darwin Initiative's logo in promotional materials. Awareness of the Darwin Initiative in Madagascar is quite limited, especially in the communities this project focuses on. However, this project has raised awareness of the Darwin Initiative and its goals. Health In Harmony utilizes various social media accounts (X, Instagram, LinkedIn, YouTube) and finds social media an effective method of growing our audience. To date, we have not linked posts to the Darwin Initiative/Biodiversity Challenge Funds.

12. Safeguarding

Has your Safeguarding Policy been updated in the past 12	Yes/ <mark>No</mark>
months? Have any concerns been reported in the past 12 months	Yes/ <mark>No</mark>
Does your project have a Safeguarding focal point?	Yes/No [If yes, please provide their name and email] Sakib Burza,
Has the focal point attended any formal training in the last 12 months?	Yes/No [<i>If yes, please provide date and details of training</i>] Child and Adult Safeguarding, level 3
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 100% [35] Planned: 100% [35]
Has there been any lessons learnt or challenges on Safeguard Please ensure no sensitive data is included within responses. No	ling in the past 12 months?
Does the project have any developments or activities planned coming 12 months? If so please specify.	l around Safeguarding in the
No	
Please describe any community sensitisation that has taken p include topics covered and number of participants.	place over the past 12 months;
Health In Harmony's Malagasy staff (approximately 35 individ 31 Health Guardians) frequently conduct community sensitiza Listening alongside programmatic activities. We estimate that local community members per month.	tion via ongoing Radical
Have there been any concerns around Health, Safety and See past year? If yes, please outline how this was resolved.	curity of your project over the
No	

13. Project expenditure

Table 1: Project expenditure <u>during the reporting period</u> (1 April 2023 – 31 March 2024)

Project spend (indicative)	2023/24	2023/24	Varianc	Comments
since last Annual Report	Grant	Total	е	(please explain
	(£)	Darwin	%	significant
		Costs (£)		variances)

Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Others (see below)	0	0	0%	
TOTAL	243, 190	243, 190		

Table 2: Project mobilised or matched funding during the reporting period (1 April 2023 –31 March 2024)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)			IUCN, Grantham Foundation, Disney Conservation Fund, Kiphart Centre, Zoo New England
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)			Individuals, Foundations, Governments, Corporate, etc.

12.

13. Other comments on progress not covered elsewhere

HIH's new seedling acclimatization process aims to enhance the survival rate of planted seedlings in reforestation sites through a multi-level acclimatization approach implemented in seedling nurseries. This process involves a period of acclimatization ranging from three weeks to one month before planting.

Initially, seedlings are transitioned from shaded areas to open spaces within the nursery environment for one week, during which they are watered twice daily. This deliberate shift from shade to sunlight induces stress in the seedlings, simulating the conditions they will encounter in the open field where sunlight exposure is constant. Subsequently, the watering frequency is reduced to once daily to introduce mild water stress, reflecting the anticipated conditions of limited water availability in reforestation sites.

Despite efforts to schedule reforestation plantings during the rainy season, the unpredictability of weather patterns, exacerbated by climate change, necessitates preparation for scenarios of insufficient rainfall. To address this challenge, a raindrop water system, utilizing water-filled plastic bottles, is implemented to gradually supply water to the seedlings in the absence of rainfall. See Annex 4.10 for a photo of the raindrop water system.

These initiatives have yielded tangible results, as evidenced by the significant increase in the survival rate of seedlings in the reforestation field, reaching above 80% in some plots (Annex 4.1). The success of these endeavors underscores the importance of proactive adaptation strategies in mitigating the impacts of climate variability on reforestation efforts.

In parallel with these technical advancements, the engagement of local community members through Radical Listening has offered important insights into the impact of the new agroforestry program. Historically, communities planted cash crops like cloves and coffee separately from food crops like beans and cassava. However, they learned in agroforestry training that the two crop types can be mixed, increasing yields without increasing plot size. Agroforestry training also introduced community members to trees like the Jackfruit tree, which can offer fruit and wood.

HIH's seedling nurseries have been built with climate resilience in mind, recognizing the vulnerability of structures to recurrent climate disturbances. By adopting resilient construction practices, the nursery can better withstand future climatic challenges, ensuring continuity in seedling production and reforestation efforts.

Additionally, a commitment to gender equality and women's empowerment is evident in the deliberate recruitment of women as nursery and insect farm managers. This initiative not only diversifies leadership roles within conservation programs but also fosters greater female participation and representation in environmental initiatives. Currently, six women are employed as nursery managers, comprising nearly half of the managerial positions.

14. OPTIONAL: Outstanding achievements or progress of your project so far (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).

File Type (Image / Video / Graphic)	File Name or File Location	Caption including description, country and credit	Social media accounts and websites to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)
				Yes / No
				Yes / No
				Yes / No
				Yes / No
				Yes / No

15. Annex 1: Report of progress and achievements against logframe for Financial Year 2023-2024

Project Summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
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.	This project holistically supports biodiversity protection by reducing local community reliance on forest resources for survival. By improving nutritional poverty (Outputs 2, 3, 4, and 5) and improving economic poverty (Outputs 4 and 5), local communities will no longer rely on Manombo Rainforest for income and food, decreasing community degradation of Manombo Rainforest. Additionally, Outputs 1 and 2 directly contribute to the regeneration of the Manombo Rainforest, creating a more viable habitat for wildlife, including endemic lemur species.	
Outcome: 31 Manombo communities will reforest 30 hect fertilization, and farming programs, improving malnutrition	tares of lemur habitat, convert 10 hectares of agroforestry p , poverty, and biodiversity protection.	plots, and test insect-based nutrition,
Outcome indicator 0.1 - Number of total hectares reforested in Manombo Rainforest will increase by 15 hectares annually, starting in Year One of project implementation [DI-D01]	Twenty-three hectares of degraded land in Manombo Rainforest have been reforested.	Seven hectares of degraded land in Manombo Rainforest will be reforested.
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 [DI-C17]	A protocol for the acceptability study has been completed. See Annex 4.7 for the protocol document.	Complete and disseminate a mixed- methods study for the acceptability of three insect powder nutritional formulations.
Outcome indicator 0.3 - Insect frass fertilizer trials developed and conducted in 12 total reforestation, agroforestry, and agriculture test plots [DI-C07]	The frass study team has been decided and convened regularly throughout year one. This team conducted a trial of frass fertilizer from August - November 2023, which failed due to a lack of watering by community-appointed teams. At the end of Year 1, the study team initiated a second trial of frass fertilizer, improving the conditions for success.	The frass fertilizer study team will complete a second trial of frass fertilizer, evaluating its value in reforestation and agriculture programs.

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 [DI-B07]	Insect farm creation and replication will begin in year 2 of the project.	As seven insect farms are built, at least 70 people will be trained in developing and managing an insect farm.
Outcome indicator 0.5 - 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques [DI-A01]	1,109 community members who live around the Manombo Rainforest were trained in agroforestry, and 56% were women.	Train 891 community members in agroforestry techniques.
Outcome indicator 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 [DI-E02]	Insect farm creation and replication will begin in year 2 of the project.	Monitor malnutrition rates in the communities that eat insect-based nutritional supplements, tracking changes in malnutrition rates.
Output 1 . Reforest 30 ha (36,000 seedlings) over two yea	ars	
Output indicator 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) [DI- D01]	HIH Madagascar collaborated with local Malagasy community members to reforest 23 hectares of the Manombo Rainforest. See Annex 4.17 for species planted in reforestation. See Annex 4.1 for online reforestation database, detailing hectares reforested.	HIH Madagascar will collaborate with local community members to plant at least seven additional hectares of Manombo Rainforest, meeting the project's goal of 30 hectares reforested.
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)	HIH Madagascar collaborated with local Malagasy community members to plant 40,579 seedlings through the reforestation program, totaling 83,779 seedlings planted and surpassing the project goal of planting 79,200 seedlings by the end of the project. See Annex 4.1 for seedling details.	HIH Madagascar will collaborate with local community members to plant the appropriate number of seedlings to reforest at least seven additional hectares of Manombo Rainforest.
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)	HIH Madagascar planted 40,579 seedlings on 23 hectares of Manombo Rainforest and has begun monitoring seedling survival rates. Initial monitoring indicates a seedling survival rate of approximately 75%. See Annex 4.1.	HIH Madagascar will continue to reforest and monitor seedling survival rates. Rates will be reported beginning October 2024, 18 months after the first reforestation planting supported by the Darwin Initiative, which was conducted in April of 2023.

Output indicator 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) [DI- D01]	HIH Madagascar collaborated with local Malagasy community members to create eight kilometers of firebreaks, protecting the Manombo Rainforest from the threat of wildfire. See Annex 4.1.	HIH Madagascar will collaborate with community members to construct at least four additional kilometers of biodiversity-protecting firebreaks.
Output 2 . Insect frass fertilizer (IFF) trials developed and evaluated for potential long-term production in insect farm	conducted in reforestation, agroforestry, and agriculture te s in communities	st plots (4 species in each plot), and
Output indicator 2.1 - Protocol developed and study equipment/material sourced within 2 months of Year One of project implementation.	A protocol for the Insect frass fertilizer trial was originally developed and finalized in August 2023, but due to trial failure, the procedure was recently updated on April 1, 2024. See Annex 4.4 for the protocol. Note that agroforestry was ultimately removed from the output to focus on reforestation and agriculture species, increasing reforestation to 6 species and maintaining 4 for agriculture.	The frass research team will complete a second trial of frass fertilizer by January 2025.
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	The frass study team has been decided and convened regularly throughout year one. This team conducted a trial of frass fertilizer from August - November 2023, which failed due to a lack of watering by community- appointed teams. At the end of Year 1, the study team initiated a second trial of frass fertilizer, improving the conditions for success.	The frass fertilizer study team will complete a second trial of frass fertilizer, evaluating its value in reforestation and agriculture programs.
Output indicator 2.3 - Study completed successfully by 20 months of project implementation	A first frass fertiliser trial was completed from August to November 2023 and a second frass fertilizer trial is currently underway, keeping the study on track for completion by month 20 of the Darwin Initiative project.	The frass fertilizer study team will conduct a second trial of frass fertilizer, completing the study by month 20 of the Darwin Initiative project.
Output indicator 2.4 - Results disseminated at the national level and in a peer-reviewed journal by end of Year Two [DI-C18]	Frass fertilizer trials began in year 1 of the project and will be finished in year 2, generating evidence for a publishable research paper.	Once the frass fertilizer study is complete by month 20 of the project, the frass fertilizer study team will write the results into a paper and submit it to a peer-reviewed journal.

Output 3. Seven village communities evaluate and ident	ify the most acceptable formulation insect powder based n	utritional supplements
Output indicator 3.1 Develop mixed-methods protocol for the acceptability study within 4 months of project implementation	A protocol for the insect acceptability study was developed and finalized on December 21, 2023. Evidence is provided in Annex 4.7. Ethical Approval from the National Academy in Madagascar was granted in March 2024.	The acceptability study protocol will be used during the acceptability study in quarter one of year two of the project.
Output indicator 3.2 Procure all three insect formulations (powder/porridge/rice cake) within 6 months of project implementation	The three products for testing have been identified (insect larvae, insect powder, and biscuits containing insect powder) and will be procured by April 2024.	Three insect formulations will be procured by the end of April 2024
Output indicator 3.3 Study conducted in all 7 villages within 8 months of project implementation	Led by Dr. Voni and the HIH Research Team, data collection will take place from May - June 2024.	The insect acceptability study will be complete by the end of June 2024.
Output indicator 3.4 Study results disseminated at the national level and in a peer reviewed journal within 13 months of project implementation [DI-C17]	This will be completed in year two of the project.	Once data analysis has been completed, the results will be synthesized into technical deliverables, written into a publishable paper, and submitted to a peer-reviewed journal.
Output 4. Create successful self-sustaining insect farms	in 7 village communities	
Output indicator 4.1 - At least 70 total people (70% female) will be trained on developing and managing an insect farm by end of year Two. [DI-B07]	The plan for creating the insect farms has been drafted. MBC and HIH are reviewing the necessary supplies to create the farms and developing plans to source the supplies. The Malagasy HIH Research Associate has met with community leaders to introduce Output 3 and 4. Once Output 3.3 is completed, HIH will know which community members are interested in insect farming and can begin training them to manage the insect farm. Meanwhile,	As seven insect farms are built, at least 70 people will be trained in developing and managing an insect farm.

	sensitisation with the communities regarding the farms is ongoing.	
Output indicator 4.2 - Starting in Year Two, the number of insect farms producing insect powder and frass in Manombo will increase from zero to seven by the end of the project [DI-C07]	Seven communities that will be sites for seven insect farms have been identified, contingent on communities being favourable to the acceptability study. They are: Andrafia, Morafeno, Anivorano, Sahamahitsy, Takoandra, Madiorano, and Manombo (see Annex 4.11).	Seven insect farms will be built in communities that surround Manombo Rainforest.
Output indicator 4.3 - At least 75% of insect farms (5 farms) are functioning to the expected capacity by 6 months into Year Two [DI-A10]	Insect farm creation and replication will begin in year 2 of the project.	Five insect farms will be built by September 2024.
Output indicator 4.4 - Over 75% of the beneficiary population of each farm consumes the pre-defined amount of insect powder daily by the beginning of Year Two [DI-D02]	Insect farm creation and replication will begin in year 2 of the project.	75% of the community members that live in the seven communities identified as farm sites (Andrafia, Morafeno, Aniborano, Sahamahitsy, Takoandra, Madiorano, and Manombo (see Annex 4.11) will consume pre-defined amounts of insect powder daily.
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. [DI-E02]	Insect farm creation and replication will begin in year 2 of the project.	HIH will monitor malnutrition rates in the communities that eat insect- based nutritional supplements, tracking changes in malnutrition rates.
Output 5. Implementation of 10 ha of agroforestry on cor	nmunity land, training 2,000 community members in agrof	orestry 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) [DI-D01]	HIH Madagascar collaborated with local Malagasy community members to plant 20 hectares of agroforestry on land that surrounds the Manombo Rainforest, which was donated by local community members, totaling 29.41 hectares of agroforestry planted. See Annex 4.9 for evidence.	The project has already achieved and exceeded its goal of planting a total of 19.41 hectares of agroforestry in collaboration with community members. In year 2, HIH Madagascar will collaborate with

		community members to maintain, monitor, and utilize the 29.41 hectares of agroforestry that have been planted.
Output indicator 5.2 - By the end of Year Two of the project, 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques [DI-A01]	HIH Madagascar trained 1,109 community members, 618 women and 491 men, in agroforestry through hands-on training and planting (Annex 4.9).	HIH Madagascar will train at least 891 local community members in agroforestry practices, including hands-on monitoring of agroforestry plots.
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)	HIH Madagascar established a system for tracking and reporting yield harvested from agroforestry plots, including weighing equipment and staff training.	HIH Madagascar staff will collaborate with communities to weigh crops that are harvested from agroforestry plots.

16. 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 insect-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 [DI-D01] 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 [DI-C17] 0.3 - Insect frass fertilizer trials developed and conducted in 12 total reforestation, agroforestry, and agriculture test plots [DI-C07] 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 [DI-B07] 	 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 	Climate events/shocks (i.e. cyclones) do not impact reforestation progress Acceptability study demonstrates willingness and acceptance of insect 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 techniques to achieve the best yields					

	 0.5 - 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques [DI-A01] 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 [DI-E02] 	0.6 - Routinely collected data from mobile clinics and health services	
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) [DI-D01] 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%) 	 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) 	 1.1 - 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

	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) [DI-D01]	1.4 - Online reforestation database - updated quarterly to track km of firebreaks constructed	
2. Insect frass fertilizer (IFF) 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	 2.1 - Protocol developed and study equipment/material sourced within 2 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 [DI-C18] 	 2.1 - Study protocol uploaded to OSF repository; confirmation of all materials received on site. 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 	Study area is not disrupted by climate shocks such as cyclones

3. Seven village communities evaluate and identify the most acceptable formulation insect 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 insect 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 [DI-C17] 	 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 insect farms in 7 village communities	 4.1 - At least 70 total people (70% female) will be trained on developing and managing an insect farm by end of year Two. [DI-B07] 4.2 - Starting in Year Two, the number of insect farms producing insect powder and frass in Manombo will increase from zero to seven by the end of the project [DI-C07] 	 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 insect formulations Project is not affected by major climate shocks (cyclones, etc).

	 4.3 - At least 75% of insect farms (5 farms) are functioning to the expected capacity by 6 months into Year Two [DI-A10] 4.4 - Over 75% of the beneficiary population of each farm consumes the pre-defined amount of insect powder daily by the beginning of Year Two [DI- D02] 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. [DI-E02] 		
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) [DI-D01] 5.2 - By the end of Year Two of the project, 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques [DI-A01] 	 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 monitoring pre- planting in Year One and then once annually; seedling survival 	 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 continue to apply techniques to achieve the best yields 5.3 - Climate events/shocks (i.e. cyclones, extended dry or rainy

5.3 - Beginning s Year One, design agroforestry crop tons every year a (Baseline: not cu measured; Targe average producti of current crops/	nated s will yield 3-5 after planting rrently et based on on calculations	 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)
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Activities

- 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 insect farms, distribution of insect 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

17. Annex 3: Standard Indicators

Table 1 Project Standard Indicators

Please note that Indicators 0.1, 0.2, 0.3, 0.4, 0.5, and 0.6 are duplicates of other indicators. Data reported there should not be counted cumulatively into project totals.

DI Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-D01	0.1 - Number of total hectares reforested in Manombo Rainforest will increase by 15 hectares annually, starting in Year One of project implementation	hectares	Protected areas Community controlled	23 hectares, community controlled			23 hectares, community controlled	30 hectares
DI-C17	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	Number		0			0	1
DI-C07	0.3 - Insect frass fertilizer trials developed and conducted in 12 total reforestation, agroforestry, and agriculture test plots	Number	Communities/sub- national	0			0	12
DI-B07	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		Gender Stakeholder group: Local Communities Training type: biodiversity, sustainable development, programme management	0			0	70
DI-A01	0.5 - 2,000 Manombo community members (60% female) will be trained in conventional agroforestry techniques	People	Gender Stakeholder	618 women 491 men			618 women 491 men	2000 local community members

DI Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planne during the project	
			group: Local Communities Training type:	1,109 total trained in agroforestr			1,109 total trained in agroforestry		
			biodiversity, sustainable development, programme	y 1,109 local community			1,109 local community members		
			Gender	members					
			Age Group						
DI-E02	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	Proportion	Indigenous Peoples and Local Communities	0			0	2	25%
DI-D01	1.1 - Number of total hectares reforested in Manombo Rainforest will increase by 15 hectares annually, starting in Year One of project implementation	Hectares	Protected areas Community controlled	59 hectares, community controlled			59 hectares, community controlled	66 hectares	
	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)	Number		83,779 seedlings			83,779	79200 seedlings	
	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)	Proportion		0			0	7	70%

DI Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-D01	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)	kilometers	ecosystem, community controlled	13 kilometers			13 kilometers	17 kilometers
	2.1 - Protocol developed and study equipment/material sourced within 2 months of Year One of project implementation.			1			1	1
	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			1			1	1
	2.3 - Study completed successfully by 20 months of project implementation			0			0	1
DI-C18	2.4 - Results disseminated at the national level and in a peer reviewed journal by end of Year Two	Number	Journal	0			0	1
	3.1 Develop mixed-methods protocol for the acceptability study within 4 months of project implementation	Number		1			1	1
	3.2 Procure all three insect formulations (powder/porridge/rice cake) within 6 months of project implementation	Number		0			0	3
	3.3 Study conducted in all 7 villages within 8 months of project implementation	Number	local communities	0			0	7
DI-C17	3.4 Study results disseminated at the national level and in a peer reviewed journal within 13 months of project implementation	Number		0			0	1
DI-B07	4.1 - At least 70 total people (70% female) will	People	Gender	0			0	70

DI Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
	be trained on developing and managing an insect farm by end of year Two.		Stakeholder group: Local Communities					
			Training type: biodiversity, sustainable development, programme management					
DI-C07	4.2 - Starting in Year Two, the number of insect farms producing insect powder and frass in Manombo will increase from zero to seven by the end of the project	Number	Community	0			0	7
DI-A10	4.3 - At least 75% of insect farms (5 farms) are functioning to the expected capacity by 6 months into Year Two	Proportion		0			0	75%
DI-D02	4.4 - Over 75% of the beneficiary population of each farm consumes the pre-defined amount of insect powder daily by the beginning of Year Two	Proportion	Food security	0			0	75%
			Gender Age Group Indigenous					
DI-E02	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.	Proportion	Peoples and Local Communities	0			0	25%

DI Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
				29.41			29.41	
	5.1 - The total amount of land converted to			hectares of			hectares of	
	agroforestry in Manombo will increase by 5 ha			community-			community-	
	annually, starting in Year One of project		Ecosystem,	controlled			controlled	
	implementation (Baseline: 9.41 ha of		community	tropical			tropical	
DI-D01	agroforestry plots)	hectares	controlled,	rainforest			rainforest	19.41 hectares
			Gender	618 women				
							618 women	
			Stakeholder	491 men				
			group: Local				491 men	
			Communities	1,109 total				
				trained in			1,109 total	
			Training type:	agroforestr			trained in	
	5.2 - By the end of Year Two of the project,		biodiversity, sustainable	У			agroforestry	
	2,000 Manombo community members (60%		development,	1,109 local			1,109 local	
	female) will be trained in conventional		programme	community			community	
DI-A01	agroforestry techniques	People	management	members			members	2000
	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)			0				3-5

Table 2Publications

No publications to date.

Title	Type (e.g. journals, best practice manual, blog post, online videos, podcasts, 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)

18. Annex 4: Onwards – supplementary material (optional but encouraged as evidence of project achievement)

- Annex 4.1 Reforestation Activity Log
- Annex 4.2 Madagascar Reforestation Handbook
- Annex 4.3 Reforestation Photo Documentation
- Annex 4.4 Insect Frass Study Protocol
- Annex 4.5 Insect Frass Fertilizer Trial Activity Reports
- Annex 4.6 Insect Frass Trail Failure Next Steps
- Annex 4.7 Insect Acceptability Study Protocol
- Annex 4.8 Insect Acceptability Study Ethical Approval
- Annex 4.9 Agroforestry Activity Log
- Annex 4.10 Agroforestry Photo Documentation
- Annex 4.11 Village Identification for Insect Acceptability Study and Farming
- Annex 4.12 Radical Listening Guide
- Annex 4.13 Darwin Initiative Feedback and HIH Response
- Annex 4.14 Project Risk Framework
- Annex 4.15 Insect Acceptability Study Survey Instruments
- Annex 4.16 Insect Acceptability Timeline and Treatment Sequence
- Annex 4.17 Reforestation and Agroforestry Species List

Annex 4.18 - Mapping Project Indicators to Darwin Initiative Standard Indicators. Submitted December 21, 2023. Approved January 18, 2024.

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