Biodiversity Challenge Funds Projects
Darwin Initiative, Illegal Wildlife Trade Challenge Fund, and Darwin Plus

Half Year Report

It is expected that this report will be a **maximum of 2-3 pages** in length.

If there is any confidential information within the report that you do not wish to be shared on our website, please ensure you clearly highlight this.

Submission Deadline: 31st October 2024

Please note all projects that were active before 1 October 2024 are required to complete a Half Year Report.

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

Project reference	DARNV014
Project title	Pioneering approaches for drone use in biodiversity conservation - Madagascar
Country(ies)/territory(ies)	Madagascar
Lead Organisation	Durrell Wildlife Conservation Trust
Partner(s)	Liverpool John Moores University (LJMU) Madagascar National Parks (MNP)
Project leader	Andriatsitohaina RAKOTOZOELY (Tsito)
Report date and number (e.g. HYR1)	30/10/2024 -HYR2
Project website/blog/social media	

1. Outline progress over the last 6 months (April – September) against the agreed project implementation timetable (if your project started less than 6 months ago, please report on the period since start up to end of September).
Techniques established for semi-automated reforestation monitoring using drones: **Started:** During the past six months, significant progress has been made in the reforestation monitoring project in Alaotra. Fieldwork commenced with systematic drone flights over selected reforestation plots, primarily using RGB sensors to capture high-resolution imagery. This imagery was processed into a comprehensive dataset for training the initial machine learning (ML) model aimed at detecting and classifying young trees. Data from the Ambohidavakely plot was specifically utilized to begin ML algorithm training. Concurrently, work on developing an AI pipeline to enhance tree detection capabilities continued. This pipeline is being built using Python and incorporates photogrammetry techniques to process aerial images into 3D models, which are then integrated into the ML workflow to construct a robust knowledge database. In late September, the LiDAR drone and additional equipment were successfully received in Tana. Preparations are underway for a LiDAR-enabled drone flight in November 2024 in the Alaotra region. This upcoming flight will allow for comparative analysis between LiDAR and RGB sensors, improving the precision and accuracy of the detection algorithms.

Additionally, the work hours for trainees involved in data processing and algorithm development were extended. This has facilitated further refinement of the detection algorithm, ensuring improved accuracy in identifying young trees and enhancing overall project outcomes.

Capacity developed for using drones for environmental conservation in Madagascar: Started: Drone Pilot Training Program: Between April 1st and the end of September 2024, a total of 90 new drone pilots (67 men and 23 women) were successfully trained. These pilots represent four provinces of Madagascar and include participants from various NGOs and governmental agencies. The final training session is scheduled for October 17th to 28th, 2024, in Diego Suarez, which will complete the training for all six provinces and 23 regions of Madagascar.

Workshop on Drone Regulations: On May 3rd, a workshop titled "Aligning Biodiversity Conservation and Drone Regulation: Strategic, Responsible Approaches for Sustainable Environment" was held, bringing together key stakeholders such as the Madagascar Civil Aviation Authority (ACM), Ministry of Environment and Sustainable Development (MEDD), Madagascar National Parks (MNP), and the UK Embassy. This workshop focused on the introduction of new drone regulations in Madagascar, with a particular emphasis on their use in conservation, especially within protected areas and national parks. The event marked the first official communication on this topic to a broad range of stakeholders. The workshop was attended by the Minister of the Environment (MEDD), the General Director of ACM, the UK Ambassador, and the General Director of MEDD.

Machine Learning and AI Workshop: On September 12th and 13th, 2024, a workshop and training session focused on machine learning and artificial intelligence (AI) were conducted, led by Professor Steven Longmore and Professor Serge Wich from Liverpool John Moores University (LJMU). The first day of the workshop, attended by 70 participants, covered global insights on the application of AI in conservation, including reforestation monitoring and lemur detection. The second day involved a hands-on session with 30 participants, where attendees developed their own machine learning models. The datasets provided for the training included LJMU data on giraffes and Bandro (Alaotran gentle lemur), as well as data from the first reforestation plot in Alaotra, which was used as a reference model for young tree detection.

Expansion of the Drone Working Group: During the recent training sessions, the Drone Working Group expanded, with many participants joining the Madagascar Conservation Drone Community (MCDC). A Google Group was created to facilitate real-time communication and knowledge exchange among members, including Durrell, Madagascar National Parks, LJMU, and other stakeholders.

Drones demonstrated as an effective detection and deterrence mechanism for environmentally damaging behaviour and informing and responding to SMART patrol activity: In July 2024, fieldwork was conducted in the Menabe Protected Area to monitor potential fire risks and illegal activities, particularly during the dry season. The field activities included the following: 20 ground truth mapping missions; 5 flights for training local staff on drone operations and 14 flights dedicated to aerial patrol and surveillance. A total of 39 drone flights were completed. The data collected from aerial patrols have been integrated into the Spatial Monitoring and Reporting Tool (SMART) using flight logs in CSV and GPX formats. This methodology enhances threat identification and allows for the customization of ground patrol itineraries based on verified, real-time information, improving the effectiveness of conservation efforts. Custom flight plan based on different level of threat have been designed and shared to local drone pilot recently trained.

The first robust, range-wide survey of Alatroan gentle lemur is delivered using drone-based infra-red detection of lemurs as a model for animal detection using this technology in Madagascar: In April 2024, aerial surveys were conducted to continue monitoring *Hapalemur alaotrensis* (bandro) in Lake Alaotra. A total of 48 transects were identified as suitable zones for detection, and in these areas, 16 groups of bandro were detected, with each group consisting of approximately 5 to 10 individuals. The collected data were integrated into a machine learning model, developed manually using Python and Google Collab, and combined with Conservation AI, a platform designed and hosted by Liverpool John Moores University (LJMU). In September 2024, professors from LJMU visited Madagascar to help refine the machine learning model and participate in a workshop focused on the creation and customization of the algorithm. The workshop also addressed the detection of young plants in selected reforestation plots used as study sites. The results have enhanced the accuracy of lemur detection and identification in Lake

Alaotra, leading to the development of a new protocol for future surveys. This protocol will be applied during the next round of aerial surveys scheduled for November 2024.

2. Give details of any notable problems or unexpected developments/lessons learnt that the project has encountered over the last 6 months. Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.

Regarding the semi-automation of young plant detection in reforestation areas, we have received the LiDAR drone batteries late September 2024, which will allow us to collect data across the various reforestation zones. However, the reference site known as Ambohidavakely, where we have been working since the project began in April 2023 (T0) to establish the baseline, and which was also surveyed in September 2023 (T1) and July 2024 (T2), has been affected by a bushfire in September 2024 that burned most of the area, including the markers we had set up. This incident necessitates the selection of a new reforestation plot, along with conducting fresh aerial surveys and establishing new reference points combined with ground measurements. The software licenses required for data processing will be purchased in October 2024 to avoid their expiration before we received the LiDAR drone batteries. The trainee students' period will end in November 2024, and their assistance is crucial for fieldwork. The good news is that with the new LiDAR drone, we can map larger areas, thereby improving both coverage and accuracy during our flights. However, a major challenge is that we need to conduct at least two flights over the same reforested plot to obtain comparative data, with a minimum interval of six months between the flights. The main constraint is that the project is set to conclude by April 2024, leaving limited time for the second round of data collection and subsequent data processing. To mitigate the risk of further setbacks, such as bushfires at one of the new reference plots, we plan to select at least three reforestation sites as detailed reference areas.

3. Have any of these issues been discussed with NIRAS and if so, have changes been made to the original agreement?

Discussed with NIRAS:	~~Yes~~/ No
Formal Change Request submitted:	~~Yes~~/ No
Received confirmation of change acceptance:	~~Yes~~/ No
Change Request reference if known: *If you submitted a financial Change Request, you can find the reference in the email from NIRAS confirming the outcome*	

4a. Please confirm your actual spend in this financial year to date (i.e. from 1 April 2024 – 30 September 2024)

Actual spend:

4b. Do you currently expect to have any significant (e.g. more than £5,000) underspend in your budget for this financial year (ending 31 March 2025)?

Yes ☒   **No** ☐

4c. If you expect and underspend, then you should consider your project budget needs carefully. Please remember that any funds agreed for this financial year are only available to the project in this financial year.

If you anticipate a significant underspend because of justifiable changes within the project, please submit a re-budget Change Request as soon as possible. There is no guarantee that Defra will agree a re-budget so please ensure you have enough time to make appropriate changes to your project if necessary. Please DO NOT send these in the same email as your report.

NB: if you expect an underspend, do not claim anything more than you expect to spend this financial year.
5. Are there any other issues you wish to raise relating to the project or to BCF management, monitoring, or financial procedures?
No

6. Please use this section to respond to any feedback provided when your project was confirmed, or from your most recent annual report. If your project was subject to an Overseas Security and Justice Assistance assessment please use this space to comment on any changes to international human rights risks, and to address any additional mitigations outlined in your offer letters. Please provide the comment and then your response. If you have already provided a response, please confirm when.
None of the feedback from the annual report was highlighted to be responded to within this half-year report and will be addressed within our next annual report.

Checklist for submission

For New Projects (i.e. starting after 1st April 2024)	
Have you **responded to any additional feedback** (other than caveats) received in the letter you received to say your application was successful which requested response at HYR (including safeguarding points)? You should respond in section 6, annexes other requested materials as appropriate.	X
If not already submitted, have you attached your **risk register**?	NA
For Existing Projects (i.e. started before 1st April 2024)	
Have you responded to **feedback from your latest Annual Report Review?** You should respond in section 6, annexes other requested materials as appropriate.	X
For All Projects	
Include your **project reference** in the subject line of submission email.	X
Submit to **BCFs-Report@niras.com**.	
Have you **clearly highlighted any confidential information** within the report that you do not wish to be shared on our website?	X
Have you reported against the most **up to date information for your project?**	X
Please ensure claim forms and other communications for your project are not included with this report.	X