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Pioneering approaches for drone use in biodiversity conservation - Madagascar

Despite unparalleled endemism, species diversity, and rich natural resources, Madagascar has one of the world's highest poverty rates, which has only deepened in recent years. This trend is closely linked with degradation of its natural resources. This project will deliver approaches and capacity for the effective use of drones to help monitor conservation targets and interventions, and respond to threats more effectively, helping to reverse the decline in natural resources on which four out every five of Malagasy people depend.

PRIMARY APPLICANT DETAILS

Name Jeff
Surname Dawson
Organisation Durrell Wildlife Conservation Trust
Tel (Mobile) [REDACTED]
Email (Work) [REDACTED]
Address [REDACTED]
[REDACTED]
[REDACTED]

Title Mrs
Name Jessica
Surname Sweeney
Organisation Durrell Wildlife Conservation Trust
Tel (Home) [REDACTED]
Email (Work) [REDACTED]
Address [REDACTED]
[REDACTED]
[REDACTED]

OTHER DETAILS

Title Mr
Name Mike
Surname Hudson
Organisation Durrell Wildlife Conservation Trust
Tel (Work) [REDACTED]
Email (Work) [REDACTED]
Address [REDACTED]
[REDACTED]
[REDACTED]

Section 1 - Contact Details

PRIMARY APPLICANT DETAILS

Name Surname Jeff Dawson
Organisation Durrell Wildlife Conservation Trust
Tel (Mobile) [REDACTED]
Email (Work) [REDACTED]
Address [REDACTED]

Title Name Mrs Jessica
Surname Sweeney
Organisation Durrell Wildlife Conservation Trust
Tel (Home) [REDACTED]
Email (Work) [REDACTED]
Address [REDACTED]

OTHER DETAILS

Title Name Mr Mike
Surname Hudson
Organisation Durrell Wildlife Conservation Trust
Tel (Work) [REDACTED]
Email (Work) [REDACTED]
Address [REDACTED]

GMS ORGANISATION

Type Charity/ trusts
Name Durrell Wildlife Conservation Trust
Phone (Work) [REDACTED]
Email (Work) [REDACTED]
Address [REDACTED]

Section 2 - Project Summary, Ecosystems, Approaches and Threats

Q3. Title


Pioneering approaches for drone use in biodiversity conservation - Madagascar


Q4a. Is this a resubmission of a previously unsuccessful application?


No

Please attach a cover letter.

Please include a response to any previous feedback in your cover letter.

 [DWCT Cover letter innovation](#)

 07/11/2022

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 pdf 217.54 KB

Q5. Key Ecosystems, Approaches and Threats

Please select up to 3 biomes that are of focus, up to 3 conservation actions that characterise your approach, and up to 3 threats to biodiversity you intend to address, from dropdown lists.

Biome 1

Tropical-subtropical forests

Biome 2

Palustrine wetlands (flooded forests, wetlands, marshes, floodplains)

Biome 3

No Response

Conservation Action 1

Land/water protection (area/resource/habitat)

Conservation Action 2

Land/water management (area, invasive control, restoration)

Conservation Action 3

External Capacity Building

Threat 1

Human intrusions & disturbance (recreation, war)

Threat 2

Agriculture & aquaculture (incl. plantations)

Threat 3

Biological resource use (hunting, gathering, logging, fishing)

Q6. Summary of project

Please provide a brief summary of your project: the problem/need it is trying to address, its aims, and the key activities you plan on undertaking. Please note that if you are successful, this wording may be used by Defra in communications e.g. as a short description of the project on the website.

Please write this summary for a non-technical audience.

Despite unparalleled endemism, species diversity, and rich natural resources, Madagascar has one of the world's highest poverty rates, which has only deepened in recent years. This trend is closely linked with degradation of its natural resources. This project will deliver approaches and capacity for the effective use of drones to help monitor conservation targets and interventions, and respond to threats more effectively, helping to reverse the decline in natural resources on which four out every five of Malagasy people depend.

Section 3 - Dates & Budget Summary

Q7. Project Country(ies)

Which eligible country(ies) will your project be working in? Where there are more than 4 countries that your project will be working in, please add more boxes using the selection option below.

Country 1 Madagascar

Country 2 No Response

Country 3 No Response

Country 4 No Response

Do you require more fields?

No

Q8. Project dates

Start date:

01 April 2023

End date:

31 March 2025

Duration (e.g. 1 year, 8 months):

2 years

Q9. Budget Summary

Darwin Funding Request	2023/24	2024/25	Total request
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(Apr - Mar) £

██████████

██████████

██████████

Q10. Proportion of Darwin Initiative budget expected to be expended in eligible countries: %

████

Q11a. Do you have proposed matched funding arrangements?

Yes

What matched funding arrangements are proposed?

Durrell has a grant from Liverpool John Moores University, who will cover █████ of the salary of the drone coordinator and █████ of the drone project officer in Y1. Costs of the Conservation Science Manager, Madagascar Project Director, Head of Research and █████ of the project lead's salary will be covered by Durrell's core funds and another private donor.



Q11c. If you have a significant amount of unconfirmed matched funding, please clarify how you will fund the project if you don't manage to secure this?

All match funding is confirmed.

Section 4 - Darwin Objectives and Conventions

Q12. Problem the project is trying to address

Please describe the evidence of the problem your project is trying to address in terms of biodiversity and its relationship with poverty. What is the need, challenge or opportunity?

For example, what are the drivers of loss of biodiversity that the project will attempt to address? Why are they relevant, for whom? How did you identify these problems? Please cite the evidence you are using to support your assessment of the problem (references can be listed in a separate attached PDF document).

Madagascar is at the forefront of this biodiversity crisis. Approximately 95 percent of Madagascar's reptiles, 89 percent of its plant life, and 92 percent of its mammals exist nowhere else on Earth, yet between 2001 to 2018 Madagascar lost 1/5th of its tree cover. Despite having rich natural resources, Madagascar has one of the world's highest poverty rates, which has worsened in recent years because of Covid-19 and droughts. This trend is closely linked with its degradation of natural resources on which four out every five of its people depend. Drones represent a modern solution to several conservation monitoring challenges, and perhaps a deterrent for illegal behaviours, but are currently under-used in Madagascar. This project will aim to build a community of conservation-based drone practitioners to boost engagement in the sector and inform actions to improve the state of Madagascar's biodiversity.

The President recently announced a National Reforestation Program aiming to restore much of Madagascar's lost forest, drastically increasing biodiversity and capturing an enormous amount of carbon. The scale and ambition of the project – to reforest a fifth of the trees on the world's fourth largest island – is impressive. It requires not only planting 60 million trees, but monitoring their growth over many years. There is currently no scalable method for tracking progress towards this target at the site level, with individual tree-survival monitoring limited to spatially restricted, ground surveys. Tree survival is relatively limited in traditional replanting projects, and the effort required to replace dead saplings often underestimated. During this project, we aim to develop a system for drone-based monitoring of tree survival and carbon sequestration using AI processing of drone-imagery and LiDAR.

Following a successful project with our partner Liverpool John Moores University (LJMU), to train four Malagasy conservationists to build, maintain and operate drones, these drone pilots and technicians are now the most experienced in Madagascar. In this project we demonstrated that drone-based infra-red detection of Aloatran gentle lemurs is possible, a species which is otherwise extremely challenging to survey as they inhabit impenetrable marsh habitat. This project will aim to expand this to a range-wide survey of this Critically Endangered species and set a precedent for the use of this technology in Madagascar.

We request funding to support innovative and experimental drone work to 1) develop semi-automated techniques for drone-based monitoring of reforestation, 2) to develop further drone capacity in Madagascar and to apply methods established in protected area management, 3) assess the effectiveness of drones as a method of deterrence against environmentally damaging behaviour and, 4) the use of drones as an efficient survey instrument for monitoring Aloatran gentle lemur.

The results will likely shape national conservation policy in other biodiversity hotspots and set a standard in how drones can be used to monitor its impact on biodiversity, carbon capture, and climate change.

The project will be staffed by a truly outstanding graduate from Madagascar, who is currently leading the technical developments on the National Reforestation Program.

Q13. Biodiversity Conventions, Treaties and Agreements

Q13a. Your project must support the commitments of one or more of the agreements listed below.

Please indicate which agreement(s) will be supported.

- Convention on Biological Diversity (CBD)
- Ramsar Convention on Wetlands (Ramsar)
- United Nations Framework Convention on Climate Change (UNFCCC)
- Global Goals for Sustainable Development (SDGs)

Q13b. National and International Policy Alignment

Using evidence where available, please detail how your project will contribute to national policy (including NBSAPs, NDCs, NAPs etc.) and in turn international biodiversity and development conventions, treaties and agreements that the country is a signatory of.

This funding would allow an outstanding graduate from Madagascar (currently leading the technical developments on Madagascar's National Reforestation Program/NRP) to continue his and his team's work developing drone monitoring and deterrence methods and contributing to the NRP.

The project will build the capacity of Protected Area and MNP professionals, contributing to Madagascar's National Development Plan target 5 – to enhance natural capital and build resilience to disaster risks. The project also contributes to their National Biodiversity Strategy and Action Plan's strategic objectives; 2 (recognise and integrate biodiversity values and benefits from sustainable use); 5,14 (protect and restore habitats and ecosystems); 11 (manage PAs more effectively); and 12 (improve the conservation status of threatened species). Better monitoring and deterrence mechanisms will benefit efficient management and governance of the forestry sector (Malagasy Forestry Policy). More efficient adaptive management of reforestation efforts and improved methodology for measuring carbon sequestration contributes to Madagascar's National Policy against Climate Change, Axis 5 (promoting research, technological advances, and adaptive management) and towards the UNFCCC.

This project promotes the value and importance of biodiversity conservation (CBD Target 1) . Improving adaptive management of ecosystem restoration, through reforestation monitoring (particularly in Protected Areas) contributes to CBD Targets 5, 11, 14 and 15, and Ramsar Targets 5, 7, and 12. Developing methodology for monitoring Critically Endangered lemurs contributes to CBD Target 12 and building capacity for conservation monitoring using drones across the Madagascar PA landscape contributes strongly to CBD Targets 19 and 11, and Ramsar Targets 14 and 16.

Through our direct work on biodiversity and ecosystems we support the United Nations SDGs: Life on Land (15). Due to the better management of ecosystem services this work will also contribute to No Poverty (1) and Clean Water and Sanitation (6) and naturally be part of Partnerships for the Goals (17).

Section 5 - Method, Innovation, Capability & Capacity

Q14. Methodology

Describe the methods and approach you will use to achieve your intended Outcome and contribute towards your Impact. Provide information on:

- How you have reflected on and incorporated evidence and lessons learnt from past and present similar activities and projects in the design of this project.
- The specific approach you are using, supported by evidence that it will be effective, and justifying why you expect it will be successful in this context.
- How you will undertake the work (activities, materials and methods).
- What the main activities will be and where will these take place.
- How you will manage the work (governance, roles and responsibilities, project management tools, risks etc.).

Please make sure you read the guidance documents, before answering this question.

There are four main objectives in this proposal. The first, to develop techniques for the semi-automated monitoring of reforestation from drone imagery; photogrammetric processing of systematically collected images of reforested plots; alongside LiDAR, to track individual trees in a globally-novel approach to the monitoring of reforestation success and covariates of tree survival. Combined with processing by Conservation AI imagery at LJMU, this aerial imagery should allow us to estimate coverage of different tree species across the plots alongside carbon sequestration. These techniques have been trialled successfully on mature trees in other ecosystems, but this novel application to later stage saplings and reforestation plots ensures this workstream is innovative.

Secondly, we will establish a drone conservation working group of NGOs, professional organisations, statutory agencies and government bodies, to promote the use of drones for conservation in Madagascar, which remains limited. In 2022, we held two workshops to bring these groups together for the first time, to promote the ethical and effective use of drones for conservation. There was great interest and support across the sector and with this we aim to boost knowledge sharing, promote further innovation, and ensure compliance with drone regulations.

Thirdly, we will conduct research on whether drones can be used as a deterrent for environmentally damaging behaviour in the core zones of national parks. Two of Durrell's project sites, Menabe-Antimena and Baly Bay National Parks, are threatened by illegal deforestation and the spread of uncontrolled fires. During previous drone work, there was anecdotal evidence of reduction in illegal activities in drone-flying zones, including the abandonment of illegal logging camps. We aim to determine, in an experimental framework, whether targeted drone deterrence flights are a scalable intervention for the prevention of these activities. We will fly our larger drones in specific areas of the park, whilst leaving others as control plots, monitoring the impact on the spatial distribution and prevalence of illegal activities through our network of SMART patrollers at each site. We will also publicise this work in local villages where we maintain village associations who run monitoring patrols but are also likely to be home to some of the perpetrators of illegal activities. This is a novel approach which would be easily scalable across the Protected Areas of Madagascar and elsewhere.

Finally, we will build on previous work using drone-based infra-red technology to detect and monitor the Critically Endangered Alaotran gentle lemur in its impenetrable marsh habitat. Traditional surveys of the species are restricted to pre-cut and heavily disturbed, fisherman's canals, and so are unreliable and unrepresentative. Utilising drones for infra-red detection of these animals could provide a system to enable the first robust, range-wide population estimates of this species. Previous trials have detected lemurs with this technology, but more work is required to develop a scalable system in a semi-automated pipeline, avoiding processing bottlenecks. This system has been developed by our partners, LJMU, and utilised successfully for larger bodied species such as Orang-utans but would be novel to this system and smaller bodied species.

Q15. Innovation

Please specifically outline how your approach or project is innovative.

Is it the application of a proven approach in a distinctly different geography/issue/stakeholder (novel to the area), or in a different sector (novel to the sector), or an unproven approach in any sector (novel to the world)?

Durrell has been pioneering the use of drones in Madagascar and has been collaborating with the Malagasy government and Ministry of Environment, providing technical support for novel conservation approaches such as drones for forest and mangrove replanting. The Ministry of Agriculture has also requested support from the Durrell drone team in agricultural crop assessment and monitoring.

With this project we aim to develop a world's first semi-automated drone-based system for reforestation monitoring addressing individual survival and carbon-sequestration, scalable across sites in Madagascar and beyond. We will also scale previous cutting-edge proof of concept work to detect and monitor Alaotran gentle lemurs with drone-based infra-red (a Critically Endangered species otherwise near-impossible to robustly monitor). Finally, we will trial using drones as a deterrent for illegal activities in the core zones of protected areas being ravaged by deforestation for agriculture and

wildfires, a novel strategy we are unaware of elsewhere.

There are few drone pilots in Madagascar and limited capacity to fly and operate these drones effectively for conservation. Furthermore, there is no capacity for building and maintaining drones. Our project will develop a new forum to boost drone-use in Madagascar's conservation sector, essential in providing new tools for the fight against runaway biodiversity loss.

Through establishing methods for effective conservation monitoring and building capacity to use them, this proposal will allow the more effective and efficient use of conservation resources in protected area management and biodiversity monitoring, which will also be replicable in other sites in Madagascar, and more widely.

Q16. Capability and Capacity

How will you support the strengthening of capability and capacity in the project countries at organisational or individual levels? Please provide details of what form this will take, who will benefit, and the post-project value to the country.

In partnership with LJMU, we have previously provided training to three Durrell and one Madagascar National Parks staff for training in building, operating and flying drones. This training was certified by the UK PfCO certificate for drone operations and made the trainees the most well-trained drone pilots in Madagascar. This subsequently enabled them to help update Madagascar's drone regulations; to provide technical support and training in drone flying, maintenance and operations for Madagascar's National Reforestation Program; to work on the technical specifications of the reforestation drones; and design the seed dispersal system. Throughout this project we aim to train an additional 50 in-country drone operators and provide advanced drone maintenance training to four people through the Durrell drone lab, including select Madagascar National Parks and Ministry of Environment staff.

To further build capacity in-country, in this project we will establish a Madagascar conservation drone practitioner working group chaired by Durrell staff, with annual knowledge sharing workshops. Through this group we aim to boost drone use and transfer knowledge, leading to sustainable drone use in the conservation sector in Madagascar. We will also collaborate with Malagasy government efforts on the development of drone pilot certification and training centres in the country.

Central to this project is the uptake of novel technologies – this includes semi-automated drone-based reforestation monitoring, which is scalable across Madagascar. This globally novel method will allow us to monitor tree survival at an individual level, and carbon sequestration through photogrammetry and conservation AI processing. Further, expanding semi-automated infra-red detection of species (pioneered by LJMU) is likely to be useful for many lemur and other species which are otherwise difficult to survey. Uptake of these technologies will enable conservation stakeholders to adaptively manage the ambitious National Reforestation Program and improve Protected Area management to better manage Madagascar's natural resources.

If necessary, please provide supporting documentation e.g. maps, diagrams, references etc., as a PDF using the File Upload below:

No Response

Section 6 - Gender, Awareness, Change Expected & Exit Strategy

Q17. Gender equality

All applicants must consider whether and how their project will contribute to reducing inequality between persons of different gender. Explain your understanding of gender equality within the context your project, and how is it reflected in your plans. Please summarise how your project will contribute to reducing gender inequality. Applicants should, at a minimum, ensure proposals will not increase inequality and are encouraged to design interventions that proactively contribute to increased gender equality.

DWCT is committed to equal opportunities and gender equality across all levels of the organisation, including the operation of our regional offices. We do not anticipate our project increasing gender inequality in any way. DWCT's Equal Opportunities Policy recognises our obligations under the Codes of Practice published by the Equality and Human Rights

Commission. We are committed to ensuring gender equality throughout all project processes which will be reflected in our recruitment of project staff, open to both male and female candidates equally, and in the design, implementation, and monitoring of the project. There will not be any discriminatory conditions placed on any persons that would restrict equality.

Q18. Awareness and understanding

How will you raise awareness and understanding of biodiversity-poverty issues in your stakeholders, including who your stakeholders are, what approaches/formats/products will you use, how you will ensure open and free access to all data, and how will you know that the messages are understood?

Output 1 includes the establishment of a specific drone conservation working group (WG) for the entire conservation sector in Madagascar, which will include government and non-governmental stakeholders. This WG will aim to specifically address key issues facing use of drones in Madagascar, providing a forum to discuss novel solutions and experiences, and develop agreed best practices. The format of the WG will be regular meetings (four times per annum), focussed workshops on specific skills, and a shared email list.

The use of drones for lemur monitoring is based on methods piloted elsewhere for other primates such as orangutans. If this method is successful for the Alaotran gentle lemur, this will provide two elements of greater understanding; i) an updated (and now robust) population estimate for *Hapalemur alaotrensis* (which is currently based on highly limited pirogue surveys) to feed into conservation action within the watershed and global population data (including IUCN Red List); and ii) whether drones can be used in this setting for population monitoring. This data will be shared both through reports to the government of Madagascar, and through academic papers by Durrell and LJMU. The thermal-infra-red processing algorithm will also be published and so be made accessible as an open-source output for all interested researchers.

Durrell's approach to community SMART patrols involves providing patrol data (particularly around frequency and location of illegal activity) both to local community associations involved in co-managing PAs (VOIs) and Malagasy law enforcement. The data gathered from drone flights will be fed into this data sharing process. The interactions with these groups will ensure the purpose of drone flights is well-understood and the drones do not negatively impact the people around each site.

Q19. Change expected

Detail the expected changes to both biodiversity and poverty reduction, and links between them, this work will deliver. You should identify what will change and who will benefit a) in the short-term (i.e. during the life of the project) and b) in the long-term (after the project has ended) and the potential to scale the approach.

When talking about how people will benefit, please remember to give details of who will benefit, differences in benefits by gender or other layers of diversity within stakeholders, and the number of beneficiaries expected. The number of communities is insufficient detail - number of households should be the largest unit used.

Short-term

Increased capacity to manage protected areas using drones throughout Madagascar's protected area network.

Methodology developed to monitor conservation targets effectively using drones benefitting conservation practitioners and developing efficiencies in conservation practice.

Improved ecological monitoring for primates, Madagascar's priority biodiversity group.

The monitoring of reforestation efforts using drones is enabled, which will allow adaptive management of large-scale reforestation efforts.

A potential reduction in fires and deforestation if drones are proven as useful deterrent mechanism.

Enhanced detection of fires and deforestation activities, protecting local communities from the risk of fire and protecting the natural resources they rely upon.

Enhanced ability to coordinate firefighting through aerial tracking of fire intensity, direction and speed.

Enhanced detection of poachers and poacher camp sites.

SMART community patrols become more effective through the integration of drone data to inform drone flights and also guide SMART patrol activity.

Improved mapping of farmlands, around biodiversity zones to enable effective land planning by local communities and their Communes (schemas aménagements communales).

Long-term

A reduction in harmful environmental behaviour through using drones effectively as a tool for the deterrence of illegal activities.

Increased monitoring of illegal activities assists Malagasy law enforcement efforts and protected area management.

Communities will benefit through a reduction in deforestation and therefore maintaining the natural capital and ecosystem services they rely on.

Effective monitoring to assist reforestation management work, towards achieving the Madagascar President's vision to regreen the island.

Support towards effective land management within Category V (Harmonious Landscapes) Protected Areas, and around National Parks.

Q20. Pathway to change

Please outline your project's expected pathway to change, including how your outcome can be scaled. This should be an overview of the overall project logic and outline why and how you expect your Outputs to contribute towards your overall Outcome and, longer term, your expected Impact.

This should directly relate to your overall project's Theory of Change which must be uploaded alongside your application. See the separate [Monitoring, Evaluation and Learning Guidance](#) for further information on your Theory of Change.

Our theory of change is that...

If effective and straightforward techniques for semi-automated conservation monitoring of tree survival, species populations and carbon sequestration using drones are developed,

And...

If drones can be demonstrated as an effective detection, research and deterrence mechanism, whilst informing species conservation and adaptive management through integration of drone data into SMART datasets, and determining drone flight paths through SMART community patrol data,

And...

If capacity for drone use in protected area management is developed and solidified amongst Madagascar National Parks staff and protected area practitioners in Madagascar, whilst also ensuring that the skills exist to maintain and repair drones within these organisations,

Then...

Drones will be utilised as a tool to deliver more effective biodiversity conservation and monitoring in Madagascar and further afield.

Q21. Exit strategy

How will the project reach a sustainable point and continue to deliver benefits post-funding?

Will the innovation be mainstreamed into “business as usual” to continue to deliver the benefits? How will the required capability and capacity remain available to sustain the benefits? How will your approach, if proven, be scaled? Are there any barriers to scaling and if so, how will these be addressed?

Significant training will be provided through this grant to increase the capacity for drone use for conservation and protected area management in Madagascar. Through providing advanced training to select beneficiaries within Madagascar National Parks and the Ministry of Environment in drone maintenance, it will enable staff not only to operate drones they already have but maintain them without being overly reliant on spare parts, which are difficult to come by in Madagascar. This has been a barrier to the use of drones in the past, when drones provided with external funding to the Ministry have broken down and been discarded.

At present, there is no Madagascar specific drone theory examination; we hope to work with Aviation Civile de Madagascar to promote the publication of a Madagascar specific exam to reduce barriers to drone pilot certification in the long term.

Through developing methodologies for reforestation monitoring and lemur species surveying, the grant will enable the uptake of drone use for more efficient conservation monitoring. If successful, these will be integrated into Durrell’s standard methodologies, ensuring immediate uptake across the organisation. Through the working group we will also ensure the majority of conservation drone users in Madagascar will be aware of these techniques. Successfully developed techniques will also be published in the peer-reviewed literature, ensuring a wider readership and potential impact beyond Madagascar.

Durrell has been working in Madagascar since 1986 and has over 90 staff in country. Durrell will continue to operate the drone conservation working group, established during this grant, after this project has ended, to provide continuing advice, support and scale the adoption of drone research methodologies to support biodiversity conservation in Madagascar in the longer term.

Section 7 - Risk Management

Q22. Risk Management

Please outline the 6 key risks to achievement of your Project Outcome and how these risks will be managed and mitigated, referring to the [Risk Guidance](#). This should include at least one Fiduciary, one Safeguarding Risk, and one Delivery Chain Risk.

Projects should also draft their initial risk register, using the [Risk Assessment template](#), and be prepared to submit this when requested if they are recommended for funding. Do not attach this to your application.

Risk Description	Impact	Prob.	Gross Risk	Mitigation	Residual Risk
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Fiduciary (financial)	Major	Rare	Moderate	Durrell undergoes annual accounting audits and has a controller to oversee project spending. Our partners also undergo rigorous monitoring and reporting processes.	Minor
The risk that funds awarded to partners are not used for intended purposes or not accounted for results in insufficient funds to conduct project activities, therefore they cannot be carried out, impacting overall project delivery.					
Safeguarding	Insignificant	Likely	Moderate	We have robust policies/procedures in place for drone use. Operators are trained, with documented credentials. Recording will not be continuous unless there is a strong justification for doing so, such as obvious illegal activity. Drone flights will largely be in areas where there are few people other than Durrell staff/partners.	Minor
Privacy: capturing footage of individuals that are not intended to be the focus of our surveillance, individuals are unlikely to realise they are being recorded or be able to identify who is in control.					
Delivery Chain	Minor	Possible	Moderate	Systematic surveys will allow areas missed due to inclement weather to easily be later reflight. This will also be enabled by contingency built into the timeline. The drone type included in this project has a 'swappable payload', meaning it can be adapted to fly in high wind and evening conditions.	Minor
Extreme high winds or other inclement weather prevents or disrupts drone flights.					
Risk 4	Minor	Unlikely	Minor	Our drone methodology has been developed over several years, with several pilots trialling different methods (type of drone model, flying altitude) to minimise disturbance impact on lemurs. The effect on sensitive species is constantly reviewed.	Insignificant
Species such as lemurs may be disturbed by drone flights.					
Risk 5	Moderate	Possible	Moderate	Durrell's drone work to date has focused on training (and mentorship) of Durrell and Malagasy government staff. Both the drone coordinator and the PA coordinator have been formally trained by LJMU (and continue to be supported). They provide mentoring and capacity building to the project officer and other DWCT staff.	Minor
Operational: Staff turnover leads to a loss of valuable programme knowledge and disrupts planned activities.					

Risk 6	Major	Unlikely	Major	Although innovative, most methods are based on trials, so the risk is low. However, failures will increase learning from the project and contribute to the body of knowledge in the sector, which will be shared with stakeholders, disseminated through the WG and through international partners.	Moderate
Some or all of the innovations do not work at all or as expected.					





Section 8 - Implementation Timetable

Q23. Provide a project implementation timetable that shows the key milestones in project activities

Provide a project implementation timetable that shows the key milestones in project activities. Complete the Word template as appropriate to describe the intended workplan for your project and upload this below as a PDF.

[Implementation Timetable Template](#)

Please add/remove columns to reflect the length of your project. For each activity (add/remove rows as appropriate) indicate the number of months it will last, and fill/shade only the quarters in which an activity will be carried out.

-
-  [Implementation Timetable v1](#)
 -  07/11/2022
 -  14:50:22
 -  pdf 648.22 KB

Section 9 - Monitoring and Evaluation

Q24. Monitoring and evaluation (M&E)

Describe how the progress of the project will be monitored and evaluated, making reference to who is responsible for the project's M&E.

Darwin Initiative projects are expected to be adaptive and you should detail how the monitoring and evaluation will feed into the delivery of the project including its management. M&E is expected to be built into the project and not an 'add on'. It is as important to measure for negative impacts as it is for positive impact. Additionally, please indicate an approximate budget and level of effort (person days) to be spent on M&E (see [Finance Guidance](#)).

Durrell is an impact-led organisation. Our Conservation Effectiveness Team is made up of three dedicated staff who assist in the adaptive management and impact measurement for each of our projects. This team would provide guidance throughout the project to ensure we were able to sensitively monitor progress towards each output and adapt activities, as required, to ensure their delivery.

We also have a dedicated Conservation Training team who are experienced in delivering in-country training programmes for conservation practitioners, at scale, and will provide advice in maximising the scope of our drone training. Members of this team are based in Madagascar and will provide regular advice. They will also provide guidance in measuring the impact

of the training on the capacity of trainees to be more effective practitioners. The development of capacity of drone pilots in Madagascar will be monitored through uptake of the training, participation levels in the drone practitioners working group, drone flight maps for newly trained drone pilots and the uptake of new research methodology in protected area management as reported in the working group.

This project will operate in parallel with Durrell's 'rewilding plans' for Menabe and Alaotra, which include extensive community engagement through support to good governance and conservation livelihoods. Our rewilding plans are adaptively managed through the Conservation Standards (the closest thing to an industry gold-standard for adaptive management) and will help to ensure this project (and the wider plans) are as impactful as possible. Through our community engagement, we are able to monitor community perceptions (both feedback directly to Durrell and through the VOIs) which will be critical in assessing how drone flights are perceived (particularly if the perceptions are negative).

We will measure any negative impacts of our activity through close contact with SMART community patrols and the communities near to where drone flights are to be conducted. However, drone flight paths will not cover village areas but areas of forest or scrub, or marshland, where there are few people other than Durrell staff/partners.

The success of drones in monitoring illegal activity can be assessed through comparing the results of ground SMART patrols, which will serve as a 'ground truthing' exercise for the use of drones for illegal activity monitoring. Our experimental framework with drone flight plots and control plots will allow us to detect changes which can be directly attributed to the drone flights and detect any displacement of illegal activities into control zones and so overall impact on the protected area during the high-risk season.

There will be specific student researchers allocated to this project (in Menabe and Ambrondrobe) who will be tasked at monitoring the success of the innovations and who will be required to write up the results. In addition, we estimate 10% of the fieldwork travel and subsistence and 50% of the drone project coordinator's time to be on M&E.

Total project budget for M&E (this may include Staff and Travel and Subsistence Costs)

██████████

Percentage of total project budget set aside for M&E

██

Number of days planned for M&E

30

Section 10 - Logical Framework


Q25. Logical Framework (logframe)


Darwin Initiative projects will be required to monitor and report against their progress towards their Outputs and Outcome. This section sets out the expected Outputs and Outcome of your project, how you expect to measure progress against these and how we can verify this.


[Logframe Template](#)

Please complete your full logframe in the separate Word template and upload as a PDF using the file upload below - please do not edit the logframe template structure (other than adding additional Outputs if needed) as this may make your application ineligible. On the application form, you will be asked to copy the Impact, Outcome and Output statements and activities - these should be the same as in your uploaded logframe.

Please upload your logframe and Theory of Change as a combined PDF document.

 [Logframe ToC v1](#)

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 pdf 367.21 KB

Impact:

Reduction in deforestation, enhanced reforestation monitoring and improved monitoring of conservation targets throughout Madagascar

Outcome:

Drones are being used to effectively monitor and improve biodiversity conservation in Madagascar

Project Outputs

Output 1:

Techniques established for semi-automated reforestation monitoring using drones

Output 2:

Capacity developed for using drones for environmental conservation in Madagascar

Output 3:

Drones demonstrated as an effective detection and deterrence mechanism for environmentally damaging behaviour and informing and responding to SMART patrol activity

Output 4:

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

Output 5:

No Response

Do you require more Output fields?

It is advised to have less than 6 Outputs since this level of detail can be provided at the activity level.

No

Activities

Each activity is numbered according to the Output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1.

- 1.1 Drone flights to collect raw data on each reforestation plot
- 1.2 Ground surveys to ground truth drone data on each reforestation plot
- 1.3 Algorithm/pipeline developed to process drone data for the effective monitoring of sapling survival rate and reforestation success and rates of carbon sequestration
- 1.4 AI algorithm training on identification of tree species and coverage across reforestation plots
- 1.5 Workshop delivered to disseminate newly developed reforestation monitoring techniques
- 1.6 Paper writing
- 2.1 Madagascar practitioners gathered to form a working group
- 2.2 Working group meetings chaired by Durrell project staff
- 2.3 Knowledge sharing workshops delivered to working group (at least one per year)
- 2.4 Seven-day full-time training course and refresher sessions delivered for 50 people for drone piloting - five conducted in total (10 people each session) by project end
- 2.5 Advanced training delivered to four people on drone maintenance through regular sessions at the Durrell drone lab

- 3.1 Experimental framework developed for the testing of drones as deterrence measure in Menabe-Antimena National Park
- 3.2 Drone flights conducted across two fire seasons during project in experimental framework, for at least four weeks at a time
- 3.3 Longitudinal monitoring using SMART by local village patrols to understand the impact of drone flights on distribution and prevalence of illegal activities in Menabe-Antimena
- 3.4 Drone detection data is integrated into SMART to inform community patrol activity
- 4.1 Systematic flights conducted to assess the population of Alaotran gentle lemurs across their marsh range
- 4.2 Ground truthing surveys in pirogues conducted to validate drone footage and image processing
- 4.3 Semi-automated pipeline for the detection of gentle lemurs from thermal infra-red imagery trained on data collected during the first field season
- 4.4 Training given to students to enable them to assist in lemur surveys
- 4.5 Paper writing

Section 11 - Budget and Funding

Q26. Budget

Please complete the appropriate Excel spreadsheet, which provides the Budget for this application. Some of the questions earlier and below refer to the information in this spreadsheet.





Note that there are different templates for projects requesting under £100,000 and over £100,000. Please refer to the Finance Guidance for more information.

- [Budget template for projects under £100k](#)
- [Budget template for projects over £100k](#)

Please ensure you include any co-financing figures in the Budget spreadsheet to clarify the full budget required to deliver this project.

NB: Please state all costs by financial year (1 April to 31 March) and in GBP. The Darwin Initiative cannot agree any increase in grants once awarded.

Please note the next section is about the financial aspects of your project, rather than technical elements.

 [221104 MASTER BCF-Budget-over-£100k-DWCT drones v1](#)
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 xlsx 90.98 KB

Q27. Funding

Q27a. Is this a new initiative or does it build on existing work (delivered by anyone and funded through any source)? Please give details.

- Development of existing work

Please give details.

Through previous UKRI funding through our partner LJMU, we trained four conservationists from Madagascar to build, maintain and operate drones. These trainees are now the most experienced drone pilots and technicians in Madagascar

and are leading the way in the innovation of drone use in Madagascar. At the President's request, they are an integral part of the National Reforestation Program in Madagascar, having designed key components of the seed dispersal system and being responsible for flying the drones. This funding will build on this momentum driven by the government, to further upskill Malagasy conservationists as drone pilots and deliver tested, effective methods for conservation monitoring and protected area management using drones.

Q27b. Are you aware of any current or future plans for similar work to the proposed project?

Yes

Please give details explaining similarities and differences, and explaining how your work will be additional and what attempts have been/will be made to co-operate with and learn lessons from such work for mutual benefits:

The National Reforestation Program in Madagascar is happening concurrently which is testing the effectiveness of drones for seed dispersal in forest and mangrove reforestation efforts. This project will complement this Program in providing drone methodology to monitor the reforestation efforts and build capacity for drone piloting within government bodies and NGOs involved in protected area management.

Q28. Capital items

If you plan to purchase capital items with Darwin funding, please indicate what you anticipate will happen to the items following project end. If you are requesting more than 10% capital costs, please provide your justification here.

We intend to purchase a LIDAR (Light Detection and Ranging) drone under this project (■■■■ of budget). This drone will be used to carry a LiDAR sensor, which can be used to create hi-resolution 3D models of reforestation plots including individual trees. This will be critical to facilitating the collection of data on reforestation success and so, we believe, justifies the slight overspend on capital items in this project.

Q29. Value for Money

Please demonstrate why your project is good value for money in terms of impact and cost-effectiveness of each pound spend (economy, efficiency, effectiveness and equity).

As we already have trained drone professionals on staff, who this project would allow us to retain, alongside an established drone building and repair lab, we are the best placed organisation in Madagascar to deliver this work with minimal up-front costs. We have submitted a budget with the purchase of only one additional drone to help deliver the work described, the biggest outlay in drone work.

Through the training we propose for 50 aspiring drone pilots in Madagascar, and four drone-engineers to be, we will amplify the impact of our project and expand the potential for drones to contribute to Madagascar's conservation by a significant amount.

The monitoring and deterrence elements of this project would represent a huge increase in efficiency to the activities they would replace, as well as being more robust and impactful. Pirogue surveys of the gentle lemur are restricted to un-representative areas of the Lac Alaotra marsh and take two months to carry out with a team of six. This project would deliver a robust range-wide survey with a probabilistic survey design in a matter of weeks and with half the staff, freeing them up to deliver much needed conservation action. Reforestation plots cannot be surveyed at the detail we are proposing without an undeliverably large number of person-hours under current reforestation funding models. As such, this project represents a potential step change in our ability to monitor, and so improve, reforestation projects across the country at a pivotal time under the President's National Reforestation Strategy.

Section 12 - Outputs, Open Access, Ethics & Safeguarding

Q30. Safeguarding

Projects funded through the Darwin Initiative must fully protect vulnerable people all of the time, wherever they work. In order to provide assurance of this, projects are required to have appropriate safeguarding policies in place.

Please confirm the Lead Partner has the following policies in place and that these can be available on request:

We have a safeguarding policy, which includes a statement of our commitment to safeguarding and a zero tolerance statement on bullying, harassment and sexual exploitation and abuse	Checked
We have attached a copy of our safeguarding policy to this application	Checked
We keep a detailed register of safeguarding issues raised and how they were dealt with	Checked
We have clear investigation and disciplinary procedures to use when allegations and complaints are made, and have clear processes in place for when a disclosure is made	Checked
We share our safeguarding policy with all partners	Checked
We have a whistle-blowing policy which protects whistle blowers from reprisals and includes clear processes for dealing with concerns raised	Checked
We have a Code of Conduct in place for staff and volunteers that sets out clear expectations of behaviours -- inside and outside the work place – and make clear what will happen in the event of non-compliance or breach of these standards	Checked

Please outline how you will implement your safeguarding policies in practice and ensure that all partners apply the same standards as the Lead Partner. If any partner of the responses are “no”, please indicate how it is being addressed.

DWCT have robust Safeguarding, Whistleblowing and Code of Conduct policies which all staff (including Malagasy staff) sign up to as part of their employment. Downstream partners such as the MoE and MNP have codes of conduct which their staff must follow.

Malagasy staff are required by law to provide a criminal record when recruited. DWCT also supports community level grievance mechanisms. Community leaders must notify both the DWCT site manager and Madagascar Programme Director of grievances. If these concern a DWCT staff member, then they are investigated as an internal grievance or whistleblowing complaint and disciplinary procedures would be undertaken.

Q31. Ethics

Outline your approach to meeting the key principles of good ethical practice, as outlined in the guidance.

We have robust policies and procedures in place for the use of drones to respect the rights, privacy, and safety of people impacted by our project, and our operators are appropriately trained, with credentials. We inform individuals that we are using a drone where possible. We will switch on and off any recording system on a drone, when not required for project activities. Recording will be turned off where a person is identifiable in the imagery unless there was a strong justification for doing so, such as obvious ongoing illegal activity. Drone flights will take place in reforestation plots, areas of forest or scrub, or marshland, where there are few people other than Durrell staff/partners. No drone flights will be conducted over private property without community/landowners' prior consent.

Drone pictures will be stored on Durrell's secure servers in our secure office in Antananarivo. Where images or videos are found to contain identifiable imagery of individuals not conducting illegal activities, these files will either be modified to remove the individual (through localised blurring or removal of frames), or the file deleted. Those containing people conducting illegal activities will be handed to law enforcement and then deleted from Durrell's servers.

Section 13 - FCDO Notifications

Q32. FCDO notifications

Please state if you think that there are sensitivities that the Foreign Commonwealth and Development Office will need to be aware of should they want to publicise the project's success in the Darwin Initiative in any country.

No

Please indicate whether you have contacted FCDO Embassy or High Commission to discuss the project and attach details of any advice you have received from them. If you have not, please say why not.

Yes (no written advice)

Section 14 - Project Staff

Q33. Project staff

Please identify the core staff (identified in the budget), their role and what % of their time they will be working on the project.

Please provide 1-page CVs or job description, further information on who is considered core staff can be found in the Finance Guidance

Name (First name, surname)	Role	% time on project	1 Page CV or job description attached?
Mike HUDSON	Project Leader	8	Checked
Andriatsitohaina (Tsito) RAKOTOZOELY	Drone Project Coordinator	100	Checked
Valisoa Fihobiana HASIFISAINANA	Drone Project Officer	80	Checked
Fidimalala (Fidy) RALAINASOLO	Protected Area Coordinator	5	Checked

Do you require more fields?


Yes


Name (First name, surname)	Role	% time on project	1 Page CV or job description attached?
Leslie WILMET	Head of Species Conservation and Research Madagascar	5	Checked
Richard LEWIS	Madagascar Programme Director	3	Checked
Aina RAMAMONJISOA	Head of Finance and Administration, Madagascar	3	Checked
To be recruited	Student researcher for data collection	10	Checked
To be recruited	Student researcher for data collection	10	Checked


No Response	No Response	0	Unchecked
No Response	No Response	0	Unchecked
No Response	No Response	0	Unchecked

Please provide 1 page CVs (or job description if yet to be recruited) for the project staff listed above as a combined PDF.

Ensure the file is named clearly, consistent with the named individual and role above.

 [00 CVs Merged](#)

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 pdf 2.08 MB

Have you attached all project staff CVs?

Yes

Section 15 - Project Partners

Q34. Project Partners

Please list all the Project Partners (including the Lead Partner – i.e. the partner who will administer the grant and coordinate the delivery of the project), clearly setting out their roles and responsibilities in the project including the extent of their engagement so far and planned.

This section should demonstrate the capability and capacity of the Project Partners to successfully deliver the project. Please provide Letters of Support for all project partners or explain why this has not been included.

The partners listed here should correspond to the Delivery Chain Risk Map (within the Risk Register template) which you will be asked to submit if your project is recommended for funding.

Lead Partner name: Durrell Wildlife Conservation Trust

Partner name:

Website address: <https://www.durrell.org/>

Why is this organisation the Lead Partner, and what value to they bring to the project?

(including roles, responsibilities and capabilities and capacity):

DWCT was established in 1963 and is headquartered at Jersey Zoo. Our reputation is built on saving species from extinction, restoring habitats, and building global conservation capacity through training and long-term mentoring approaches. We have had a permanent presence in Madagascar since 1986. With over 90 in-country staff, we deliver conservation programmes in four regions: Alaotra-Mangoro, Sofia, Boeny and Menabe. This work is led by Programme Director, Richard Lewis, from Antananarivo. Strategic, logistic and technical support is provided by DWCT's Field Programmes, Conservation Science and Training departments in the UK and Madagascar. In collaboration with partners, DWCT will coordinate delivery of project activities and associated monitoring efforts. Proposed activities are a scaling up of the work we have already begun in partnership with MNP and LJMU. We already have trained drone professionals in the team, who are respected by our partners and are heavily involved in the National Reforestation Programme, as well as an established drone building and repair lab. Our team is therefore best placed to innovate the next steps in reforestation monitoring alongside the government program, and to build capacity within the Malagasy government to continue drone piloting work. Monitoring and deterrence activities will operate in parallel with DWCT's strategic plans in Menabe, Boeny and Alaotra, in areas where DWCT is well established with communities and has the capability to implement and trial these methods effectively.

International/In-country Partner

International

Allocated budget (proportion or value):



Represented on the Project Board

Yes

Have you included a Letter of Support from the organisation?

Yes

Do you have partners involved in the project?

Yes

1. Partner Name:

Liverpool John Moores University (LJMU)

Website address:

<https://www.ljmu.ac.uk/about-us/faculties/faculty-of-science/school-of-biological-and-environmental-sciences>

What value does this Partner bring to the project?

LJMU will continue their successful technical collaboration with Durrell throughout this project, including the contribution of staff time of their experts, Professor Steve Longmore and Professor Serge Wich. LJMU and DWCT collaboration has established the basis of this project, including the development of DWCT's drone lab and trials of some of the solutions proposed under this project. LJMU are providing some of the salary of Drone Project Coordinator, Tsito Rakotozoely and will provide the team with technical support and monitoring throughout.

(including roles, responsibilities and capabilities and capacity):

A key part of the LJMU role in this project will be to create a drone users' working group in Madagascar to bring this community together more permanently.

International/In-country Partner International

Allocated budget: 0

Represented on the Project Board Yes

Have you included a Letter of Support from this partner? Yes

2. Partner Name: Madagascar National Parks (MNP)

Website address: Madagascar National Parks (parcs-madagascar.com)

What value does this Partner bring to the project? MNP are responsible for the management of 43 of Madagascar's National Parks and have a member of staff trained in the flying and maintenance of drones during our previous project with LJMU. They are responsible for the monitoring of biodiversity in these parks and so represent an obvious partner for ensuring all lessons learned and techniques developed during this project can be utilised immediately across Madagascar for greatest impact.

(including roles, responsibilities and capabilities and capacity): MNP are long-term partners with Durrell in some of our project sites and co-deliver a number of conservation monitoring and action workstreams.
Continuous collaboration between MNP and DWCT deliver comparative data possibilities for more accurate results in GIS, forest status, firefighting, and M&E of drone use.

International/In-country Partner In-country

Allocated budget: 0

Represented on the Project Board Yes

Have you included a Letter of Support from this partner? Yes

3. Partner Name: *No Response*

Website address: *No Response*

What value does this Partner bring to the project? *No Response*

(including roles, responsibilities and capabilities and capacity):

International/In-country Partner International
 In-country

Allocated budget: 0

Represented on the Project Board Yes
 No

Have you included a Letter of Support from this partner? Yes
 No

4. Partner Name: *No Response*

Website address: *No Response*

What value does this Partner bring to the project? *No Response*

(including roles, responsibilities and capabilities and capacity):

International/In-country Partner International
 In-country

Allocated budget: 0

Represented on the Project Board Yes
 No

Have you included a Letter of Support from this partner? Yes
 No

5. Partner Name: *No Response*

Website address: *No Response*

What value does this Partner bring to the project? *No Response*

(including roles, responsibilities and capabilities and capacity):

International/In-country Partner International
 In-country

Allocated budget: 0

Represented on the Project Board Yes
 No

Have you included a Letter of Support from this partner? Yes
 No

6. Partner Name: *No Response*

Website address: *No Response*

What value does this Partner bring to the project? *No Response*

(including roles, responsibilities and capabilities and capacity):

International/In-country Partner International
 In-country

Allocated budget: 0





Represented on the Project Board Yes
 No

Have you included a Letter of Support from this partner? Yes
 No

If you require more space to enter details regarding Partners involved in the project, please use the text field below.

No Response

Please provide a combined PDF of all letters of support.

 [LoS merged](#)
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 pdf 1.51 MB

Section 16 - Lead Partner Track Record

Q35. Lead Partner Capability and Capacity

Has your organisation been awarded Darwin Initiative, Darwin Plus or Illegal Wildlife Trade Challenge Fund funding before (for the purposes of this question, being a partner does not count)?

Yes

Please provide details of the most recent awards (up to 6 examples).

Reference No	Project Leader	Title
DARCC011	Hanitra Nomentsoa Andrianantenaina	Realising the Durban Vision: Strengthening Madagascar's protected area management capacity
29-003	Jeff Dawson	Improving livelihoods and protecting biodiversity on Floreana Island, Galapagos
28-008	Fidy Ralainasolo	Restoring the Alaotra Ramsar Watershed - The Breadbasket of Madagascar
27-004	Chris Ransom	Building future resilience for communities and wildlife in Ambondrobe
DPlus105	Mike Hudson	Building capacity to make Montserrat a Mountain Chicken Refuge
IWT074	Chris Ransom	Cracking Wildlife Smuggling in Madagascar

Have you provided the requested signed audited/independently examined accounts?

If yes, please upload these on the certification page. Note that this is not required from Government Agencies.

Yes

Section 17 - Certification

Q36. Certification

On behalf of the

Trustees

of

I apply for a grant of



I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.

(This form should be signed by an individual authorised by the applicant institution to submit applications and sign contracts on their behalf.)

- I have enclosed CVs for key project personnel, a cover letter, letters of support, a budget logframe, theory of change, Safeguarding Policy and project implementation timetable.
- Our last two sets of signed audited/independently verified accounts and annual report (or other financial evidence - see Financial Guidance) are also enclosed.

Checked

Name	Chris Ransom
Position in the organisation	Director of Conservation Field Programmes
Signature (please upload e-signature)	CR SIGNATURE 07/11/2022 15:32:57 jpg 13.55 KB
Date	07 November 2022

Please attach the requested signed audited/independently examined accounts.

- | | |
|--|--|
| Durrell Annual Report and Financial Statements 2020
07/11/2022
16:50:27
pdf 4.86 MB | Durrell Annual Report and Financial Statements 2021
07/11/2022
16:50:08
pdf 2.15 MB |
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Please upload the Lead Partner's Safeguarding Policy as a PDF

- [2021 Safeguarding Policy Final](#)
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 pdf 144.55 KB

Section 18 - Submission Checklist

Checklist for submission

I have read the Guidance, including the "Guidance Notes for Applicants", "Monitoring, Evaluation and Learning Guidance", "Risk Guidance" and "Finance Guidance". Checked

I have read, and can meet, the current Terms and Conditions for this fund.	Checked
I have provided actual start and end dates for my project.	Checked
I have provided my budget based on UK government financial years i.e. 1 April - 31 March and in GBP.	Checked
I have checked that the budget is complete, correctly adds up and I have included the correct final total at the start of the application.	Checked
The application has been signed by a suitably authorised individual (clear electronic or scanned signatures are acceptable).	Checked
I have attached the below documents to my application:	Checked
<ul style="list-style-type: none"> • my completed logframe as a PDF using the template provided 	
<ul style="list-style-type: none"> • my 1 page Theory of Change as a PDF which includes the key elements listed in the guidance 	Checked
<ul style="list-style-type: none"> • my budget (which meets the requirements above) 	Checked
<ul style="list-style-type: none"> • my completed implementation timetable as a PDF using the template provided 	Checked
<ul style="list-style-type: none"> • 1 page CV or job description for all the Project Staff identified at Question 32, including the Project Leader, or provided an explanation of why not. 	Checked
<ul style="list-style-type: none"> • a letter of support from the Lead Partner and partner(s) identified at Question 33, or an explanation of why not. 	Checked
<ul style="list-style-type: none"> • a cover letter from the Lead Partner, outlining how any feedback received at Stage 1 has been addressed where relevant. 	Checked
<ul style="list-style-type: none"> • a copy of the Lead Partner's safeguarding policy, which covers the criteria listed in Question 29. 	Checked
<ul style="list-style-type: none"> • a signed copy of the last 2 annual report and accounts for the Lead Partner, or provided an explanation if not. 	Checked
(If copying and pasting into Flexi-Grant) I have checked that all my responses have been successfully copied into the online application form.	Checked
I have been in contact with the FCDO in the project country(ies) and have included any evidence of this. If not, I have provided an explanation of why not.	Checked
I have checked the Darwin website immediately prior to submission to ensure there are no late updates.	Checked
I have read and understood the Privacy Notice on the Darwin Initiative website.	Checked

We would like to keep in touch!

Please check this box if you would be happy for the lead applicant (Flexi-Grant Account Holder) and project leader (if different) to be added to our mailing list. Through our mailing list we share updates on upcoming and current application rounds under the Darwin Initiative and our sister grant scheme, the IWT Challenge Fund. We also provide occasional updates on other UK Government activities related to biodiversity conservation and share our quarterly project newsletter. You are free to unsubscribe at any time.

Checked

Data protection and use of personal data

Information supplied in the application form, including personal data, will be used by Defra as set out in the **Privacy Notice**, available from the [Forms and Guidance Portal](#).

This **Privacy Notice must be provided to all individuals** whose personal data is supplied in the application form. Some information may be used when publicising the Darwin Initiative including project details (usually title, lead partner, project leader, location, and total grant value).

Project Title: Pioneering approaches for drone use in biodiversity conservation - Madagascar

	Activity	No. of months	Year 1 (23/24)				Year 2 (24/25)			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 1	Techniques established for semi-automated reforestation monitoring using drones									
1.1	Drone flights to collect raw data on each reforestation plot	8	X				X			
1.2	Ground surveys to ground truth drone data on each reforestation plot	6		X				X		
1.3	Algorithm/pipeline developed to process drone data for the effective monitoring of sapling survival rate and reforestation success and rates of carbon sequestration	12		X	X	X		X	X	
1.4	AI algorithm training on identification of tree species and coverage across reforestation plots	10		X	X		X	X	X	
1.5	Workshop delivered to disseminate newly developed reforestation monitoring techniques	1			X					X
1.6	Paper writing	8			X	X		X	X	
Output 2	Capacity developed for using drones for environmental conservation in Madagascar									
2.1	Madagascar practitioners gathered to form a working group	1	X							
2.2	Working group meetings chaired by Durrell project staff	2	X			X		X	X	
2.3	Knowledge sharing workshops delivered to working group (at least one per year)	4			X					X
2.4	Seven day full-time training course and refresher sessions delivered for 50 people for drone piloting - five conducted in total (10 people each session) by project end	2		X	X			X	X	
2.5	Advanced training delivered to four people on drone maintenance through regular sessions at the Durrell drone lab	4				X				X
Output 3	Drones demonstrated as an effective detection and deterrence mechanism for environmentally damaging behaviour and informing and responding to SMART patrol activity									
3.1	Experimental framework developed for the testing of drones as deterrence measure in Menabe-Antimena National Park	6		X	X	X		X	X	X
3.2	Drone flights conducted across two fire seasons during project in experimental framework, for at least four weeks at a time	6		X	X	X		X	X	X
3.3	Longitudinal monitoring using SMART by local village patrols to understand the impact of drone flights on distribution and prevalence of illegal activities in Menabe	4			X	X			X	X

Project Title: Pioneering approaches for drone use in biodiversity conservation - Madagascar

	Activity	No. of months	Year 1 (23/24)				Year 2 (24/25)			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3.4	Drone detection data is integrated into SMART to inform community patrol activity	6		X	X	X			X	X
Output 4	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									
4.1	Systematic flights conducted to assess the population of Alaotran gentle lemurs across their marsh range	4		X		X		X		X
4.2	Ground truthing surveys in pirogues conducted to validate drone footage and image processing	6		X		X		X		X
4.3	Semi-automated pipeline for the detection of gentle lemurs from thermal infra-red imagery trained on data collected during the first field season	6			X		X		X	
4.4	Training provided to students in lemur surveying using drones	4	X		X		X		X	
4.5	Paper writing	8			X	X		X	X	

Project Title: Pioneering approaches for drone use in biodiversity conservation - Madagascar

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
Impact: Reduction in deforestation, enhanced reforestation monitoring and improved monitoring of conservation targets throughout Madagascar			
<p>Outcome: Drones are being used to effectively monitor and improve biodiversity conservation in Madagascar</p>	<p>0.1 Drones are being utilised for reforestation monitoring, including individual survival, across at least four reforestation plots by end of project 0.2 A conservation drone working group drives the uptakes of drones for conservation in at least 10 protected areas across Madagascar by project end 0.3 Drones are adopted in management plans for the deterrence of illegal activities in core protected zones in at least two protected areas 0.4 A range wide survey of the Alaotran gentle lemur using drone-based infra-red data is completed and provides a model for infra-red animal monitoring in Madagascar</p>	<p>0.1 Drone flight maps and monitoring reports 0.2 Training records and flight logs and usernames will determine those actively using drones for PA management alongside reports from regular meetings of the working group 0.3 Longitudinal SMART data and research report 0.4 Report on the outcome of the range-wide survey, with recommendations for transference to other systems</p>	<p>0.1a The model for processing drone-imagery to track individual tree survival on reforestation plots is developed successfully 0.1b Reforestation efforts continue post-election 0.2 Conservation drone users continue to engage in our workshops and meetings 0.3 Experiment shows that drones are successful in deterring illegal behaviours in protected areas, and do not displace activities to other areas of the park. 0.3b Drone maintenance enables sufficiently regular flights to maintain deterrent effect 0.3c Deterrent effect does not wane, significantly, through time 0.4a Development of semi-automated detection of drones in the infra-red imagery continues to progress successfully 0.4b No negative reaction to drones is observed during surveys (not to date, but regularly monitored)</p>

Project Title: Pioneering approaches for drone use in biodiversity conservation - Madagascar

<p>Outputs: 1. Techniques established for semi-automated reforestation monitoring using drones</p>	<p>1.1 Three reforestation plots surveyed by drones in both dry and rainy season by end of Y1 1.2 Three reforestation plots surveyed for ground truthing in both dry and rainy season by end of Y1 1.3 Technique developed for the processing of drone imagery to track individual survival of trees in reforestation plots allowing carbon sequestration to be accurately tracked, alongside correlates of tree survival 1.4 AI based system developed to accurately detect tree species and coverage in reforestation plots to enable post-hoc monitoring of reforestation plots 1.5 One training session delivered to new working group on standardising drone-based reforestation monitoring in Madagascar by end of project 1.6 Paper submitted to an international journal, on effective monitoring of reforestation using drones by end of project</p>	<p>1.1 Drone flight path maps 1.2 Survey reports 1.3 Quarterly progress reports 1.4 Quarterly progress reports 1.5 Workshop minutes and attendance sheet 1.6 Submitted to peer-reviewed journal and received receipt of submission</p>	<p>1.3a GNSS resolution is high enough to ensure individual trees can be identified aerially across multiple longitudinal images 1.3b trees can be distinguished from background vegetation in drone imagery at all life stages 1.4 AI can be trained to detect differences in RGB imagery between tree species 1.5 There is interest amongst working group for the session 1.6 Techniques for processing drone data for reforestation monitoring are successful and scalable</p>
<p>2. Capacity developed for using drones for environmental conservation in Madagascar</p>	<p>2.1 Cross NGO/government working group created on drone use by Y1Q2 2.2 At least four meetings of the drone working group in each year of the project 2.3 Two knowledge sharing workshops delivered to working</p>	<p>2.1 Working group meeting attendance report 2.2 Working group meeting attendance report 2.3 Workshop minutes and attendance sheet</p>	<p>2.2 Government officials are able to regularly attend working group meetings alongside drone professionals 2.4 If the Madagascar government creates it's own theory exam, this target would</p>

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	<p>group participants by end of project (middle and end)</p> <p>2.4 At least 50 pilots trained and passing UK theory exams (or equivalent) to demonstrate competence by end of project</p> <p>2.5 Advanced training provided in drone maintenance to four people (Two from MNP, Two from MoE or major NGO using drones) by end of project</p>	<p>2.4 Copies of theory exams successfully completed (names redacted for privacy)</p> <p>2.5 Training attendance log and feedback</p>	<p>change to completion of this exam</p> <p>2.5 MNP / Government / NGO staff are able to attend regular drone training sessions</p>
<p>3. Drones demonstrated as an effective detection and deterrence mechanism for environmentally damaging behaviour and informing and responding to SMART patrol activity</p>	<p>3.1 Reduced illegal activity detected by SMART community patrols after deterrence flights in treatment plots</p> <p>3.2 Drone monitoring flights are being used for to detect smoke and illegal activity by project end</p> <p>3.3 Drone tracks and incursion data integrated into Durrell's SMART database and informing SMART adaptive management by end of project</p>	<p>3.1 SMART patrol data</p> <p>3.2 Project report and drone detection rate</p> <p>3.3. SMART reports including drone patrol tracks</p>	<p>3.1 Illegal activities are not displaced to other areas of the protected area (control sites). This will be monitored.</p>
<p>4. 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</p>	<p>4.1 Drone flights conducted for lemur detection across the Lac Alaotra marsh by the end of Y1</p> <p>4.2 Ground truthing surveys conducted for lemur populations and compared to drone data by end of Y1</p> <p>4.3 Semi-automated infra-red processing algorithm developed enabling processing of range-wide survey data</p>	<p>4.1 Drone flight path maps</p> <p>4.2 Survey reports</p> <p>4.3 Students research reports</p> <p>4.4 Submitted to peer-reviewed journal and received receipt of submission</p>	<p>4.1 No adverse reactions observed in lemurs in response to drone flights (none to date, but constantly reviewed)</p> <p>4.3 Thermal infra-red continues to successfully detect lemurs in different habitats across the marsh</p> <p>4.4 Thermal infra-red system continues to successfully detect lemurs enabling development of semi-automated algorithm</p>

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	4.4 Manuscript submitted on the detection of Alaotran gentle lemurs with drone-based thermal infra-red		
<p>Activities</p> <ul style="list-style-type: none"> 1.1 Drone flights to collect raw data on each reforestation plot 1.2 Ground surveys to ground truth drone data on each reforestation plot 1.3 Algorithm/pipeline developed to process drone data for the effective monitoring of sapling survival rate and reforestation success and rates of carbon sequestration 1.4 AI algorithm training on identification of tree species and coverage across reforestation plots 1.5 Workshop delivered to disseminate newly developed reforestation monitoring techniques 1.6 Paper writing 2.1 Madagascar practitioners gathered to form a working group 2.2 Working group meetings chaired by Durrell project staff 2.3 Knowledge sharing workshops delivered to working group (at least one per year) 2.4 Seven-day full-time training course and refresher sessions delivered for 50 people for drone piloting - five conducted in total (10 people each session) by project end 2.5 Advanced training delivered to four people on drone maintenance through regular sessions at the Durrell drone lab 3.1 Experimental framework developed for the testing of drones as deterrence measure in Menabe-Antimena National Park 3.2 Drone flights conducted across two fire seasons during project in experimental framework, for at least four weeks at a time 3.3 Longitudinal monitoring using SMART by local village patrols to understand the impact of drone flights on distribution and prevalence of illegal activities in Menabe-Antimena 3.4 Drone detection data is integrated into SMART to inform community patrol activity 4.1 Systematic flights conducted to assess the population of Alaotran gentle lemurs across their marsh range 4.2 Ground truthing surveys in pirogues conducted to validate drone footage and image processing 4.3 Semi-automated pipeline for the detection of gentle lemurs from thermal infra-red imagery trained on data collected during the first field season 4.4 Training given to students to enable them to assist in lemur surveys 4.5 Paper writing 			