# EA18/1503

**Meta-population dynamics of Malagasy plovers: population ecology, movements and reproductive success**

Since the "Lawton Report" of 2010, there has been an increasing focus of conservation biologists on the connectivity of habitats and its role in ensuring species survival. "Bigger", "better", "more" and "joined" are the strategies for increasing survival of species in managing a spatial network of habitat patches. However, for any specific system, the effectiveness of any of these strategies depends on the interplay between local population dynamics and large-scale metapopulation structure.

Because of high endemism, escalating threats, as well as being under-protected and little studied, my research team has worked on Malagasy wetland birds, specifically their conservation biology, behavior ecology and genetics

Since 2010 my research has focused on Kittlitz's, Madagascan, and White-fronted plovers of the Andavadoaka, the largest saltmarshes patches with high concentration of plovers in SW Madagascar. Little is known about the metapopulation structures and population ecology of these species in these important and threatened ecosystems and therefore how effective different management strategies might be in promoting population sizes. The aim of this project is to better understand the roles of local and metapopulation dynamics in this group of threatened species, with a view to designing better management strategies.

Previously, we showed that Kittlitz's plovers and white-fronted plovers have different social structure from the Madagascan plover                                            , and I expect this difference will influence their movements and population fluctuations. By analyzing together the previous preliminary data since 2010 and new key data to collect on 2019, I plan to answer two questions:

1.What are the key aspects of population ecology of three breeding plovers and the structure of metapopulation spread across habitat patches?

2.What are the implications of these key aspects in conservation of species and their habitat?

To answer these questions, this project has four specific objectives:

1. Quantify the population ecology data (spatial distribution, density, breeding success) of species and their changes over time.

2. Test whether ecological factors such as abiotic factors (water, soil, vegetation, patch size) and biotic factors (nest predators, presence same or congener species, adult sex ratio) influence population dynamics.

3. Characterize the structures of plover metapopulations (patch' size, distance, connectedness, and occupancy dynamics).

4. Use these data to update conservation measures of species and identify key breeding patches.

The outcome of this work will allow to determine the factors (biotic and abiotic) affecting population ecology, as well as understand the metapopulations structures of these species. In terms of conservation outcomes I will:

* Quantify the habitat patches of plovers from the best (productive/sources) to bad (non-productive/sinks),

* Propose the minimal rescue habitat patch of species (minimal habitat quality of persistence of species)

* Prioritize habitat patches within the metapopulation for designing priority sites of protection and management.

The BES project will also allow me to continue supervising Malagasy students, and make contact with UK scientists.

## PRIMARY APPLICANT DETAILS

**Name** ███
**Surname** ███
**Email (Work)** ███████

## CONTACT DETAILS

**Role** Referee 2

**Title** █
**Name** ███
**Surname** ████
**Email (Work)** █████

## CONTACT DETAILS

**Role** Referee 1

**Title** █
**Name** ██
**Surname** ███
**Email (Work)** ██████

# Section 1 - Eligibility

**Please answer the questions below to determine if you are eligible for this scheme**

**Have you previously been awarded an Ecologists in Africa grant?**

No

**Do you have at least an MSc or equivalent degree?**

Yes

**Can you answer yes to each of the following:**
- **Are you a citizen of a country in Africa or its associated islands that is a 'low-income economy' or 'lower-middle-income economy' according to the World Bank categorization?**
- **Are you working for a University or research institution in Africa (including field centres, NGOs, museums etc.) that provides basic research facilities?**
- **Will the proposed work be carried out in a country in Africa or its associated islands?**

Yes

**How much are you applying for?**

Up to £10000

**Please note, we do not accept re-submissions of the same project.**

**Applications will be rejected without being sent out for review if they are re-submissions of a proposal rejected in a previous round, or if they represent only a minor revision of such a proposal (for example, with a modified experimental design). As a guide, in order to be significantly different, at least 80% of objectives & activities should be different to the original proposal.**

**Using the above statement, is this project a resubmission?**

No

# Section 2 - Contact Details

## PRIMARY APPLICANT DETAILS

| | |
|---|---|
| **Name** | ████ |
| **Surname** | ████ |
| **Email (Work)** | ████ |

## CONTACT DETAILS

| **Role** | Referee 2 |
|---|---|
| **Title** | █ |
| **Name** | ████ |
| **Surname** | ████ |
| **Email (Work)** | ████ |

## CONTACT DETAILS

EA18/1503

| Role | Referee 1 |
|---|---|
| Title | ███ |
| Name | ███ |
| Surname | ███ |
| Email (Work) | ███ |

## GMS ORGANISATION

| Type | Organisation |
|---|---|
| Name | ███ |
| | ███ |
| Phone | ███ |
| Email | ███ |
| Address | ███ |
| | ███ |
| | ██ |
| | ███ |

| | |
|---|---|
| **If you do not have a current organisation (i.e. you are an independent researcher/retired), please provide your preferred contact address above and select the checkbox to the right.** | Checked |

**BES Membership Number**
**You do not need to be a member to apply, however if you are, please provide your number below**

███

# Section 3 - CV

**Education History**

**Please note if you do not know the exact day, select the 1st day of the month e.g. March 2005:  01/03/2005**

| Start Date | End Date | Qualification | Organisation | Additional Info |
|---|---|---|---|---|
| ███ ██ | ███ ██ | PhD | University of ███ ███ | summa cum laude |
| ███ ██ | ███ | Master | University of ███ ███ | *No Response* |
| ███ ██ | ███ | Bachelor of Sciences | University of ███ ███ | *No Response* |

**Employment History**

**Please note if you do not know the exact day, select the 1st day of the month e.g. March 2005:  01/03/2005**

| Start Date | End Date | Position | Organisation | Additional Info |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| ██████ ██ | ████ ██ | Director of Institut | ███ █████████ ████████████ ████████████ ███████ | ███████████ ████ ██ |
| ██████ ██ | ████ ██ | █████████ ████████████ ████████████ ████████████ ██████████ ████████ | ███████████ ██████████ ████████████ █████████ | *No Response* |
| ██████ ██ | ████ ██ | Lecturer | ███ ████████████ ████████████ ████████████ ████████ | *No Response* |
| ██████ ██ | ██ ████████ ██ | Consultant on bird population surveys | BirdLife International ████████ ████████ ████████ █████████ ███████████ ████ | *No Response* |

**Research Grants/Fellowships Awarded**

| Date | Details | Amount Awarded (£) | Additional Info |
|---|---|---|---|
| ███████ | ████████ █████████ █████████ █████████ ███████ ███████ ██████ ███████ ████████ | £1,936.00 | *No Response* |
| ███████ | █████████ ████████ █████████ █████ ████████ ███████ | £5,963.00 | *No Response* |
| ████████ | █████████ █████████ ███████ █████████ ███████ ████████ █████████ | £2,500.00 | *No Response* |

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**Conference Participation**
 **Please list a maximum of 3 most relevant and recent conferences**

| Conference Name | Details |
| --- | --- |
| Workshop on climate change 5-7 October 2016 at Morondava, Madagascar | ████████████████████████ ████████████████████████████ ██████████████████████████████████ ████████████████████████ |

**Other Awards/Achievements/Skills**

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██████

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*No Response*

**Summary of Publication Record**

███████████████████████████████████████████████████████████
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**Professional Membership**

 Member of Malagasy academic searchers syndicat (SECES = Syndicat des Enseignants chercheurs)

**Additional Information**

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# Section 4 - Project Details and Keywords

**NB: The Total Project Cost and Amount Requested will be added automatically from the figures you provide on the budget page.**
**Once you have completed your budget, you will be required to come back into this page, ensure the figures are correct, and save the page.**

**Summary Project Details**

| Total project cost: £ | Amount requested from BES: £ |
| --- | --- |
| 9,985.00 | 9,985.00 |

# Please read our [Bulletin article](#) for guidelines on writing an effective lay summary.

**Project title:**

Meta-population dynamics of Malagasy plovers: population ecology, movements and reproductive success

**Project lay summary:**

Since the "Lawton Report" of 2010, there has been an increasing focus of conservation biologists on the connectivity of habitats and its role in ensuring species survival. "Bigger", "better", "more" and "joined" are the strategies for increasing survival of species in managing a spatial network of habitat patches. However, for any specific system, the effectiveness of any of these strategies depends on the interplay between local population dynamics and large-scale metapopulation structure.

Because of high endemism, escalating threats, as well as being under-protected and little studied, my research team has worked on Malagasy wetland birds, specifically their conservation biology, behavior ecology and genetics ███████████████████████████████ ████████████████████████████████████████████

Since 2010 my research has focused on Kittlitz's, Madagascan, and White-fronted plovers of the Andavadoaka, the largest saltmarshes patches with high concentration of plovers in SW Madagascar. Little is known about the metapopulation structures and population ecology of these species in these important and threatened ecosystems and therefore how effective different management strategies might be in promoting population sizes. The aim of this project is to better understand the roles of local and metapopulation dynamics in this group of threatened species, with a view to designing better management strategies.

Previously, we showed that Kittlitz's plovers and white-fronted plovers have different social structure from the Madagascan plover ███████ ████████████████████████████ and I expect this difference will influence their movements and population fluctuations. By analyzing together the previous preliminary data since 2010 and new key data to collect on 2019, I plan to answer two questions:

1.What are the key aspects of population ecology of three breeding plovers and the structure of metapopulation spread across habitat patches?

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To answer these questions, this project has four specific objectives:

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The outcome of this work will allow to determine the factors (biotic and abiotic) affecting population ecology, as well as understand the metapopulations structures of these species. In terms of conservation outcomes I will:

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* Propose the minimal rescue habitat patch of species (minimal habitat quality of persistence of species)

* Prioritize habitat patches within the metapopulation for designing priority sites of protection and management.

The BES project will also allow me to continue supervising Malagasy students, and make contact with UK scientists.

**Project start date:**　　　　**Project end date:**

01/01/2019　　　　　　　31/12/2019

**Project country:**

Madagascar

███████████

EA18/1503

**We have chosen a selection of keywords, which cover the breadth of the ecological research we fund. These keywords link the ecological content of an application to the most appropriate member of the BES Review College.**

**As your selections will determine which reviewers are asked to assess your application, please select carefully.**

**Please choose three words from the following:**
- ☑ Conservation ecology
- ☑ Population ecology
- ☑ Tropical Ecology

## Section 5 - Grant Specific Questions

**Please provide details of the Research plan. This should include the background to the project, preliminary data, research questions, experimental approach and timetable for delivery.**
**Please capitalize all headings.**

Background to the project

Freshwater ecosystems are among the most threatened habitats globally (Holland et al 2012), with freshwater vertebrate species declining faster than those in either terrestrial or marine realms (WWF 2014). Madagascar is of immense conservation interest for its high level of endemism but also for the threat the existing species are facing. Madagascar's wetlands show similar rates of species endemism with forests (Benstead et al 2003, Sparks and Stiassny 2003): of Madagascar's 12 bird species classified Endangered or Critically Endangered, 9 are wetland bird. Wetlands also supply most of the Madagascar's staple foodstuff, rice, the majority of which is grown in wetlands cleared of their natural vegetation (Food and Agriculture Organization 2002). The main threats to wetlands biodiversity are overexploitation of wetland resources, habitat destruction/modification (Dudgeon et al 2006, Strayer and Dudgeon 2010, Kull 2012, Laurance et al 2014). In sum, the Malagasy wetlands are important in conservation although most Malagasy wetlands are understudied and under protected, including my study area in Andavadoaka.

Since 2010, I and my team interest in improving conservation research on wetland bird in Andavadoaka (SW Madagascar) and revealed various findings on the distribution, ecology, behaviour and genetics of three species that includes the threatened Madagascan plover and the widespread Kittlitz'splover and White-fronted plover. These species breed on the edges of saltmarsh patches in Andavadoaka which are surrounded by dry spiny forests, mangroves and coastal sand dune habitats. Little or non-effort has been done for the conservation of breeding saltmarshes habitat for the plovers. We learned that little is known about the population ecology of breeding plovers and the structures of metapopulations patches and we need that data to promote the conservation of saltmarshes in this area. For promoting the importance of saltmarshes patches as important breeding sites for plover's metapopulations and improving our knowledge on concepts of population ecology and structures of metapopulation of plovers, I propose to collect new key data on metapopulations dynamics of these three plover species.

This BES proposal will focus on population ecology of three plovers and the structure of their metapopulations patches for helping conservation biologist and site managers in prioritizing the important metapopulations breeding patches for the species. This project will improve the conservation management and research for these species and their saltmarshes habitat in southwest of Madagascar.

Preliminary data

- Conservation biology of studied plovers: Madagascan plover is distributed on the west coast of Madagascar from northwest to southwest whereas the Kittlitz's plover and White-fronted plovers are common. The population size of Madagascan plover is approximately 3,100 individuals (Long et al 2008, BirdLife International 2018). My work with Madagascan plover showed that this species is threatened by low breeding success due to nest predation, inflexible breeding behaviour and habitat specialisation ████████████ and predicted to decline in future years. There are no published data yet on breeding ecology of Kittlitz's plover and White-fronted-plover in Madagascar.

- Behaviour ecology of studied plovers: Madagascan plover, Kittlitz's plover and white-fronted plover have different social behavior, and our recent works found difference in their population demography as well (Cunningham et al. 2018, Eberhart-Phillips et al. (2018).

- Metapopulations of three studied plovers:
An example of nest locations of these three studied species in Andavadoaka saltmarshes complex is shown in uploaded file. The lake Antsirabe in the middle symbolize the largest breeding patch well occupied that is surrounded by several small patches of saltmarshes occupied and unoccupied by the three breeding species comparable to the mainland – islands population model.
The distribution of nests of each species varies among the sites: the Madagascan plover can breed only at some patches whereas the Kittlitz's plover's can occupy most of recorded breeding patches. Also, the White-fronted plover appears prefer to breed at coastal patches.

From 2010 to 2018, my team has ringed 1890 Kittlitz's plover (1043 adults + 847 juveniles), 584 Madagascan plover (331 adults + 253 juveniles) and 702 White-fronted plover (342 adults + 360 juveniles) in Andavadoaka, and found 2240 nests including 1278 Kittlitz's plover, 408 Madagascan plover and 554 White-fronted plover nests.

Uploaded file (support document) contains nest locations map of three plovers in Andavadoaka (2014), all references list, photos of study site, applicant in field and mobile hide (Szekely et al 2003), applicant's CV and research permit.

Research questions:
1. What are the key aspects of population ecology of three breeding plovers and the structure of metapopulation spread across habitat patches?

2. What are the implications of population ecology of three plovers and metapopulation structure for the conservation of species and their habitat?

Experimental approach: detailed research plan

I am planning to analyse existing previous preliminary data (nests and captures) my team has collected since 2010, and augment these with new key data 2019 to address research objectives above. Specifically,

Objective 1. Quantify population ecology of three plover species and their population between habitat patches:

- Assess spatial distribution of three species by locating with GPS the coordinates their presence/absence of individuals at each patch over time and mapping their distribution

- Evaluate breeding and non-breeding densities by counting the total number of banded and non-banded individuals per patch's area which is calculated as multiplication of its length and width

- Estimate breeding success using Mayfield (1975). The density of nests and broods will be estimated as their total number per patch's area.

Objective 2: Test whether ecological factors such as abiotic factors and biotic factors do influence these population ecology data (spatial distribution, density, breeding success and dispersal) of three plovers. I propose to collect and analyse the following data

2.1- Abiotic factors

- Presence, absence and size of water plan: recording with GPS the presence and absence of each water plan and their size (length and width)

- Soil type: recording the type of soil (sand, clay, calcite, stones, and presence / absence of rocks

- Vegetation type: presence/absence, size

- Patch's size: recording its length and width using GPS

- Distance inter-patches: estimating distance between each patch using GPS

2.2- Biotic factors

- Nest/chicks predators: predators can be observed directly or known from nests/chicks disappearing

- Presence / absence / abundance of zebus' dungs: as they attract insects and plovers to eat that insects, we'll records the presence, absence (using GPS) and abundance (using direct counting) of dungs at each patch

- Presence / absence / abundance of same or congener species: surveying the presence or absence of same species or different species using their GPS locating and counting their number for estimating their abundance or density.

- Estimate local adult sex ratio (ASR) by counting the number of males and females of previously banded and molecularly sexed birds (more than 2000 birds including the three species were already molecularly sexed in previous years) to see their fluctuating over times.

2.2- Statistical analyzes of hypothetised factors for each population using multiway General Linear Models (GLMs). I would also like to learn time-series analyses, and how to control for spatial autocorrelation.

Objective 3. Characterize the structures of metapopulations patches

- Estimate the size of each patch and distance inter-patch using GPS locating

- Estimate the connectedness and monthly variation of percent of patches occupied/unoccupied, abandoned/recolonized, inter-connected/isolated and the source and sink patches will be estimated from the analysis of resighting data (GPS relocating any previous banded birds at each encountering and any time) indicating the dispersal or movement (emigration / immigration) of males, females and juveniles. There were more than 3000 individually ringed and 2000 molecularly sexed plovers of three species in previous years and I'll continue to ring and molecularly sex new non-banded individuals.

4. Using the aforementioned data for updating conservation measures of species and proposing important breeding patches for the species:

- Update population ecology data in the conservation status of species in IUCN and then predicting the long-term probability of a species persisting in a given habitat patch

- Qualify the saltmarshes habitat patches of plovers from the best (high) or productive (sources) to bad (low) or non-productive (sinks) and

- Propose the minimal rescue patch habitat for each species (persistence in poor quality of habitat)

- Prioritize the important habitat patches of metapopulations of three species, useful in designation of priority sites for protection and management.

A new initiative "Velondriake" is a recent protected area that is a community-based conservation managed by local association Velondriake and NGO Blue Ventures in Andavadoaka (Harris 2007, Roy et al 2009, Andriamalala and Gardner. 2010). Conservation activities of sites managers are focused mainly on marine, mangrove and baobabs habitat protection. The BES project would contribute to this ongoing project Velondriaka by carrying out essential monitoring activities using plovers as model organisms, and reinforcing the conservation of saltmarshes habitat patches of shorebirds and other wetland birds living inside of Velondriake protected areas.

Timetable for delivery:

Fieldwork data collecting: 1st January 2019 to 30th June 2019

Data analysis: 1st July 2019 to 30th September 2019

Writing up research publication(s) and submitting report to BES: 1st October 2019 to 31 December 2019

**Please provide details of agreed collaborations and project partners that will facilitate the proposed project.**

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**Please provide details of the suitability of the institution where the work will be carried out and the availability of equipment and facilities required for the work.**

This project will be based at the University of Toliara (Faculty of Sciences) Madagascar where I work. This institution will provide lab space and office facility to facilitate the realization of the project and support the research permit request to the authorities.

In addition, there are also available facilities at our Field Research Centre in Ampasilava near of study sites available for the proposed research:
- Equipment for ringing, capturing and taking blood samples of plovers
- Infrastructures (houses, toilets and showers) with electricity
- Cooking gears, accommodation and dining facilities
- Car and mobile hides for facilitating the displacement and research of nests and broods
- Others equipment such as GPS, binoculars, telescopes, transponders tags, water filter,
- Office stuff such as laptop, scanner and printer
- As part of this application, I plan to use the facilities for molecularly sexing new banded bird through our collaboration with Sheffield University.

**Please provide details of necessary permits/licences obtained, if applicable.**

We need a research permit that we usually renew every six month. Current research permit (please see a copy in uploaded file support document) is still valid and there is no problem to renew it for the next six month.

**Please indicate how you will assess the scientific impact of the project and the benefits for non-academic audiences.**

-As scientific impact of the project:

* New scientific data on population ecology, breeding and behavior ecology of Madagascan plover and its breeding congeners (White-fronted and Kittlitz's plover) in structured metapopulations patches will be available for scientific report and journal.

* Updating the conservation status of species (threatened Madagascan plover and common White-fronted and Kittlitz's plover) will be available for IUCN and BirdLife international

-As benefits for non-academic audiences of project: information on important metapopulation patches and viability of threatened Madagascan plover in available metapopulation patches are available for local authorities, users of study site, sites managers and conservationists.

**How do you intend to make your research data publically available?**

- Publishing the results and associated data in scientific journal
- Providing report / data to the local authorities, sites managers and conservationists
- Making available the report and two published papers at library of Universities collaborators

**What are the risks to the health and safety of those involved in the project and how are these risks to be minimised?**

Risks (R) and Mitigations (M):

R1:Insufficient First Aid kits
M1:Checking many times and adding

R2:Emergency needed
M2:Permanent access to car and communication point
R3:Hazard animal biting
M3:Using first aid kits or nearest doctor or hospital
R4:No network communication
M4:Checking nearest signal point
R5:Unsafe food/water quality
M5:Using water filter, boiled/purified water, cleaned food/tools/hands
R6:Camp security
M6:Asking local authorities on safe place to camp and using local people as guide and guard
R7:Driving in remote areas/poor road conditions
M7:Driving slowly, paying more attention, using local people as help driver

**Please identify any ethical considerations that may arise from the project.**

-Capturing, ringing and taking bloods samples of bird will be carried out in respect of healthy of bird, not damaging the birds, nor putting in endangered situations after the fieldwork (respect of 'Guidelines for the Use of Animals in Research' published in the journal (Animal Behaviour 2006, 21: 245-253, Bird Conservation International 2000, 10: 1-15).

-We respect the procedures on obtaining necessary license and permits for this project.

-We follow the guidelines and rules of scientific journal in which we intend to publish the work from this project and there is not conflict of interest between the authors.

**Please give details of relevant scientific contacts you have already established with ecologists in your own country and details of your PhD project supervisor, if applicable.**

Details of relevant scientific contacts in Madagascar:

-███████████████████████████████████████████████████████████████████
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**If applying for travel funds, please outline your travel plans, provide details of your overseas host institution, outline the activities planned for your visit and how these will enhance your research.**
**(NB: one of your Statement of Support must be provided by a contact at the host institution you intend to visit)**

Applying for travel funds:
- Travel plan: July-August 2019
-██████████████████████████████████████████████████████

- Activities planned for the visit:
* Data analysis and writing-up scientific paper about this research project
* Writing-up a new research grant application

- Advantage of visit for the research: Data from this project will be analyzed and published under the directive of ████████
█████████████

**Please provide details of other funding applications made for this research project.**

There is not other application made for this research project

**Have you previously applied for a grant from the BES?**

Yes

**If you would like to upload a document in support of your application please attach using the control below. Please make sure you reference these in your text.**

██████████
EA18/1503

**NB: A maximum of 1 file can be uploaded. Please only upload files <u>essential</u> to the application. <u>Files with additional text to supplement word limits will not be considered and may make your application ineligible.</u>**

- ⬇ ████████████.
- 📅 08/09/2018
- 🕐 20:09:56
- 📄 docx 4.59 MB

## Section 6 - Budget

**Please note all budgets must be provided in Great British Pounds (GBP)**

**Equipment/Consumables**

| Item | Quantity | Description | Total Cost |
|---|---|---|---|
| GPS | 1 | 1GPS @ 300GBP = 300GBP (for collecting data on distribution, density, breeding ecology, dispersal and distance inter-patches) | £300.00 |
| Binocular | 1 | 1 binocular @ 300GBP = 300GBP (for searching nests, broods, resighting banded bird and estimating ASR) | £300.00 |
| Traps and bags | 3 | 3 Funnel traps @ 10GBP = 30GBP + 10 bags @ 3GBP = 30GBP (for putting @ and putting new non-banded bird before ringing and taking blood samples) = Total = 60GBP | £60.00 |
| Safring and prefabricated color rings for ringing new plovers | 1,000 | 1000 metals rings (Safring) @ 0.056GP = 60 GBP + 700 prefabricated colors rings (100 units per colors @ 7 different colors) @ 0.15GBP= 105GBP (for individually ringing new non-banded bird with combination of one metal and three color rings per individu) + postage 50GBP | £215.00 |
| Consumables for fieldwork | 1,000 | 1000 tubes lysis for keeping blood samples of new banded bird before exporting them for molecularly sexing @ 0.01GBP=100GBP + 2 litres of ethanol for keeping samples @ 20GBP=40GBP + 15 rechargeable batteries AA and AAA @ 4GP=60GBP, total = 200GBP | £200.00 |
| | | **Overall Equipment Cost:** | **£** 1,075.00 |

**Local Travel/Accommodation/Subsistence**

| Item | Description | Total Cost |
|---|---|---|
| Travel from home ████████████ to fieldwork site ████████████ | Gasoil for the fieldwork car from home to Andavadoaka (15 litres per 100km * 2000km = 300 litres * 1GBP = 300GBP | £300.00 |

| Travel for collecting data at each patch (daily visits inter-patches and camps) | Gasoil for the fieldwork car for these visites (4 litres per day * 150 working days = 600 litres * 1GBP = 600GBP | £600.00 |
|---|---|---|
| Local taxi-brousse tickets for displacement of the team not using the fieldwork car | 10 tickets for other transports @ 20GBP per transport = 200GBP | £200.00 |
| Travel back home from fieldwork site ██████████ to home ██████████ ████ | Gasoil for the fieldwork car from ██████████ back to home ██████████ (15 litres per 100km * 2000km = 300 litres * 1GBP = 300GBP | £300.00 |
| | **Overall Local Travel Cost:** | **£** 1,400.00 |

## International Travel/Accommodation/Subsistence
## (Including multiple entry VISA)

| Item | Description | Total Cost |
|---|---|---|
| International travel | Return ticket ██████████ | £1,500.00 |
| Accommodation | Accommodation during travel or staying | £100.00 |
| Subsistence | Visa, food and local transport | £400.00 |
| | **Overall International Travel Cost:** | **£** 2,000.00 |

## Literature, Documentation, Information

| Item | Description | Total Cost |
|---|---|---|
| Documentation | Photocopying, library access and buying software | £100.00 |
| *No Response* | *No Response* | *No Response* |
| *No Response* | *No Response* | *No Response* |
| | **Overall Literature/Documentation Cost:** | **£** 100.00 |

## Wages
## (Funding is not available to cover tuition fees)

| Position | Description of Role | Rate & Duration of Employment | Total Cost |
|---|---|---|---|
| Field assistants | Faciliting and helping team during fieldwork data collecting at different patches and on 3 plovers species | 2GBP per day @160 days @ 4 persons (one per studied species @ 3 species + one local guide) = 1280GBP | £1,280.00 |

| | | | |
|---|---|---|---|
| Project manager and leader | Fieldwork data collecting, reporting, data analysing and writing-up sceintific paper | One-off | £300.00 |
| *No Response* | *No Response* | *No Response* | *No Response* |
| | | **Overall Wages Cost:** | **£** 1,580.00 |

**Other costs not yet specified**

| Item | Description | Total Cost |
|---|---|---|
| Food for the team during the fieldwork data collecting | 4GP per person per day @ 5 persons (4 assistants + 1 Project leader) @ 170 days = 3600 | £3,400.00 |
| Permit fee | For local authorities and protected areas: 2GBP per person per month @ 5 persons @ 6 months = 60 GBP | £60.00 |
| Cooking gears for the team during the fieldwork data collecting | Stove, pots, silverware etc. | £87.00 |
| Medication | First aid kit, including antibiotics | £83.00 |
| Contingency | *No Response* | £200.00 |
| | **Overall Other Costs:** | **£** 3,830.00 |

**Total project cost:**
**£**
9,985.00

**Amount Requested from BES**

£9,985.00

EA18/1503