

Darwin Initiative for the Survival of Species



Final Report

1. Darwin Project Information

Project Reference No.	162/10/024
Project title	Conservation of Malagasy Microchiropterans and their Habitats
Country	MADAGASCAR
UK Contractor	Professor Paul Racey
Partner Organisation(s)	Department of Animal Biology University of Antananarivo
Darwin Grant Value	£145,125
Start/End date	1.12.01 to 30.11.04
Project website	N/A
Author(s), date	Richard Jenkins, Paul Racey & Daniel Rakotondravony February 2005

CONTENTS PAGE

Contents	Page No.
Project background/Rationale	2
Project summary	3
Scientific, training and technical assessment	6
Project impacts	9
Project outputs	15
Project operation and partnerships	18
Monitoring and evaluation, lesson learning	20
Actions taken in response to annual report reviews	22
Leverage	23
Sustainability and legacy	25
Value for money	27
Appendix I	28
Appendix II	31
Appendix III	39
Appendix IV	40

2. Project Background/Rationale

- *Describe the location and circumstances of the project*

The project was based on Madagascar, the 'Great Red Island'. Geographic isolation has made Madagascar a centre of endemism, with levels approaching 90% for many taxa. Chronic deforestation over the last 50 years has made Madagascar one of the top international conservation priorities and has been the catalyst for a range of conservation projects and research studies.

The available information on the wildlife of Madagascar, based on research and conservation projects up to 2001, was recently summarised (*The Natural History of Madagascar*. 2003 Goodman, SG & Benstead, JP). This book is a good pointer to the priorities of biologists working in Madagascar over the last 10-15 years. There are 694 the references about Malagasy mammals in the book and 6% pertain to bats and 66% to lemurs. This is clearly disproportionate to the number of bat (c. 32) and lemur (c.48) species currently known.

The training agenda for Malagasy biologists is set mainly by the research interests of visiting scientists because each is obliged to involve a Malagasy student biologist (D.E.A) in fieldwork. The D.E.A. (Diplômes d'études Approfondies) degree in Madagascar is seen as a prerequisite to a successful career in conservation. The impressive effort in cataloguing Malagasy small vertebrates by leading international researchers during short, but regular visits to Madagascar (including some previous Darwin Initiative projects) has resulted in a number of D.E.A. students 'cutting their teeth' with training in frogs, birds and rodents. Many of these biologists are now in influential positions in international NGOs in Madagascar and they, perhaps inadvertently, continue to champion the conservation of the taxa with which they are most familiar.

By contrast to other groups of endemic Malagasy vertebrates, bats had received scant attention from biologists. In part, this was addressed by the University of Aberdeen's Darwin Initiative grant (*The Role of Fruit Bats in Maintaining Biodiversity in Madagascar #162/07/02*) that made significant progress in training Malagasy students in fruit bat ecology and conservation and uncovered threats to fruit bats in loss of roosts and overhunting. Madagascar has approximately 30 species of bats, of which ca. 27 are microchiropterans. Apart from a description of specimens collected before the 1970s, there had been no attempt to assess the conservation priorities of Malagasy microchiropterans. This is perhaps hardly surprising as scientific studies on mammals have been dominated by taxonomists and primatologists in Madagascar. The main aim of the present Darwin Initiative project was to train Malagasy students in methods to survey and study microchiropterans, leading to their inclusion in reserve management plans and the national conservation agenda.

- *What was the problem that the project aimed to address?*

The problem was a lack of Malagasy biologists trained to work on microchiropterans. No scientists had ever sponsored Malagasy D.E.A. students on microchiropteran bat ecology projects (with the exception of a University of

Aberdeen student expedition in 1999) and there was a dearth of trained personnel capable of getting bats onto the conservation agenda and dealing with the issues necessary to keep them there.

- Who identified the need for this project and what evidence is there for a demand for this work and a commitment from the local partner?

Following the success of the University of Aberdeen's Darwin Initiative fruit bat project, the host partner on that project (Dr Daniel Rakotondravony) invited Professor Paul Racey to seek funding to establish a training programme for Malagasy students to learn about microchiropteran ecology with the longer term aim of getting the bats placed permanently onto the conservation agenda. Dr Rakotondravony and his colleagues at the Department of Animal Biology, University of Antananarivo, have retained their commitment to the project and have instrumental in its success, helping us both with research/administration/student supervision and by supporting our requests for additional sources of funding and the creation of a national bat conservation association.

3. Project Summary

- *What were the purpose and objectives (or outputs) of the project? Please include the project logical framework as an appendix if this formed part of the original project proposal/schedule and report against it. If the logframe has been changed in the meantime, please indicate against which version you are reporting and include it with your report.*

The main purpose, set out in the original log framework, was to get microchiropterans onto the conservation agenda and this was achieved by:

- 1) Surveying rainforest and karst protected areas
 - 2) Training Malagasy students in techniques to research bats, including the use of advanced bat detectors
 - 3) Assessing the contribution that microchiropterans make to reducing the numbers of insect crop pests
- *Were the original objectives or operational plan modified during the project period? If significant changes were made, for what reason, and when were they approved by the Darwin Secretariat?*

There were no significant changes to the operational plan or original objectives. The fieldwork programme was delayed in 2002 because of a disputed general election, and resulting civil strife as described in our first annual report. An important shift in the exit strategy developed during 2003 that saw the project's team in Madagascar make a commitment to maintaining the bat specialist group after the end of the Darwin Initiative funding. This adjustment to the exit strategy was warmly received by the external reviewer following our last annual report.

- *Which of the Articles under the Convention on Biological Diversity (CBD) best describe the project? Summaries of the most relevant Articles to Darwin Projects are presented in Appendix I.*

This project assisted Madagascar in meeting a number of its commitments under

the CBD, but in particular focussed on Article 12 (Research & Training). We established a scientific training programme for Malagasy students that promoted research (e.g. student theses, publications) and sustainable use (e.g. tourism) of Madagascar's microchiropterans.

- *Briefly discuss how successful the project was in terms of meeting its objectives. What objectives were not or only partly achieved, and have there been significant additional accomplishments?*

Reporting against the three objectives listed above:

1) Surveying rainforest (RF) and karst limestone (KL) protected areas

The project conducted bat surveys in the following protected areas:

Tsingy de Bemaraha National Park (KL), Namoroka National Park (KL), Isalo National Park, Ankarafantsika National Park, Analamazoatra-Mantadia National Park (RF), Ambohitantely Special Reserve (RF), Ranomafana National Park (RF)

The project conducted also bat surveys in the following non-protected areas:

Antananarivo, St. Augustin (KL), Sept Lacs (KL; proposed conservation zone), Anjozorobe Forest (RF; proposed conservation zone), Makira Forest (RF; proposed conservation zone), St Luce Forest (RF), Mandena Forest (RF), Anjohibe Caves (KL), Maromiza Forest (RF)

We surveyed forests, buildings and caves in 16 sites (one less than was stated originally). This list of sites differs significantly from the original proposal. Only 2 of the 11 rainforest sites named in the application were visited. This reflected the flexibility of the team to respond to requests and we preferred to follow the emerging conservation agenda in Madagascar rather than adhere to the original list that was devised 18 months prior in the UK.

Advantages to this approach ensure that our work has conservation relevance and a high profile. Whilst typical vertebrate surveys in Madagascar last about 10 days per site, our efforts at Tsingy de Bemaraha (8 weeks: July & October), Ankarafantsika (9 weeks: March & November), Namoroka (4 weeks) and St Augustin/Sept Lacs (9 weeks: June, October & February) were characterised by longer duration stays that enabled us to better understand seasonal changes and sample rare species. We visited each of the four karst sites listed on the original proposal, and made return visits to Tsingy de Bemaraha and Namoroka National Parks. The visit to Ankarana Special Reserve was deliberately short and served as a fact-finding mission because an American masters student had been conducting surveys of the bats in the caves and we did not want to duplicate his efforts. Despite the presence of the research student, the reserve's director complained of a lack of information for guides and tourists on bats and invited the Darwin Fellow to produce a version of the bat brochure made for Tsingy de Bemaraha for Ankarana.

The adjusted list of field sites reflected a higher effort in western forest and karst than eastern humid forests. Microchiropteran surveys during the first seven months of the project revealed low species diversity and abundance in the humid forests. As a major goal of the project was to train Malagasy

student the shift in 2003 and 2004 to sites in western Madagascar allowed us to catch more bats and provide better hands-on training opportunities.

We consider objective #1 to have been met.

2) Training Malagasy students in techniques to research bats

The original application set the ambitious target of training 12 D.E.A. students from Malagasy universities, and has met that target. The project succeeded in training 12 students from three different host country institutions. The D.E.A. degree often takes 2 or 3 years to complete after the conclusion of the fieldwork. Five students (Rantoanina Andrianasolo, Andriantsialonina Andriamanandratra, Myriam Rakotondramanana, Hanta Julie Razafimanahaka and Cecile Bidaud) have completed their degrees, whilst a further five have submitted their thesis for review by the examining committee (Felicien Randrianandrianina, Ralisita Mahefatiana, Tsibaraha Mbohoahy, Andrianajoro Rakotoarivelo and Picot Monica). The remaining students have all completed fieldwork and are currently preparing their theses (Rampilamanana Roseline and Norotiana Razafindrakoto).

We therefore consider objective #2 to have been met.

3) Assessing the contribution that microchiropterans make to predating insect crop pests

This is a relatively new area of applied ecological research and the link between microchiropteran bats and economic insect pests has proved elusive even in countries with a long history of bat research. Such a project was however specifically requested by our principal Malagasy collaborator Dr. Rakotondravony. Our first step was to employ two additional Darwin Assistants with the extra funds acquired by the project. Nicolas Ranaivoson is an experienced entomologist and Radosoa Andrianaivoarivelo a very promising biologist who completed his D.E.A. on the University of Aberdeen fruit bat project. Together they collected faecal samples from three species of free-tailed bats (molossid bats are voracious predators of insect pests in other countries) and a reference collection of insects. A key/identification guide was developed by Nicolas and Radosoa to assist the identification of insect remains in bat faeces and we used this new document to describe the diet of free-tailed bats in the east of Madagascar. This work has developed into a project which is studying the diet of bats in Madagascar's cotton-producing areas. The proper foundation and gradual development of the 'bats as predators' theme and our capacity to undertake the research has enabled us to be able to realistically tackle the question of insect cotton pests and our expertise in this area is now recognised in Madagascar. It was not possible to complete this work during the life of the present Darwin project because (i) we had to start at the beginning by making our own key (ii) processing insect remains in bat faeces is time consuming and labour intensive. Nevertheless, we hope to acquire additional funding in 2005 and 2006 to continue this important project, the results of which we expect to provide leverage to maintain bats on the conservation agenda. We therefore consider this objective to have been only partially achieved.

4) Additional accomplishments

- 1) We have provided extensive field training to a Malagasy grassroots NGO, called ACCE.
- 2) We have been invited to assist in the design and production of bat conservation awareness posters for two protected forests in the east.
- 3) Invitations from external bodies for us to conduct bat surveys represent a new chapter in mammal conservation in Madagascar. Despite outnumbering lemur species in many reserves, bats have traditionally been neglected. Whilst progress has been made in getting bats onto the conservation agenda, some organisations/people have been slower to incorporate bats into their field survey programmes. Even as recently as November 2004, Conservation International launched a species inventory of a forest in western Madagascar but failed to invite a bat specialist group. Ironically, the same organisation is a major proponent of developing Malagasy taxon specialist group to meet the demand for field surveys. We predict that more and more surveys will incorporate bats into their conservation plans and Madagascar is best served by having a bat specialist group as a permanent member of its conservation community.

4. Scientific, Training, and Technical Assessment

The main training component of the project is for Malagasy DEA (Darwin trainees) students to learn the techniques required to study bats. The DEA degree in Madagascar is usually the first experience the students have of field research and can be a stepping-stone to a PhD or employment.

Following discussions with our Malagasy university partners we adopted the following structure for DEA student projects: the Darwin Fellow provides the project ideas because the students generally have no prior knowledge of bats. After preliminary discussions the students prepare a research proposal using the computers and literature available in the project office. The trainee must obtain the endorsement of his/her proposal from a university supervisor before starting the research. The first period in the field is always with the Darwin Fellow and is devoted to introducing the trainees to the relevant methods (e.g. bat detectors, insect traps, radio telemetry, mist nets). Malagasy Darwin Assistants and other, more experienced team members, maintain high support levels for trainees throughout the field project. The trainee is expected to be more independent during the second half of the fieldwork and is given the opportunity to develop original ideas. A Darwin-funded visit from the university supervisor of the trainee occurs during the fieldwork. Students receive one-to-one training in data entry, statistical analysis and thesis preparation from the Darwin Fellow and they have 24-hour access, 7 days a week to the computers in the project office and three guest rooms are also at their disposal. We have provided our student from the University of Toliara with a laptop computer (otherwise he would be sharing the department's PC with 22 of his colleagues) and he made short, residential study visits to the Antananarivo office.

The additional funding secured by the project has enabled the team of Darwin Assistants to be increased by three to a total of five. The assistants are all

experienced in their fields (three from the previous Darwin Initiative grant to the University of Aberdeen's fruit bat project, one from BP-funded Microchiroptera expeditions and an entomologist) and are not currently engaged in any formal study. They receive more advanced training than the DEA students (e.g. advanced statistics, desktop publishing and preparation of scientific publications) and are given an opportunity to devise and manage budgets, write project proposals and to lead field trips.

National Park guides who work with us received training in bat identification and learn about bat ecology. This is especially useful in parks such as Bemaraha where many tourists are taken into caves to see the roosting bats.

The Darwin Fellow has been assisted in training Malagasy students by separately funded short visits by Professor Paul Racey, and Dr Jon Russ of the University of Aberdeen and Dr Lorraine Marshall-Ball of the University of St Andrews.

- **Research** - *this should include details of staff, methodology, findings and the extent to which research findings have been subject to peer review.*

As outlined above, the project employed a number of full time research assistants and at the end of the funding there were four bat biologists, an entomologist and botanist engaged full-time on the project.

We used a variety of methods to answer the research questions posed in our original application, reflecting the wide range of disciplines required to study bat ecology. We relied heavily on the use of ultrasound bat detectors to quantify habitat use and species composition in different forest areas. Each of the Darwin Trainees was trained in the theory, use and analysis of sound recordings. We also trapped a large number of bats using mist nets and harp traps in forest-flyways and near roosts. This allowed us to collect information on biology, reference echolocation recordings, morphology and faeces. The faeces were used to describe the diet of microchiropterans.

Our bat conservation surveys have made the following important discoveries:

- 1) The inventories that are used widely in Madagascar to rapidly assess vertebrate species composition are too short to adequately sample bat species richness
- 2) The acoustic signatures of Vespertilionidae, Hipposideridae and Myzopodidae are distinctive and can be used to identify free-flying bats by echolocation surveys
- 3) We have described a new, endemic bat species to Madagascar and the holotype is lodged with the University of Antananarivo (see outputs Goodman, Jenkins and Ratrimomanarivo in press).
- 4) Some microchiropteran species are not dependent on primary, intact forests
- 5) Plantation forest, secondary formations and agricultural land play an

important role in maintaining bat biodiversity

- 6) Some of Madagascar's rarest bat species roost in buildings and therefore pose a new challenge to mammal conservationists
- 7) Forest edges are important habitats for bats and have a high abundance of insect prey; microchiropteran activity decreases sharply 50 m from the forest edge and is very low at 150 m from the edge.
- 8) Roost conservation is a priority, especially in caves in the west where disturbance levels by people appear to be high
- 9) Field recordings have revealed the echolocation signatures of bat species that have yet to be trapped
- 10) The rare endemic sucker-footed bat *Myzopoda aurita* roosts in caves and is not wholly dependent on vegetation for roost sites
- 11) Geology appears to be an important factor in determining microchiropteran abundance and diversity, with higher species richness and capture rates occurring in karst forests than forests on alluvial substrata

We have had two publications accepted in peer-reviewed journals (Animal Conservation and Zoosystema) and two more have been submitted (Acta Chiropterologica, and Biodiversity and Conservation). Another publication prepared by the Darwin bat team using results from the University of Aberdeen's fruit bat project has been accepted (with minor revisions) in Biotropica. All of our future research findings will be subject to peer-review.

- ***Training and capacity building activities*** – this should include information on selection criteria, content, assessment and accreditation.

All Darwin Trainees were selected by our host-country partners and all were enrolled in an advanced degree and completed a research project on bat ecology and conservation as part-fulfilment of their course. Some aspects of the training programme were common to all students are included:

FIELD: bat catching, handling and identification, use of bat detectors

OFFICE/LABORATORY: basic statistics, thesis preparation, scientific writing, English language, preparing oral presentations, windows (excel & word)

According to individual research projects, students were also trained in:

FIELD: radio tracking, time expansion acoustic analysis, insect sampling

OFFICE/LABORATORY: ordination, GIS, analysis of time-expanded echolocation recordings, insect determination, faecal analysis

Training was provided by Dr Richard Jenkins, the Darwin Fellow, and his team of Darwin Assistants. The project could not have worked without the significant input into the training programme of the latter, in particular in the field of entomology. In this respect, the Darwin Trainees benefited from support and advice up to, and including the final thesis defence, from the whole bat team.

Field training was assessed during visits by host-country institution supervisors and an annual visit by Professor Paul Racey. Each DEA student is assigned a departmental supervisor, in addition to the guidance and training received from Dr Jenkins and his team, who makes a short field visit to evaluate the student and the research project. Four faculty members of the Department of Animal Biology, University of Antananarivo and one from the Department of Water and Forests, University of Antananarivo, accompanied the Darwin team in the field.

Certain courses were provided by external organisations, and these included English language (Trade & Communications Network and the American Cultural Centre), advanced computing (Trade & Communications Network) and GIS and GPS-integration (F.T.M). In addition, Radosoa Andrianaivoarivelo attended a three week training course in the U.K. (field surveys, GIS and project management) and a Tropical Biological Association field course in Uganda.

5. Project Impacts

- *What evidence is there that project achievements have led to the accomplishment of the project purpose? Has achievement of objectives/outputs resulted in other, unexpected impacts?*

Our achievements in training students, gaining national media coverage and our various written outputs have resulted in the inclusion of bats on conservation agendas. Attendance at national or regional workshops in Madagascar is usually by invitation only and only those organisations/individuals who are considered to be genuine and able to make a significant contribution are asked to participate. Our increasing number of invitations to attend or run workshops is, we believe, not only a reflection that bats now received wider attention than before but also good evidence of the capacity of the Darwin Bat Team to take on the emerging issues of bat conservation and to guide others into appropriate areas of conservation intervention or collaboration.

All of the Darwin Trainees that have either graduated or produced draft theses are good evidence of the success of our goal to train Malagasy students. None of these students had a prior knowledge of bats and their academic achievements are a direct reflection of the training programme supported by this Darwin Initiative grant.

- *To what extent has the project achieved its purpose, i.e. how has it helped the host country to meet its obligations under the Biodiversity Convention (CBD), or what indication is there that it is likely to do so in the future? Information should be provided on plans, actions or policies by the host institution and government resulting directly from the project that building on new skills and research findings.*

The project has achieved its dual purpose of getting microchiropterans onto the national conservation agenda and helping Madagascar meet its CBD obligations. Evidence for this has come from:

The inclusion of bat conservation in speeches

- 1) Mr Brian Donaldson, his Majesty's Ambassador to Madagascar included microchiropteran conservation in his speeches on 8/12/03, 17/6/04, 16/11/04 and 22/11/04. These speeches were made in the presence of Malagasy government officials and representatives from biodiversity conservation organisations.
- 2) M. Le Général de Corps Armée, RANJEVA Marcel, Ministre des Affaires Etrangères (Foreign Minister) on 17/6/04 outlined the potential role of microchiropterans as insect pests and publicly backed the work of the DI bat team.
- 3) In a national T.V. documentary in January 2005 about Tsingy de Bemaraha National Park the director spoke about the importance of the reserve for bats, the role of microchiropterans and the discovery of a new bat species in the park. The Darwin Team was not involved in this film but the all of the information used by the director during the broadcast came from the Darwin project. We believe that his voluntary inclusion of bats in this film is very strong evidence that we have got bats onto the conservation agenda and that park management teams are significantly more aware about their reserves' bat populations following a visit by the Darwin Bat Team

Invitations to conduct bat surveys and conservation research

Organisation	Nature & date of the request	Date of work	Site of intervention
Wildlife Conservation Society	Bat survey (Dec. 02)	Feb. 03	Makira Forest (E)
Wildlife Conservation Society	Bat survey (Jan. 05)	To be confirmed, funding dependent	Makira Forest (W)
Wildlife Conservation Society	Bat survey (Jan. 04)	Mar. 04	Torotorofotsy
ANGAP	Bat survey (Oct. 03)	Planned for Oct. 05	Tsingy de Bemaraha National Park (N)
ANGAP	Schools education project (Jul. 04)	To be confirmed, funding dependent	Tsingy de Bemaraha National Park (N)
ANGAP	Guide training on bats (Oct. 04)	To be confirmed, funding dependent	Ankarana Special Reserve
ANGAP	Integrating bat and ecotourism (Sep. 04)	Jun. 05	Kirindy-Mitea National Park

Ivoloina Zoological Park	Introduction to bat conservation (Nov. 04)	Apr. 05	Staff training
Birdlife Madagascar	Introduction to bat conservation (Nov. 04)	Planned for 2005	Staff training
QIT Madagascar Minerals	Bat survey and conservation education (Oct. 04)	May 05 Dec. 05	Conservation assessment of bat roosts and schools project
Mbarakaly NGO	Bat survey and conservation education (Sept. 04)	To be confirmed, funding dependent	Conservation assessment of bat roosts and schools project
Missouri Botanical Gardens	Bat survey (Oct. 04)	To be confirmed, funding dependent	Mahabo Forest Analalava Forest
Man & the Environment NGO	Bat survey and guide training (Oct. 04)	To be confirmed, funding dependent	Vohimana Reserve Vohibola Reserve
Conservation International/WWF	Bat survey of Comoros Islands (Nov. 04)	To be confirmed, funding dependent	Assessing proposed protected areas
Association Mitsinjo	Bat education/ecotourism (Aug. 04)	Apr. 05	Analamazoatra-Mantadia National Park
Madagascar Fauna Group	Fruit bat enclosure and education materials (Nov. 04)	To be confirmed, funding dependent	Ivoloina Parc, Toamasina

Invitations to participate in workshops/meetings

Organisation	Nature of the workshop/meeting	Date of work	Site of intervention
QIT Madagascar Minerals	Biodiversity Committee meeting	Oct. 04	Fort Dauphin
IUCN	Global Mammal Assessment	Apr. 05	Assessment of IUCN Red List for Malagasy bats
WWF	Conservation priority setting	Feb. 05	Zahamena-Mantadia corridor
Conservation International	Ecotourism	Feb. 05	Mangoro Region
Association Mitsinjo	Wetland conservation	Feb. 05	Torotorofotsy

CI	Support for taxon-specific Malagasy NGOs	Feb. 05	National
ACCE	Integrating bat conservation into primary school teaching	Apr. 05	Tamatave Province

An important point to note from the tables above are the large number of invitations that the project received during 2004 (its last year). This is because the initial survey programme was decided during the project planning period in 2000 and it took approximately two years of fieldwork, media coverage and networking to establish the reputation of the bat team in Madagascar. The requests and invitations reflect new projects and ideas, many of which include fruit bats, and therefore represent the growth of the project as a conservation group within Madagascar and are not a list of unfulfilled objectives from the current project.

- *Please complete the table in Appendix I to show the contribution made by different components of the project to the measures for biodiversity conservation defined in the CBD Articles.*
- *If there were training or capacity building elements to the project, to what extent has this improved local capacity to further biodiversity work in the host country and what is the evidence for this? Where possible, please provide information on what each student / trainee is now doing (or what they expect to be doing in the longer term).*

There was no local capacity to survey microchiropterans before the project. Whilst certain organisations possessed the trapping equipment to survey bats, they evidently did not possess the will. There are now two teams in Madagascar with the capacity and dynamism to survey bats (the Darwin team and WWF's bat team) and both are staffed entirely by Darwin Trainees or Darwin Assistants from the present project.

The capacity has not just been created in fieldwork techniques because, perhaps just as importantly, Darwin Assistants have become involved in national workshops and conservation assessments and biodiversity priority-setting meetings. Our invitations to these events show (i) our capacity to engage at this level (ii) our continuing presence beyond the Darwin grant (iii) that bats have arrived on the conservation agenda.

The project has received a modest amount of funding to continue its work in 2005 and 2006. This continuation is a reflection of the ambition of the Malagasy team members and is recognition of the fact that without a bat specialist team in Madagascar, bats would very quickly slip from the conservation agenda and the ex-Darwin biologists would find it very difficult to secure bat-related employment.

DARWIN ASSISTANTS

Amyot Kofoky is the principal expert on microchiropteran acoustic surveys and has remained with the project since the end of the Darwin funding. He hopes to complete his Ph.D. and his long-term aim is to work for the Ministry of the Environment, whilst maintaining a part-time role in the new bat NGO.

Julie Ranivo, a Darwin Trainee on the Aberdeen megachiropteran project, left the project in October 2002 and travelled to France to give birth. She returned to Madagascar in March 2003 and joined Dr Steve Goodman's inventory team to work for a Ph.D. on microchiropterans.

Fanja Ratrimomanarivo, a Darwin Trainee on the Aberdeen megachiropteran project, left the project in June 2004 to work for a Ph.D. on microchiropterans with Dr Steve Goodman.

Daudet Andriafidison, a Darwin Trainee on the Aberdeen megachiropteran project, has remained with the project and is our expert on fruit bat foraging and conservation.

Radosoa Anrianaivoarivelo, a Darwin Trainee on the Aberdeen megachiropteran project, has remained with the project and has started his Ph.D. with the University of Antananarivo and Dr Richard Jenkins on fruit bat ecology.

DARWIN TRAINEES

Felicien Randrianandrianina continues to be assist in fieldwork activities whilst he waits for his D.E.A. theses to be examined. He will join the project full time if we receive the Darwin Post-Project funding.

Hanta Julie Razafimanahaka was employed as a full time biologist on the project as soon as she completed her first thesis in June 2003. She is a remarkable talent and is likely to make a major contribution to bat conservation in the future. In March 2005 she will be the first Malagasy student to present an oral paper at the Cambridge International Conference on Conservation Science and has received two bursaries to support her visit. In April 2005 she begins her D.E.A. degree and will continue to be employed part-time. She will conduct a bat ecology project as part of her D.E.A. and she hopes to obtain an M.Sc. in the U.K. during 2006/07 before returning to Madagascar to do a Ph.D.

Andrianajoro Rakotoarivelo continues to be assist in fieldwork activities whilst he waits for his D.E.A. theses to be examined. He will join the project full time if we receive the Darwin Post-Project funding.

Myriam Rakotondramanana has enrolled for her second D.E.A. (her first was in ecology and her second will be in plant physiology) and will conduct a research project on seed germination and fruit bats with the bat team.

Andriantsialonina Andriamanandra and **Rantoanina Andrianasolo** have both expressed an interest in continuing their bat research activities but as they both have large families it is more likely that they will obtain employment elsewhere.

Tsibaraha Mbohoahy is waiting for supervisor's comments on his thesis. In April 2005 he will accompany the bat team to Ste. Luce Forest. He hopes to find work with conservation NGOs.

Norotiana Razafindrakoto is preparing her thesis but is unlikely to continue in conservation after its completion because she is a single mother.

- *Discuss the impact of the project in terms of collaboration to date between UK and local partner. What impact has the project made on local collaboration such as improved links between Governmental and civil society groups?*

We believe that the project has significantly enhanced the relationship between the Malagasy university departments and the University of Aberdeen. The main reason for this was simply the existence of the project – university staff in Madagascar are very supportive of training/research projects to build the capacity of students and faculty members and they were very happy to work alongside the bat project. The University of Aberdeen's Darwin Initiative fruit bat project was very well received in Madagascar and the perception that the microchiropteran project was a natural follow-on also helped the collaborative efforts. The very fact that two Malagasy researchers from our host country partners volunteered to become members of an advisory board (that we hope to set up to consolidate the project) is proof that they deemed the project to be a success, that they want to become more closely involved and that there is a future for bat conservation on the island.

- *In terms of social impact, who has benefited from the project? Has the project had (or is likely to result in) an unexpected positive or negative impact on individuals or local communities? What are the indicators for this and how were they measured?*

Young Malagasy biologists who have developed an interest in bat conservation and ecology have benefited most from the project. In addition to either receiving sponsorship for their DEA or employment as Darwin Assistant, the project has allowed them to develop their careers and take the national stage, whether on T.V. or in workshops, through introducing bat conservation issues.

The major negative impact (= victim of success) of the project has been to inadvertently create an expectancy that Darwin (and DEFRA) will commit long-term to bat conservation in Madagascar. Whilst this was not one of the original exit strategies it is an inevitable consequence of developing and supporting a team of young Malagasy scientists with similar interests. All of the project's Darwin Assistants have experienced long periods of unemployment, largely because they were trained in bat conservation during the first Darwin fruit bat project and there were no bat-related jobs available.

Darwin Initiative projects that are designed to increase the capacity in certain taxa provide both specialist and general (= transferable) skills to the trainees. In a job market which is naturally underdeveloped for the taxonomic skills (a reason for the Darwin project in the first place) it is more likely that the general skills, in addition to the kudos of being associated with a Darwin project, are more useful for the trainees in finding post-Darwin employment. It is considerably more difficult to secure a Darwin legacy by expecting trainees to find employment in

the area of their specific training.

As an example, we can use the fortunes of the University of Aberdeen's previous Darwin Initiative project on fruit bat. The two D.E.A students from the University of Toliara have both secured employment in conservation (WWF and Programme Bemaraha) although their jobs do not encompass the conservation of fruit bats. Of the seven D.E.A students from the University of Antananarivo, between the end of the previous project and the beginning of the current project: one became a precious stones dealer, one left her D.E.A. to have a baby, one joined WWF to follow a microchiropteran Ph.D. and four others took occasional employment elsewhere. Thus it could be argued that very little of the considerable expertise these students accrued during the project was used to the benefit of national bat conservation efforts. The current Darwin project has reversed this trend and it employed four of the ex-fruit bat trainees. Two have since left for WWF to pursue post-doctoral research on microchiropterans and two more were employed by the Darwin project to work on microchiropteran conservation. Funding secured for 2005 and 2006 will see the latter two Malagasy biologists return to researching fruit bat ecology and their expertise gained in the first University of Aberdeen Darwin project is of immeasurable value to the project. The important point is that the career development of a number of the fruit bat trainees was only made possible by the second Darwin Initiative grant on microchiropterans because there was no other relevant outlet. Our employment of the fruit bat trainees was well received by our host partners and there may have been a sense of inferred responsibility on the University of Aberdeen to assist the trainees in finding bat-relevant employment or further study.

6. Project Outputs

- *Quantify all project outputs in the table in Appendix II using the coding and format of the Darwin Initiative Standard Output Measures.*
- *Explain differences in actual outputs against those in the agreed schedule, i.e. what outputs were not achieved or only partly achieved? Were additional outputs achieved? Give details in the table in Appendix II.*

There were five outputs listed in the original logframework:

- i) National Action Plan for Microchiropterans
- ii) National Database for Microchiropterans
- iii) Bat management plans for protected areas
- iv) Brochures for tourists and guides
- v) Malagasy graduate trainees

1) National Action Plan for Microchiropterans

This document is in the early stages of preparation and the objective has therefore been partially achieved. It became clear during the first two years of the project that bat conservation in Madagascar was not ready for a national action plan because of a staggering lack of information and the enormous gaps in bat taxonomy. For example, we know of seven new bat species found

in Madagascar since 2003 and that does not include the 3-6 species of *Pipistrellus* currently being described as a spin-off initiative from our project. National action plans must be rigorous and founded on hard scientific data but the available information on microchiropterans, even after two years fieldwork, remains insufficient. We do not in anyway consider this to be a failure but believe instead that our work has demonstrated that we knew even less about the microchiropterans of Madagascar than we thought we did in 2000.

During the 2000 CAMP workshop in Madagascar that assessed the conservation status the island's vertebrates the microchiropterans only received cursory attention. Our surveys and results have helped to raise the conservation status of bats in Madagascar and in May 2004 we were invited by Conservation International to apply for a small grant in 2005 to produce a conservation status assessment of Malagasy bats and review their IUCN Red List status. This was envisaged to be different from an action plan because it would summarise all existing information and produce the first accurate distribution maps. This document could, in time, be the springboard for a national action plan. During November 2004, IUCN and Conservation International decided that all of Madagascar's mammals would benefit from similar treatment and a week-long workshop will be held in Madagascar as part of the Global Mammal Assessment in April 2005. All of the Malagasy invitees to participate in the Chiroptera assessment group at this workshop are (or were) Darwin Trainees or Assistants on our project and we have recently received a small grant from CI to prepare the bat database for this project.

2) National database for Microchiropterans

We have developed a microchiropteran database that is available to any interested parties and have also donated our bat specimens to the University of Antananarivo. The importance of such databases was highlighted recently when the GMA workshop was announced (see 4 above) because the workshop needs access to all available information. There are three databases in Madagascar with useful and relevant information. In addition to ours, the Wildlife Conservation Society manages a publicly available database on Malagasy animals (to which our project and the previous Darwin Project on fruit bats has contributed) and Dr Steve Goodman of the Chicago Field Museum (and WWF Madagascar) has his own database. It is unclear how the databases will be used because (i) ours is relatively small, being only two years old (ii) WCS's is thought to suffer from a lack of data verification and (iii) Dr Goodman has indicated his reluctance to make his data available to a wider audience. We consider this objective to have been met, although the application and use of our database requires continued staff input as does its integration with other datasets.

3) Bat management plans for individual protected areas

We have provided the managers of the following sites with information and advice directly related to bat conservation: Tsingy de Bemaraha National Park, Namoroka National Park and Makira Forest. At the first two sites our management recommendations were given directly after the end of the fieldwork when Darwin Assistants gave PowerPoint presentations to the park

management staff. In Tsingy de Bemaraha, where there is a dynamic conservation team, we provided specific advice on monitoring and research at a number of cave roosting sites.

Our acoustic surveys at many sites were focussed mainly on providing fieldwork and training opportunities for Malagasy students and the research results were aimed at assessing general (i.e. landscape/habitat disturbance) conservation issues, rather than providing specific advice to park staff. However, advice was always given on the location and management of bat roosts, especially when they were in caves or trees, so that conservation and protection measures could be appropriately directed.

4) Brochures for tourists and guides

It is important to provide accurate information on the ecology and conservation of bats to guides and tourists; it enhances the visitors' experience and assists in getting bats onto the conservation agenda. We received many requests from national parks to provide information on bats for tourists, but this was difficult to do in some reserves because either there were no tourists (as in the very remote Namoroka National Park), or more usually it was a rainforest park with no caves presenting little opportunity for tourists to watch bats. Whilst our bat detector survey allowed us to study bats in rainforests, the absence of caves at these sites render bats as invisible to tourists and guides.

However, at two national parks (Tsingy de Bemaraha National Park and Ankarafantsika National Park) we were closely engaged with reserve guides and the management teams in initiatives to improve ecotourism and raising the awareness about bat conservation. We provided bat conservation brochures (in three languages) to both of these sites and trained guides in bat identification.

5) Malagasy graduates trained

For full details of these outputs see the relevant sections. We consider these outputs to have been achieved, as evidenced by the completed Malagasy trainee theses already submitted to Darwin and the drafts from the remaining students. Details of all publications that can be publicly accessed will be provided when the in press papers are published.

- *How has information relating to project outputs and outcomes been disseminated, and who was/is the target audience? Will this continue or develop after project completion and, if so, who will be responsible and bear the cost of further information dissemination?*

Workshops/meetings – conference audiences

Scientific publications – international conservationists

Local newsletters – rural population and general public

National media – general public

Information posters and brochures – protected area visitors and staff

Dissemination activities will be increased after the project by the Darwin bat team. The cost of this is integrated into the grants already obtained for 2005

and 2006.

7. Project Expenditure

- Tabulate grant expenditure using the categories in the original application/schedule.

Item	Budget	Expenditure	Percentage variation

- *Highlight agreed changes to the budget.*
- *Explain any variation in expenditure where this is +/- 10% of the budget*

Financial support from British Airways via Fauna and Flora International to fund Prof. Racey's key note speech in the Transkarst International Conference allowed us to use the remaining funds to support additional costs associated with Darwin Trainees and Assistants towards the end of the project.

8. Project Operation and Partnerships

- *How many local partners worked on project activities and how does this differ from initial plans for partnerships? Who were the main partners and the most active partners, and what is their role in biodiversity issues? How were partners involved in project planning and implementation? Were plans modified significantly in response to local consultation?*

We worked with a total of 9 local partners (Department of Animal Biology, University of Antananarivo; Department of Water and Forests, School of Agronomy, University of Antananarivo; School of Biological Sciences, University of Toliara; Department of Water and Forests, Ministry of the Environment; Madagascar Parks Service ANGAP; NGO Fenamby, NGO Arongampanihy-Culture-Communication-Environment; NGO Man and the Environment; Association Mitsinjo). This was more than the four overseas institutions listed on the original application, reflecting on-the-ground partnerships that developed during the project.

Our main host country partner was the Department of Animal Biology, University of Antananarivo. In terms of Darwin Trainee and field evaluation visits, they were also the most active partner. Their role in the project was mainly the selection and co-supervision of Darwin Trainees, and they also facilitated our twice-yearly renewal of our research permit. They also have a wide role in biodiversity

issues; the department is the CITES authority for Madagascar and its staff collaborate with a wide range of visiting scientists.

This small department, has few qualified staff and a busy workload, and we worked mainly with Dr Daniel Rakotondravony and Professor Mme Olga Ramilijaona although they were not heavily involved in project planning. Similarly, project implementation rarely involved them directly, although we had to make frequent alterations to our fieldwork schedule in line with the exam timetables of their students, which were prone to change without adequate notice.

- *During the project lifetime, what collaboration existed with similar projects (Darwin or other) elsewhere in the host country? Was there consultation with the host country Biodiversity Strategy (BS) Office?*

There were no other Darwin projects, directly relevant to our activities. Our closest collaboration with similar projects was with WWF/Chicago Field Museum's Ecological Training Programme. The ETP specialises in providing high quality training to DEA students in methods for vertebrate inventory. It has been in existence for over 10 years and in 2002, its leader Dr Steve Goodman, became interested in bats. We have enjoyed a healthy collaboration with this project, although we have yet to co-supervise a student. In September 2003 we jointly surveyed the bats of Namoroka National Park. During the Darwin project, two Darwin Assistants left the team to pursue PhDs in ETP. We regularly benefit from Dr Goodman's expertise as a taxonomist and currently have a joint paper in press describing a new species of bat that we trapped in 2003. We also have a joint paper on the conservation of bats in western Madagascar in press in the journal Animal Conservation. This collaboration is evolving and in 2005, students from ETP and Malagasy staff from the Darwin team will reassess the IUCN Red List for Malagasy bats together. We believe however, that the adherence to the catching-killing-taxonomy-list ethos which has characterised much vertebrate inventory work in Madagascar has its limits and many of the questions now facing bat conservation in Madagascar require dedicated Malagasy field biologists with a good knowledge of ecological methods to take bat conservation science into the future.

Mme Claudine Ramiarison (CBD representative in Madagascar) is aware of the project and has received copies of all major education and awareness outputs.

- *How many international partners participated in project activities? Provide names of main international partners.*

There was no major involvement by international partners in project activities although WWF has supported both DI bat projects, looked after the Darwin vehicle between projects and serviced and insured it for the first part of the present project. This reflected the lack of attention given to bats by international NGOs and our relatively new arrival on the conservation scene in Madagascar. We retained regular contact with Conservation International, WWF and the Wildlife Conservation Society throughout the project but now these organisations have realised the impact the DI project was having they started seriously to engage with the Darwin bat team in their activities during the latter half of

2004.

- *To your knowledge, have the local partnerships been active after the end of the Darwin Project and what is the level of their participation with the local biodiversity strategy process and other local Government activities? Is more community participation needed and is there a role for the private sector?*

Local partnerships have been maintained at the end of project. In fact the project has not ended, it is just that the Darwin funding has stopped. Local partners are now collaborating closer than ever because we all share the ambition of creating a permanent bat conservation organisation in Madagascar that can harness the skills and enthusiasm that is so evident in the Darwin Trainees and Darwin Assistants.

In addition to close partnerships with our host country partners, and in particular the Malagasy universities and the national parks service (ANGAP), we developed highly effective working relationships with local Malagasy NGOs.

9. Monitoring and Evaluation, Lesson learning

- *Please explain your strategy for monitoring and evaluation (M&E) and give an outline of results. How does this **demonstrate** the value of the project? E.g. what baseline information was collected (e.g. scientific, social, economic), milestones in the project design, and indicators to identify your achievements (at purpose and goal level)? Evaluation activities as outlined in the original proposal were as follows:*
 - i) Regular e-mail contact between Prof. Racey and the Darwin Fellow: this was achieved and maintained on daily basis when Richard Jenkins was in Antananarivo
 - ii) Visits to Madagascar by Prof. Racey: Annual month-long visits by Professor Racey provide a fresh view of project progress. During these visits Racey and Jenkins report in writing and meet with local university partners and WWF's Regional Director, who has provided useful insights and advice about priorities and future directions.

Another effective form of evaluation is the involvement of Malagasy research scientists in the Darwin Trainees research programme. Field visits by the Malagasy supervisors are an important way of them understanding the project, learning more about bats and evaluating the students and our training programme. This assessment is continued at the thesis production stage and the public defence. The Malagasy university supervisors are not involved in thesis preparation, but to provide detailed comments on drafts. The thesis is therefore seen as a reflection not only of the student but also of the Darwin project and it is for this reason that each graduation is treated in the project as a major achievement.

- *What were the main problems and what steps were taken to overcome them?*

A major obstacle encountered during the project was the Department of Animal Biology's system for supervising and examining DEA thesis. From the end of

student's field project they often have to wait up to three years before the thesis defence. For a degree that is akin to a U.K. one-year MSc, the duration is disproportional to the qualification. On the current project we circumvented this problem by forging additional partnerships with other university departments and it is noteworthy that four out of the five students to have completed their degrees are from the Department of Water and Forests. This system adds a significant burden to any Darwin project, and previous Darwin projects in Madagascar (e.g. chameleons and fruit bats) suffered in a similar fashion. The Darwin Fellow must acquire additional funds throughout 2005 and maybe into 2006 to support the final stages of the Darwin Trainees theses. This problem is not related to the respective start date of the students – our first trainee started in October 2002 and has yet to be given a date for his defence, whilst the four students who joined the project in July 2003 (from the Department of Water and Forests) have all completed their theses.

- *During the project period, has there been an internal or external evaluation of the work or are there any plans for this? Evaluation is described above.*
- *What are the key lessons to be drawn from the experience of this project? We would welcome your comments on any broader lessons for Darwin Initiative as a programme or practical lessons that could be valuable to other projects, as we would like to present this information on a website page.*

The key lesson is that, when Darwin projects take on the task of capacity building in taxon-specific initiatives, there will be a high likelihood that a large proportion of the trainees will remain unemployed after the project, and should they be lucky enough to find work, there is fair chance that the taxon-specific skills learned during the project will not be used.

The Darwin Fellow has directly seen the fall-out of two previous Darwin projects in Madagascar (fruit bats and chameleons), that were both considered successful during their life, and it is very clear that without additional support the trainees are largely left without any viable future in the subject area of the Darwin project, although they may be able to put their basic training as biologists to use in seeking employment elsewhere.

Another lesson is that, in a country like Madagascar at least, where national support and resources for students limit their development, the full time presence of the Darwin Fellow is an absolute key to success. Whilst outputs and papers can be produced from a desk in the UK, it was only by having a permanent presence in Madagascar during this project that the Darwin Fellow was to provide sufficient facilities (i.e. 24/7 office) and supervision (one-to-one, as often as needed). Furthermore, by being in-country it enabled us to respond rapidly to bat conservation issues and to develop new project ideas. Getting bats onto the conservation agenda cannot be measured in real terms. We have done what we believe to be necessary to achieve this, using a variety of methods, but the key test will be in 5 or 10 years time. We believe that bats will very quickly fall off the conservation agenda unless there is a squad of Malagasy biologists in place to

fight the corner for bat conservation.

Perhaps the most obvious and important message, notwithstanding the caveats of building capacity and expectancy, is that the Darwin Initiative continues to fund projects of international importance that fall outside the remit of other funding bodies. We believe that bats would still be off the conservation agenda were it not for the two Darwin Initiative grants to the University of Aberdeen. Problems associated with the Darwin legacy will vary on a project by project basis but it is clear that the projects make a significant contribution to assisting countries implement the CBD. In our case, the only way of consolidating the legacy was to create a national bat conservation association and we recognise that this is not appropriate for all projects. In 2003 the president of Madagascar committed to doubling the size of the countries protected area and this has led to an initiative to identify the remaining areas of biodiversity importance outside of the reserve network. We have been informed that the Darwin bat team will be invited to participate in conservation surveys to assess the status of candidate protected areas.

10. Actions taken in response to annual report reviews (if applicable)

- *Have you responded to issues raised in the reviews of your annual reports? Have you discussed the reviews with your collaborators? Briefly summarise what actions have been taken over the lifetime of the project as a result of recommendations from previous reviews (if applicable).*

With the exception of our first annual review, which was after only four months of the project, we have received generally positive comments from external referees and no major issues were raised. In our penultimate report, the reviewer supported our aim to create a national bat conservation organisation in Madagascar to meet the ambitions of the Darwin Trainees and Assistants and to conserve the significant legacy of the project.

11. Darwin Identity

- *What effort has the project made to publicise the Darwin Initiative, e.g. where did the project use the Darwin Initiative logo, promote Darwin funding opportunities or projects? Was there evidence that Darwin Fellows or Darwin Scholars/Students used these titles?*

We use the Darwin logo at every opportunity and to date it has appeared on:

- desk top calendar
- colour posters
- project vehicle logo
- student theses
- bat conservation brochures
- national TV
- PowerPoint presentations at conferences and national parks

In many circumstances it is not appropriate to use the logo and we always make sure the Darwin name is acknowledged (e.g. on a student thesis). In Madagascar, it is highly unlikely that many people associate the Darwin finch

logo with the UK government's response to the Rio Earth Summit. On our project vehicle, and in addition to the Darwin and WWF logos, we have the Malagasy and Union flags. Our university partners and large international NGO's were aware about Darwin.

The logo itself was not influential in fund raising, but the Darwin grant enabled us to lever significant additional funds during the project.

The term Darwin Fellow also confers additional status on contract postdocs and should be retained.

- *What is the understanding of Darwin Identity in the host country? Who, within the host country, is likely to be familiar with the Darwin Initiative and what evidence is there to show that people are aware of this project and the aims of the Darwin Initiative?*

The sentence "The Darwin Initiative aims to help countries rich in biodiversity but poor in resources to conserve that biodiversity" has been used at every opportunity and at every public platform so that many in Madagascar will be aware of it – all major NGOs, University Departments in life and environmental sciences and many media people. For example, the British Ambassador hosted a reception during Professor Racey's visit in November 2004, for ministers, senior civil servants, University staff and Darwin employees. All will be very familiar with the Darwin Identity.

- *Considering the project in the context of biodiversity conservation in the host country, did it form part of a larger programme or was it recognised as a distinct project with a clear identity?*

This project had a clear identity. This was achieved by working on a neglected taxon, by having a project office, by the Darwin Fellow being permanently based in Madagascar, by relentlessly championing bat conservation at every opportunity, by having a team of up to six Malagasy biologists and 12 students engaged on bat projects, and by visiting over 16 sites across the country and by frequent media coverage. Evidence for our clear identify comes from the now frequent use of the Malagasy acronym for our project 'LFR'.

12. Leverage

- *During the lifetime of the project, what additional funds were attracted to biodiversity work associated with the project, including additional investment by partners?*

Funding organisation	Amount £ GBP	Duration	Purpose
DURING THE PROJECT			
Rio Tinto, U.K. via FFI	18k	3 years (02-04)	Support for Darwin Trainees & bat surveys
The Royal Society	1.8k	1 month (02)	Prof. Racey's visit to Madagascar
QIT Madagascar Minerals	0.4k	1 month (02)	Reconnaissance bat survey
Wildlife Conservation Society	0.6k	2 months (03)	Bat survey, Makira forest
Wildlife Conservation Society, Small African Project Grant	1.4k	1 year (04/05)	Radosoa Andrianaivoarivelo
National Geographic Society	11k	1 year (03)	Support for Darwin Trainees & bat surveys
Rufford Foundation	5k	1 year (03)	Amyot Kofoky's (Darwin Assistant) bat survey of karst sites
Fauna and Flora International/DEFRA Flagship Species Fund	2k	1 year (03)	Roost conservation and primary school project
The Carnegie Trust for the Universities of Scotland	2k	2 months (03)	Prof. Racey's visit to Madagascar
The Carnegie Trust for the Universities of Scotland	2k	2 months (04)	Dr Lorraine Marshall-Ball's research visit
British Ecological Society, Small Project Grant	1.5k	1 year (03)	Bat survey of karst sites
The Lubee Bat Conservancy	2k	2 years (03/04)	Participatory monitoring of bat roosts
Cleveland Metroparks Zoo	1.6k	1 year (04)	Bat surveys, training and conservation education

Bat Conservation International Scholarship	0.6k	1 year (03)	Amyot Kofoky
Bat Conservation International Grassroots grant	2.4k	1 year (04)	Roost surveys and conservation education
Conservation, Health & Food Foundation	5k	1 year (04)	Support for Darwin Trainees & bat surveys
DfID Small Grants programme	2.3k	1 year (04)	Roost surveys and conservation education
Conservation International	0.5k	3 months (04)	Survey of Bongolova Forest
FFI & British Airways supporting conservation complimentary flights	Free flight	Return flight	Prof. Paul Racey's key note speech in international karst conference
Tropical Biological Association	Full scholarship	1 month	Field course in Kibale Forest, Uganda (Radosoa Andrianaivoarivelo)
AFTER THE PROJECT			
BP Conservation Programme	40k	2 years (05/06)	Consolidating the Darwin bat team
People's Trust for Endangered Species	4k	1 year (05)	Fruit bat conservation
British Ecological Society, Overseas Bursary	8k	2 years (05/06)	Amyot Kofoky's microchiropteran surveys
Disney Wildlife Conservation Fund	11k	1 year (05)	Fruit bat research and conservation
Cambridge International Student Conservation Science Conference	1k	1 month (05)	Julie Razafimanahaka
BP Conservation Programme, Alumni grant	0.8k	2 months (05)	Julie Razafimanahaka U.K. visit
Conservation International	0.5k	1 month (05)	Julie Razafimanahaka U.K. visit
Conservation International	1k	1 month (05)	Preparation of bat database for IUCN/GMA workshop
TOTAL	126k		

- *What efforts were made by UK project staff to strengthen the capacity of partners to secure further funds for similar work in the host country and were attempts made to capture funds from international donors?*

All levered funds listed in section 12 are from International donors. Our Malagasy trainees have been trained in writing grant applications with evident success. Their University supervisors are happy for us to involve them as co-applicants in seeking funds from international donors, but few of them ever take the initiative themselves.

13. Sustainability and Legacy

- *What project achievements are most likely to endure? What will happen to project staff and resources after the project ends? Are partners likely to keep in touch?*

Malagasy student biologists do not have it easy. DEA degrees can take up to four years to complete (depending on the university department) and they receive a bursary of only £7 per month. A new, dynamic and relatively high profile project such as ours will always be attractive to DEA students looking for research projects (three of the project's DEA students approached the project on their own initiative), especially as we can offer the 24/7 facilities and resources in the project office. Engaging Darwin Trainees is therefore not a significant achievement. The single most significant achievement has been to develop an effective team of multi-disciplinary (field survey including acoustic sampling, faecal analysis, education) Malagasy bat researchers. This has provided Madagascar with its own bat specialist group and has the potential to go from strength to strength and is therefore the achievement that is most likely to endure. However, for this achievement to have the greatest endurance we believe that a national bat conservation association is needed. This also fits in with the government's policy of supporting taxon-specific Malagasy NGOs/specialist groups. Project resources will therefore remain with the bat team to be used during future projects. Four senior project staff (Malagasy Darwin Assistants) will remain on the project.

- *Have the project's conclusions and outputs been widely applied? How could legacy have been improved?*

In a general sense, yes. The main conclusion was that bat conservation is important and if Madagascar is serious about conserving its endemic mammal species then bats should be incorporated in planning and management decisions. The appreciation of this message resulted in the Darwin bat team being frequently included to conservation meetings and workshops. We are under no illusion that the task is not complete however, and considerable effort is still required to conserve Malagasy bats.

Our recommendations and discoveries in Tsingy de Bemaraha National Park have been incorporated into the reserve's management plan and a monitoring programme at a small number of cave roosts has begun.

The legacy could be improved by supporting the Darwin bat team in the long-term by providing an annual grant. We have demonstrated that additional funding can be raised to expand certain project activities, but this is only achieved with maximum efficiency when the fund raiser's creativity is not over-shadowed by the looming reality of mass job losses at the end of a grant. The application for a Darwin post-project fund reflects the need for the Darwin Fellow to be engaged on the project during its transition from a project to an NGO. The long-term future is for a small team of Malagasy biologists, trained on the Darwin bat projects, to run the Madagascar Chiroptera specialist group. It is likely that they will still require regular technical input from a scientific advisor but a full-time expatriate staff member would be surplus to requirements. Guaranteed, annual core funding would ensure success and a genuine legacy of a Darwin Chiropteran Group with a high chance of survival.

We are aware that the provision of core funding (as opposed to funding project costs) is a problem facing small NGOs throughout the world. One way of addressing the problem is by taxing projects with say a 15% contribution to core, but this needs donor approval which is not always forthcoming.

- *Are additional funds being sought to continue aspects of the project (funds from where and for which aspects)?*

We have already obtained grants to assist the ex-Darwin project to survive and hope to develop the Darwin legacy by creating an NGO that works on both megachiropterans and microchiropterans. We have received £40k from the BP Conservation Programme for general project activities, £11k from the Disney Wildlife Conservation Fund and £4k from the Peoples' Trust for Endangered Species for fruit bat conservation and £7k from the British Ecological Society for conservation research on microchiropterans.

In addition to a Darwin post-project application submitted in January 2005, we have submitted funding proposals to the following organisations:

Fruit bat conservation (Whitely Laing Foundation, Seacology, National Geographic Society, Houston Zoo, Lincoln Park Zoo, British Ecological Society)

Microchiropteran conservation (Rufford Foundation, IUCN Sir Peter Scot Fund, Conservation International, International Foundation of Science)

Student training (WWF Prince Bernhard Scholarship, Lube Bat Conservancy)

14. Value for money

- *Considering the costs and benefits of the project, how do you rate the project in terms of value for money and what evidence do you have to support these conclusions?*

This Darwin Initiative grant enabled us to lever significant additional funding (£126k) that allowed to considerably expand the remit and size of the Darwin Bat Team. Thus, its achievements represent considerable value for money.

Value for money was ensured by adhering to the original budget and the personal financial contribution of the Darin Fellow to running the project office (c. £200 (per month)).

We have employed six Malagasy biologists already holding Masters for a total of 12 person years

We have trained 11 Malagasy biologists for Masters degrees. This is no mean achievement, and is similar to the training output of NGOs in Madagascar over approximately twice as many years.

15. Appendix I: Project Contribution to Articles under the Convention on Biological Diversity (CBD)

Please complete the table below to show the extent of project contribution to the different measures for biodiversity conservation defined in the CBD Articles. This will enable us to tie Darwin projects more directly into CBD areas and to see if the underlying objective of the Darwin Initiative has been met. We have focused on CBD Articles that are most relevant to biodiversity conservation initiatives by small projects in developing countries. However, certain Articles have been omitted where they apply across the board. Where there is overlap between measures described by two different Articles, allocate the % to the most appropriate one.

Project Contribution to Articles under the Convention on Biological Diversity		
Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use	5	Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	15	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	20	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation	0	Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.

10. Sustainable Use of Components of Biological Diversity	5	Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures	0	Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	40	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	15	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts	0	Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources	0	Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.
16. Access to and Transfer of Technology	0	Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such access and joint development of technologies.
17. Exchange of Information		Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge

19. Bio-safety Protocol	0	Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Total %	100%	Check % = total 100

16. Appendix II Outputs

Please quantify and briefly describe all project outputs using the coding and format of the Darwin Initiative Standard Output Measures.

Code	Total to date (reduce box)	Detail (←expand box)
Training Outputs		
1a	Number of people to submit PhD thesis	2 Amyot Kofoky : part-time Ph.D. University of Antananarivo. Acoustic survey of Malagasy microchiropterans Radosoa Andrianaivoarivelo : Ph.D. University of Antananarivo. Role of <i>Rousettus madagascariensis</i> in maintaining forest biodiversity
1b	Number of PhD qualifications obtained	0
2	Number of Masters qualifications obtained	4 obtained: Myriam Rakotondramanana , D.E.A. December 2004. School of Agronomy, Department of Water and Forests, University of Antananarivo. Rantoanina Andrianasolo , D.E.A. December 2004. School of Agronomy, Department of Water and Forests, University of Antananarivo. Cecile Bidaud , D.E.A. October 2004, Department of Animal Biology, Faculty of Sciences, University of Antananarivo. Andriantsialonina Andriamanandratra , January 2005, School of Agronomy, Department of Water and Forests, University of Antananarivo. 4 submitted: Andrianajoro Rakotoarivelo , November 2004, Department of Animal Biology, Faculty of Sciences, University of Antananarivo. Felicien Randrianandrianina , October 2004, Department of Animal Biology, Faculty of Sciences, University of Antananarivo. Ralisata Mahefatiana , January 2005, Department of Animal Biology, Faculty

Code	Total to date (reduce box)	Detail (←expand box)
		<p>of Sciences, University of Antananarivo. Tsibaraha Mbohoahy, January 2005, School of Biological Sciences, University of Toliara</p> <p>3 in advanced stages of preparation: Norotiana Razafindrakoto, Rampilamanana Roseline, Picot Monica. Department of Animal Biology, Faculty of Sciences, University of Antananarivo.</p>
3	Number of other qualifications obtained	Hanta Julie Razafimanahaka, June 2004, Undergraduate thesis (Environmental Engineer), School of Agronomy, Department of Water and Forests, University of Antananarivo.
4a	Number of undergraduate students receiving training	0
4b	Number of training weeks provided to undergraduate students	One student received 3 training weeks in the field and 3 weeks in the office
4c	Number of postgraduate students receiving training (not 1-3 above)	0
4d	Number of training weeks for postgraduate students	Average of 4 training weeks in the field and 8 weeks in the office for each D.E.A. student during first year, with intermittent supervision./training for up to three years thereafter
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(i.e not categories 1-4 above)	7 Darwin Assistants: Nicolas Ranaivson (1.5 yrs) Radosoa Andrianaivoarivelo (2 yrs) Daudet Andriafidison (2 yrs) Julie Ranivo (0.5 yrs) Fanja Ratrimomanarivo (2 yrs) Amyot Kofoky (2.5 yrs) Rabe Andriasanana (0.5 yrs)
6a	Number of people receiving other forms of	2: English language (American Cultural Centre)

Code	Total to date (reduce box)	Detail (←expand box)
	short-term education/training (i.e. not categories 1-5 above)	4: English language (Trade & Communications Network) 8: Advanced French 6: GIS and ArcView 6: Integrating GPS and GIS 1: Project management and planning
6b	Number of training weeks not leading to formal qualification	Generally 30 weeks per year for each Darwin Assistant who learn, through work experience and one-two-one mentoring new and advanced skills beyond those of D.E.A. students
7	Number of types of training materials produced for use by host country(s)	5 i) Basic guide to the field identification of Malagasy microchiropterans ii) Film (VCD & cassette) in Malagasy about bat conservation iii) Colour poster in Malagasy about the role of microchiropterans iv) Colour poster, drawn by primary school children, about bat conservation v) Colour poster on the bats of Bemaraha, based on J. Razafimanahaka's thesis
Research Outputs		
8	Number of weeks spent by UK project staff on project work in host country(s)	Darwin Fellow (Richard Jenkins) Yr 1 (28 wks) Yr 2 (48 wks) Yr 3 (47 weeks) Project leader (Paul Racey) Yr 1 (4 wks), Yr 2 (4 wks) Yr 3 (2 wks)
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	1 Bat management plan for Tsingy de Bemaraha National Park
10	Number of formal documents produced to assist work related to species identification, classification and recording.	3 i) Brochure to the bats of Tsingy de Bemaraha for guides and tourists ii) Brochure about Commerson's Leaf-nosed bat for Ankarafantsika National Park for guides and tourists iii) Identification guide to the insect fragments in the faeces of

Code	Total to date (reduce box)	Detail (←expand box)
11a	Number of papers published or accepted for publication in peer reviewed journals	<p>microchiropterans</p> <p>3 in press</p> <p>i) Goodman, S.M., Andriafidison, D., Andrianaivoarivelo, R., Cardiff, S.G., Jenkins, R.K.B. Kofoky, A., Mbohoahy, T., Rakotondravony, D., Ranivo, R., Ratriomanarivo, F., Razafimanahaka, J., Razakarivony V. and Racey, P.A. (<i>in press</i>) The distribution and conservation of bats in the dry regions of Madagascar. <i>Animal Conservation</i></p> <p>ii) Goodman, S.M., Jenkins, R.K.B and F. Ratriomanarivo. A review of the genus <i>Scotophilus</i> (Chiroptera: Vespertilionidae) on Madagascar, with the description of a new species. <i>Zoosystema (in press)</i>.</p> <p>iii) Andriafidison, A., R, Andrianaivoarivelo, J MacKinnon, RKB Jenkins and PA Racey Dry season nectarivory by Malagasy fruit bats. <i>Biotropica (accepted with minor revisions)</i>.</p> <p>2 submitted</p> <p>i) Kofoky, A., Ratriomanarivo, F., Razafimanahaka, J.H., Andriafidison, D., Rakotondravony, D. and Racey, P.A. <i>Habitat Use, Roost Selection and Conservation of Bats in Tsingy de Bemaraha National Park, Madagascar. Biodiversity and Conservation (submitted)</i></p> <p>ii) Radosoa A. Andrianaivoarivelo, Nicolas Ranaivoson, Richard K.B. Jenkins and Paul A. Racey. Seasonal variation in the food habits and activity of three synanthropic bats from Madagascar. <i>Acta Chiropterologica (submitted)</i></p>
11b	Number of papers published or accepted for publication elsewhere	0
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	<p>1</p> <p>A bat database containing of all our specimen and capture records was established during the project. This will be used in a IUCN national assessment on Malagasy mammals in April 2005 and the data will be then made freely available on the web</p>

Code	Total to date (reduce box)	Detail (←expand box)
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	1 We have significantly added to the fruit bat roost database that was established on the University of Aberdeen's previous Darwin project. This will be added to the microchiropteran roost database.
13a	Number of species reference collections established and handed over to host country(s)	1
13b	Number of species reference collections enhanced and handed over to host country(s)	0

Dissemination Outputs		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	5 i) August 2003. A seminar was given to the reserve managers and guides of Tsingy de Bemaraha National Park by Darwin Trainees and Assistants ii) October 2003. Paul Racey gave a seminar at the Department of Animal Biology, University of Antananarivo. iii) February 2004. A seminar was given to the biodiversity team of QIT Madagascar Minerals. iv) March 2004. A seminar was given to the reserve managers and guides of Ankarafantsika National Park by Darwin Trainees and Assistants v) September 2004. A seminar was given to the reserve managers and guides of Kirindy-Mitea National Park by Darwin Trainees and Assistants vi) October 2004. A seminar was given to the reserve managers and guides of Namoroka National Park by Darwin Trainees and Assistants
14b	Number of conferences/seminars/workshops attended at which findings from Darwin project work will be presented/disseminated.	2 Prof Racey gave an invited key note address to an international multidisciplinary conference TRANSKARST 2004 in Hanoi on the role of Karst in the Conservation of Mammalian Biodiversity
15a	Number of national press releases or publicity articles in host country(s)	3: General microchiropteran conservation awareness 6: Darwin Assistant's (R. Andrianaivoarivelo) U.K. visit 7: Education project visit by British Ambassador
15b	Number of local press releases or publicity articles in host country(s)	3 Vintsy. WWF environmental education newsletter Tsingy de Bemaraha National Park newsletter National newsletter for media workers
15c	Number of national press releases or	2

	publicity articles in UK	Featured in the inaugural Darwin Newsletter Australasian Bat Society newsletter
15d	Number of local press releases or publicity articles in UK	0
16a	Number of issues of newsletters produced in the host country(s)	0
16b	Estimated circulation of each newsletter in the host country(s)	N/A
16c	Estimated circulation of each newsletter in the UK	N/A
17a	Number of dissemination networks established	0
17b	Number of dissemination networks enhanced or extended	0
18a	Number of national TV programmes/features in host country(s)	4 World Environment Day feature June 04 (TVM and TV Plus) Bat conservation in Mangoro region feature July 04 (TVM) British Ambassador's field visit feature November 04 (6 channels for 2 nights) Prof. Paul Racey's IUCN/bat conservation speech feature November 04 (TVM & RTA)
18b	Number of national TV programme/features in the UK	0
18c	Number of local TV programme/features in host country	3 (on TVM, Moramanga regional broadcasts) World Environment Day feature June 04 Bat conservation in Mangoro region feature July 04 British Ambassador's field visit feature November 04
18d	Number of local TV programme features in the UK	0
19a	Number of national radio interviews/features in host country(s)	2 on RNM (Radio National de Madagascar)

19b	Number of national radio interviews/features in the UK	0
19c	Number of local radio interviews/features in host country (s)	2 on Radio Dombosco about project work in the Mangoro Region
19d	Number of local radio interviews/features in the UK	0
Physical Outputs		
20	Estimated value (£s) of physical assets handed over to host country(s)	
21	Number of permanent educational/training/research facilities or organisation established	1 We have created the foundations for a new national bat conservation association staffed by Darwin Assistants and Trainees
22	Number of permanent field plots established	Dry season monitoring of bats in four caves by park staff at Tsingy de Bemaraha National Park
23	Value of additional resources raised for project	£123k

17. Appendix III: Publications

Provide full details of all publications and material that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Details will be recorded on the Darwin Monitoring Website Publications Database that is currently being compiled.

Mark (*) all publications and other material that you have included with this report

Type *	Detail	Publishers	Available from	Cost £
(e.g. journals, manual, CDs)	(title, author, year)	(name, city)	(e.g. contact address, website)	

18. Appendix IV: Darwin Contacts

To assist us with future evaluation work and feedback on your report, please provide contact details below.

Project Title	Conservation of Malagasy microchiropterans and their habitats
Ref. No.	162/10/024
UK Leader Details	
Name	Paul A. Racey
Role within Darwin Project	UK-based project leader
Address	School of Biological Sciences, University of Aberdeen, Aberdeen, AB24 2TZ
Phone	
Fax	
Email	
Other UK Contact (if relevant)	
Name	Richard Jenkins
Role within Darwin Project	Madagascar-based project co-ordinator
Address	1) School of Biological Sciences, University of Aberdeen, Aberdeen, AB24 2TZ 2) Bat Conservation Madagascar, B.P. 5181, Antananarivo 101, Madagascar
Phone	
Fax	
Email	
Partner 1	
Name	Professor Olga Ramilijaona
Organisation	Department of Animal Biology, Faculty of Sciences, University of Antananarivo
Role within Darwin Project	Selection of Darwin Trainees, supervision of research projects, evaluation, administrative support
Address	Département De Biologie Animale, Faculté Des Sciences, Université d'Antananarivo, B.P. 906, 101 Antananarivo, Madagascar
Phone	
Email	

Partner 2 (if relevant)	
Name	<i>Dr Daniel Rakotondravony</i>
Organisation	Department of Animal Biology, Faculty of Sciences, University of Antananarivo
Role within Darwin Project	Selection of Darwin Trainees, supervision of research projects, evaluation, administrative support
Address	Département De Biologie Animale, Faculté Des Sciences, Université d'Antananarivo, B.P. 906, 101 Antananarivo, Madagascar
Phone	
Email	