



Darwin Initiative Annual Report



Important note:

To be completed with reference to the Reporting Guidance Notes for Project Leaders – it is expected that this report will be about 10 pages in length, excluding annexes. Submission deadline 30 April 2010

Darwin Project Information

Project Ref Number	17-006
Project Title	Bushmeat hunting in Madagascar: linking science, policy and local livelihoods
Country(ies)	Madagascar
UK Contract Holder Institution	School of the Environment and Natural Resources, Bangor University
Host country Partner Institution(s)	Madagasikara Voakajy Department of Water and Forests, Ecole Supérieure des Sciences Agronomiques (ESSA-Forêts), University of Antananarivo Ministry of the Environment and Forests Institut Pasteur Madagascar Conservation International Madagascar
Other Partner Institution(s)	
Darwin Grant Value	£299,860
Start/End dates of Project	1 st May 2009 to 30 th April 2012
Reporting period	1 Apr 2009 to 31 Mar 2010 and Annual Report No. 1
Project Leader Name	Julia P G Jones
Project website	http://www.madagasikara-voakajy.org/en/bushmeat (whole website is being updated)
Author(s) and main contributors, date	29/3/2010, Richard K. B. Jenkins, H. Julie Razafimanahaka, Julia P. G. Jones

1. Project Background

This project is based in Madagascar, in the western Indian Ocean. It seeks to address the hitherto neglected issue of the exploitation of wild animals by people for food on the island. For decades in Madagascar, species-based conservation efforts have paid little attention to the issue of hunting as a pressure on native wildlife. Despite numerous accounts of hunting wild animals in Madagascar over this period, a systematic effort to determine the extent and impact of this activity was notably rare. Madagasikara Voakajy, a Malagasy association that the Darwin Initiative helped to create in 2005, began to investigate the use of bushmeat in 2007 and quickly discovered widespread evidence of the consumption of protected and game species by people (Randrianandrianina, F.H., Racey, P.A and Jenkins, R.K.B. in press. Hunting and consumption of mammals and birds by people in urban areas of Western Madagascar. Oryx). Madagasikara Voakajy then sought appropriate technical expertise from Bangor University to assist the development of its bushmeat work. The resulting Darwin Initiative project (1127) aims to improve capacity within Madagascar, in terms of scientific and socio-economic understanding, and ensure that this improved capacity is applied to improving the management of harvested endemic species.

2. Project Partnerships

Project Partnerships

Bangor University (BU) is partnered primarily with Madagasikara Voakajy (MV) on this project. Richard Jenkins, a part-time post doctoral research officer from BU, was based in the MV office from May 2009 to the end of the reporting period. The key MV personnel involved in management of the project are Julie Razafimanahaka and Mhy Andriamampionona. Julie manages the day to day activities of the bushmeat project and Mhy oversees the financial and administration aspects. There are also five other MV biologists employed on the project: Felicien Randrianandrianina, Andrinajoro Rakotoarivelo, Victor

Rakotomboavonjy, Daudet Andriafidison, Radosoa Andrianaivoarivelo. Richard Jenkins (BU) and the MV technical team (i.e. Julie and her assistants) meet every Tuesday when not in the field to discuss progress; these weekly updates are emailed to Julia Jones in Bangor. Julia Jones also spent two weeks in Madagascar in September 2009 (BU_16) and has regular (at least once a week but often much more frequent) skype and email communication with Julie and Richard (and less frequent contact with other members of the team).

The government of Madagascar, Conservation International, ESSA-Forêts (Ecole Supérieure des Sciences Agronomiques, Département des Eaux et Forêts: at the University of Antananarivo) and the Institute Pasteur are also active partners on the project. ESSA-Forêts is mainly engaged in the capacity building aspect of this project and we work closely with them by providing student training and work placements. The project's focal point in this institution is Professor Bruno Ramamonjisoa, the head of department. We maintain regular contact with Bruno through email and telephone conversations and he participates in partner meetings. We have also established links with two other people in this department, Dr. Jonah Ratsimbazafy and Dr. Zo Hasina Rabemananjara, through their role in supervising the three students from ESSA-Forêts who are sponsored by the project. The Institute Pasteur in Antananarivo specializes in diseases and provides technical expertise to the project by screening samples of bushmeat collected by MV and BU for viruses. The initial focal point, Dr Marc Reynes, moved from Madagascar to Cameroon in September 2009 and was replaced by Dr Jean-Michel Heraud. We maintain regular contact through telephone and meetings to facilitate the smooth operation of the blood sample collection

The Department of the Valorisation of Natural Resources (DVRN) in the Ministry of Environment and Forest is closely involved in the project and personnel from this department have attended bushmeat seminars organised by the project. Our main contacts in this department are its head, Mrs. Lydie Raharimaniraka, and the head of the species management section, Mrs. Sahondra Rabesihanaka. We maintain regular contact with these people, especially Mrs. Rabesihanaka.

Conservation International has contributed small grant project funding in three sites of strategic importance. This international NGO has a strong track record in species conservation and they follow progress and outputs of this project closely. We maintain regular contact, through meetings and email updates with Dr James MacKinnon (Technical Director) and Mr. Harison Randrianasolo.

The relationships with these various partners are defined by the text in protocols of collaboration that were developed and signed in the first year of the project, between (1) BU and MV, (2) MV and ESSA-Forêts, (3) MV and Institute Pasteur and (4) MV and Ministry of Environment and Forests (submitted, awaiting signatures). Grant agreements define the partner relationship between MV and Conservation International.

In the first year of the project we organised two meetings for all partners, one in December 2009 and one in February 2010, where objectives, achievements and future plans were presented. We have also had more frequent bilateral meetings where appropriate, especially with people from DVRN and CI

Other collaboration

Project personnel have had informal contact with other people working on bushmeat in Madagascar but there are no NGOs or institutions focussing on hunting at the moment. We suggested to one of our partners, Conservation International, that it might be possible to link-up with some of their other African partners who are engaged in tackling bushmeat but nothing has come of that to date. One international NGO with a permanent team in Madagascar requested training from MV personnel on methods to survey bushmeat exploitation but because the first year of the project was largely devoted to testing and refining methods we were unable to accept the invitation. The CBD focal point was invited to meetings that we organised in December 2009 and February 2010 and a representative attended the latter.

3. Project progress

3.1 Progress in carrying out project activities

Output 1: **“Review of vertebrate species that are listed as game under Malagasy law with respect to their distribution, biology, status and the extent to which they are hunted”.**

All of the three activities (collate all available data on biology, conservation and legislation pertaining to hunted species in Madagascar, conduct a review of hunting and its impact on animals in Madagascar and present results to the Malagasy authorities) listed in the original proposal under Output 1 were completed during the first year, as planned (see outputs section below for details).

Output 2 **“Determine the factors that influence patterns of exploitation”.**

Activities related to Output 2 have also all been implemented. Case-study sites were selected with stakeholders. Key sites were areas recently identified as future protected areas by the Malagasy government and under temporary protection. We therefore focused on the Zahamena Ankeniheny Corridor, Bongolava, Kirindy-Antimena, Mangabe-Sasarotra and a number of small forest fragments in the Anosibe An’ala District. However because bushmeat trade can be driven by urban markets we have also carried out interviews in urban centres (Antananarivo, Moramanga and Morondava). It has taken longer than expected to develop our methodologies for assessing offtake because we opted for a robust assessment of some novel approaches designed to overcome the problems of asking direct questions about sensitive subjects such as bushmeat hunting. We have been testing methods developed by social scientists for investigating illegal drug use and other sensitive behaviours (e.g. the Randomised Response Technique) and applying them in a novel context. We envisage that these will be published in reputable journals and bring positive publicity to the project as well as providing a lasting legacy in terms of Malagasy scientists having played a role in developing these methods and being able to train others. The training component was completed earlier, during September, with classroom lessons and field-testing under supervision of BU staff. Field-testing began in October 2009. In two sites, we also conducted a six-month covert monitoring survey before conducting the interviews. The methods testing fieldwork therefore continued into the third and final quarters of the first year. These results are now being analyzed.

Output 3 **“Determine the impact of hunting for species that make important contributions to rural livelihoods,”**

This part of the project (Activities 3.1-3.3) was not due to begin until Year 2 but we identified three target species for this work: *R. madagascariensis* (small fruit bat), *Mantidactylus grandidieri* (edible frog) and *Tenrec ecaudatus* (insectivorous mammal). We have carried out a large mark and recapture study of *R. madagascariensis* with matched funding from a different organisation. So far 1,022 bats have been captured and marked and 106 recaptured (see below for more details). The edible frog study focussed on monitoring deliveries in urban restaurants and we counted and measured 1,328 frogs between December and March. Much to our surprise, edible frogs generated the most debate and discussion in meetings when we discussed our project with partners and stakeholders. Tenrecs are hunted and eaten by many rural people in Madagascar and we wanted to investigate the sustainability of the harvest. Our team, consisting of between one and three people, were based in the west of Madagascar for two months. We experimented with a range of methods for obtaining population information and conducted an extensive set of interviews (see below).

Output 4 **“Recommendations for revisions to national legislation prepared with the Malagasy government”.**

These activities (4.1-4.2) were originally scheduled for Year 3 but we have made substantial progress with these activities already. We have conducted a detailed review of Malagasy hunting legislation and identified some significant issues. Some of the key issues we uncovered included (i) lack of clarity regarding commercial hunting and the need to obtain the relevant permission (ii) edible frogs are included in the legislation for two different ministries and (iii) the legal hunting season for some species does not correspond well to their life cycle. We presented our preliminary conclusions to the Malagasy government and other partners in February 2010.

Output 5 **“Assess the knowledge of rules concerning hunting of wild species among relevant groups”**

Activity 5.1 started in September 2009 and a standard questionnaire was designed. We have since made rapid progress and have prematurely obtained a substantial amount of information. This was possible because of cooperation from MV that allowed its field project staff to be involved in this part of the study.

Standard questionnaires were therefore completed by different MV staff from a range of different sites across the island. We also have a Malagasy DEA (masters) student working on knowledge of rules among conservation professions for her dissertation research. We envisage delivering this output before the end of Year 2.

Output 6 “Greater recognition of traditional knowledge incorporated into regional policy”

This output has only one activity associated with it (6.1) but is a key component of the whole project. It is designed to bring together results from our social and biological research together to inform stakeholder communities about the impact of (over) hunting, or the current status of traditional *fady*. The project has benefited from new co-financing and this has allowed us to develop our links with the focal communities, essential for success in delivering this output. Specifically, meetings were held with government authorities and community groups in four focal sites where we are piloting this work.

Output 7 “Analysis of the risk of disease transfer from humans eating bats”

MV biologists were trained by Institute Pasteur staff to collect tissue samples safely from bats, as set out in Activity 7.1. Also, as set out in the original proposal, collection and screening of samples (*Rossetus madagascariensis*, *Pteropus rufus* and *Eidolon dupreanum*) occurred during Year 1, and will continue in Year 2.

Output 8 “Malagasy masters students (five in total) graduated (Diplôme d’Etude Approfondies) and trained in the skills needed to undertake applied research in conservation science. Six undergraduates undertaking work experience with MV”

All activities (8.1-8.4) were completed as scheduled in the original proposal. This included 4 Malagasy students being recruited and supported in designing and implementing their dissertation research and two students so far carrying out work placements with MV (see below for details).

3.2 Progress towards Project Outputs

There were 8 main outputs in the original proposal and we report progress on them below:

1. Review of vertebrate species that are listed as game under Malagasy law with respect to their distribution, biology, status and the extent to which they are hunted

Government personnel have so far been very enthusiastic and have fully engaged with the project (as evidenced by the government issuing formal invitations for our seminar, and hosting it in their office at the Ministry of Environment and Forests). We received full cooperation in our efforts to obtain copies of all legal text pertaining to wildlife legislation. The main output of this review is an excel data file that summarizes the (1) legal, (2) CITES and (3) IUCN Red List status for game (and other species). The additional information distribution and biology has been incorporated into a draft manuscript for Output #4. We provide evidence to support progress in the form of (see supporting material, each from hereon coded as Bangor University (BU) 1, 2 etc. BU_1) draft publication, (2) the excel species database (BU_2).

2. Determine the factors that influence patterns of exploitation

We have accumulated a large dataset (including 9,434 interviews across 11 districts in Madagascar) that will allow us to deliver this output. Because of the inherent sensitivities involved in asking questions about hunting we have employed a variety of different methods, some that are being used for the first time in Madagascar. This large data set consists of information obtained using Questionnaires (1), owners of small restaurants recording and reporting all purchases (2), covert recording in villages by co-operating community members (3), RRT interviews (4) and hunter follows (5). Samples sizes and locations are shown in Fig 1.

As by way of example of the type of data we have collected; we recruited 56 covert monitors in three different regions of Madagascar. Aside from fish, the three most frequently encountered wild animals being eaten or sold were tenrecs (n = 555), birds (n = 270) and lemurs (n = 227). It is illegal to hunt, keep and kill lemurs. We believe that analysing our large dataset will provide important insights in the factors that influence exploitation. Furthermore, the publication of these results will serve to raise awareness levels of the issue. We are currently working on a publication co-authored by a number of the MV team and Julia Jones and Richard Jenkins of Bangor University with the provisional title: Bushmeat in Madagascar: epicurean, commodity or staple? The Fig 1 below summarises the range of data we have collected so far.

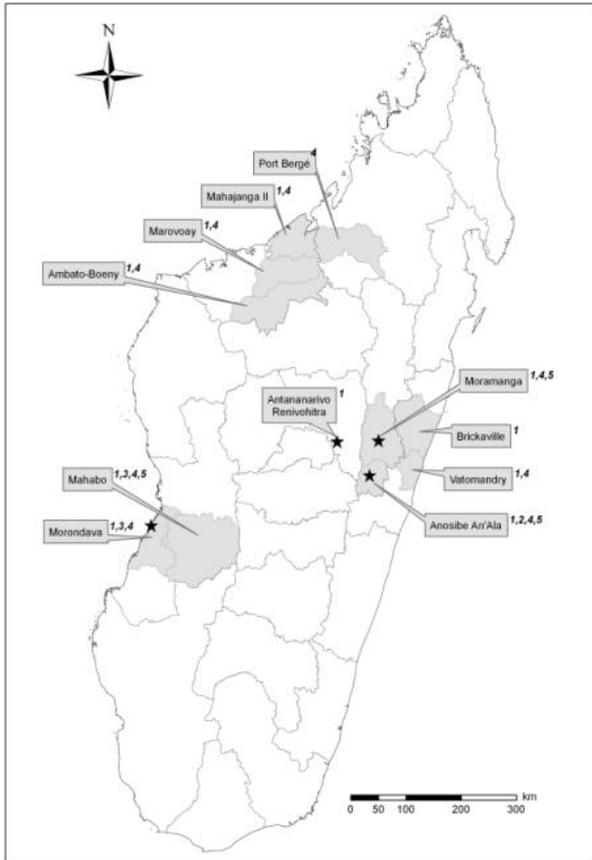


Fig 1: Map of the districts of Madagascar in which the project team was active. Numbers refer to the different methods 1: Questionnaires (n=1714 households and 18 schools), 2: hotely reporting (n=12), 3: covert recording (n=56), 4: RRT interviews (n=795), 5: hunter follows (n=32).

3. Determine the impact of hunting for species that make important contributions to rural livelihoods

This part of the project was concerned mainly with game species but in some circumstances also included strictly protected species such as lemurs. We have begun data collection (as described below) and a Bangor University post-doc (Aidan Keane) will be joining the team on the 1st of May for a year to carry out the modelling. In the first year we focussed efforts on the endemic and Near Threatened fruit bat *R. madagascariensis*. We conducted three, month-long mark-recapture visits (the bat roosts are isolated and remote) and have already compiled a unique data set from a total of 1,022 marked bats and 166 recaptures. Radosoa Andrianaivoarivelo of MV obtained matched funding from the Cambridge Student Conference of Conservation Science bursary scheme to spend a month at Bangor University working with Julia Jones on the data (BU_35). Preliminary analysis and modelling of these data have confirmed the value of the data we are collecting (although error bars on estimates of survival are large-as expected, models are converging and we hope that increasing the length of the study will improve the precision of our estimates of demographic rates). We have therefore been able to make an informed decision to continue the capture sessions into the second year of the project. We also conducted a small research project to determine the levels of exploitation on the Madagascar flying fox *Pteropus rufus*. This Vulnerable species is frequently consumed by people in western Madagascar and we worked with local hunters to record daily harvest levels.

Significant resources were used to investigate the impact of hunting on common tenrec *Tenrec ecaudatus*. This common species is not threatened but harvest levels are reportedly high, anecdotal evidence suggested that overexploitation may be a serious problem in some areas. Project staff and students were based in the Menabe Region from between July 2009 and March 2010 and used a variety of different methods to collect data. We successfully obtained data on the level of exploitation by surveying markets, restaurants, hunters and households. We experienced difficulties however in developing a methodology to assess the population density of the species (parameters we wanted for the planned population modelling). We sought expert advice prior to conducting fieldwork and tested a number of different methods (e.g. line transects, tracking hunters, quadrat searches). Although we were able to locate a high number of burrows it was difficult to confirm occupancy or achieve other direct assessments of tenrec abundance because we saw so few animals. The data collection for this part of

the project finished on 29 March 2010 and we are now evaluating the results before deciding how to proceed.

We believe that we are on course to meet this output but the type of data available will vary between each species. We anticipate retaining a focus on bats, frogs and tenrecs for the remainder of the project. Table 1 below summarises the different methods used for each species:

Table 1: The data collection methods for each of the species studied.

Species	Method	Results
<i>T. ecaudatus</i>	Transect x 7 x 250 m	No animals observed
	Quadrat x 3 x 2500m ²	36-61 potentially active burrows (Jan.-Feb). 1 active burrow (Mar.)
	Hunter follows x 4 x 160 mins x [16-24 ha each]	5 tenrecs captured
<i>R. madagascariensis</i>	Mist netting at 4 caves on three different occasions	1,022 bats captured (166 recaptured)
<i>P. rufus</i> and <i>E. dupreanum</i>	7 log books used by hunters	442 bats hunted in 34 nights recorded in log books
<i>M. grandidieri</i>	Measuring frogs delivered to a restaurant in Moramanga	1,328 frogs delivered; method works well

4. Recommendations for revisions to national legislation prepared with the Malagasy government

We communicated the results of our review of national legislation to the Malagasy government and other partners in a half-day meeting in February 2010. The meeting was held in the offices of the Ministry of Environment and Forests and in addition to their personnel (2 people), it was attended by representatives of Madagascar National Parks (1 person), ESSA-Forêts (1 person), CITES Scientific Authority for Animals (1 person), Ministry of Livestock and Fisheries (1 person), Conservation International (1 person) and a national hunting organization (1 person). There was considerable interest in the exploitation of edible frogs, not only because levels of domestic demand are very high, but because the frogs are included within legislation made by both the Ministry of Environment and Forests and Ministry of Livestock and Fisheries. It was decided in the meeting to request that the Ministry of Environment and Forests becomes the sole manager of all edible frog species.

There is very little appetite for changing wildlife legislation in Madagascar at the moment. We presented a range of actions, some of which could be done externally (e.g. update species lists, update CITES taxonomy, update IUCN Red List) but some require the full backing of the government. With the recent upsurge in environmental crime in Madagascar, notably against tropical hardwood and tortoises, it will be difficult to convince decision makers that the classification of game species is a significant issue. We provide evidence to support progress in the form of (1) official invitation to the meeting which was issued by the Ministry of Environment and Forest (ref: BU_3), (2) list of participants from the February meeting (ref: BU_4-5), and (4) PowerPoint presentation given in the February meeting (ref: BU_6)

5. Assess the knowledge of rules concerning hunting of wild species among relevant groups

We designed a standard questionnaire that could be used in different regions of Madagascar. Surveys of environmental professionals are continuing, although we have completed 52 in Antananarivo and 77 in other regions of Madagascar. We provide evidence to support progress in the form of (1) letter of introduction for the Malagasy student who is undertaking the questionnaires in Antananarivo (BU_7).

6. Greater recognition of traditional knowledge incorporated into regional policy

The first part of this has consisted of a broad assessment of the importance of *fady* (taboo) in different regions of Madagascar. This has now been completed and we have 1,787 interview responses from both urban and rural settings (see Figure 1). This data set will provide us with a general overview of the importance of *fady* nationally as well as for specific localities. In the second year of the project we will present these results from focal areas to stakeholders. In another component of this project we are working with community based associations at four sites to develop local by-laws (*dina*) to govern the hunting and protection of wild animals. The *dina* will be developed by the communities, in a process facilitated by project staff and using some of the survey and monitoring data collected. This component of the project is funded by matched funding from IUCN-France (FFEM) and community groups are currently monitoring their own use of wild animals. This will be followed by a workshop to discuss the results of the monitoring and to use them to develop the *dinas*. We provide evidence to support progress in the form of a photograph during the first stakeholder workshop in Anosibe An'ala (BU_18), the first

page of the participant list from the workshop (BU_38) and an example of the certificates issued following the training component of the workshop (BU_37).

7. Analysis of the risk of disease transfer from humans eating bats (Nipah and Corona viruses)

We captured and collected samples from 138 individual fruit bats. MV staff were initially trained by personnel from the Institute Pasteur. The first batch of samples (July and August 2009) was analyzed by the Institute Pasteur but tests for lyssa virus proved negative. We provide evidence to support progress in the form of (1) Institute Pasteur report to MV (ref: BU_15), (2) MV mission report to Malagasy government (ref: BU_25, BU_40), photo of MV staff being trained by IP staff (BU_41).

8. Malagasy masters students (five in total) graduated (Diplôme d'Etude Approfondies) and trained in the skills needed to undertake applied research in conservation science. Six undergraduates undertaking work experience with MV.

We experienced no difficulties in recruiting willing and able students and the process was coordinated by ESSA-Forêts). The project is currently supporting four research students from ESSA-Forêts, and an additional two more completed a professional placement with MV (see Table 2). One of the DEA students began his project before the DI project started. Each of the research students is expected to finish their degrees by the end of September 2010.

Table 2: The students currently involved in the project.

Student Name	Level	Training	Thesis Title
Acyl Randrianarison	Ingéniorat (Diplôme)	Research	Etude de la diversité et de la disponibilité de sources de protéines animales dans la région Menabe
Willy Mananjara	Diplôme d'Etude Approfondies	Research	Impacts biologiques et socio-économiques de la collecte de <i>Mantidactylus grandidieri</i> dans la zone de Moramanga
Voahirana Randriamamonjy	Diplôme d'Etude Approfondies	Research	Connaissance de la législation sur la chasse par les acteurs environnementaux à Antananarivo
Mirana Rajaonera	Diplôme d'Etude Approfondies	Research	Etude de l'exploitation de <i>Tenrec ecaudatus</i> dans la Région Menabe – Cas du Fokontany Manamby
Olivia Clarisse	Third year student	Professional placement	Not applicable
Faramamindrainy Razafimahatratra	Third year student	Professional placement	Not applicable

As stated in our original application, we wanted to work with ESSA-Forêts students because they are frequently recruited by government. In February 2010 Mirana Rajaonera was recruited to work for the Ministry of Forests and Environment in a region where Madgasikara Voakajy has a number of ongoing projects, including two on bushmeat. Mirana's employment will probably result in a delay in her obtaining her DEA because she begins her new job on 1 May but it will enhance the legacy of this Darwin Initiative project and give us every chance of raising the profile of hunting in regional environmental matters. We provide evidence to support progress in the form of (1) student research proposals (ref: BU_10), (2) professional placement reports (BU_11-12), recruitment notice for students in second year of the project (BU_31), student mission reports (BU_32-34) and student skills evaluation sheets (BU_13-14).

3.3 Standard Measures

Table 3 Project Standard Output Measures

Code No.	Description	Year 1 Total	2	3	4	Total to date	Number planned for this period	Total planned
3	Accredited 5-day GIS course for Malagasy students	1	0	0	0	1	1	5
4A	Work experience for Malagasy students	2	0	0	0	2	2	6
4B	Number of work	3					3	9

	experience training weeks								
4C	Training for 3 masters students and 1 PhD students	4				4	4	7	
4D	Number of weeks training for masters and Rado (PhD)	30				30	30	60	
5	On the job training for MV staff	4				4	4	4	
7	Ethical protocol for MV	1				1	0	0	
8	Richard K. B. Jenkins	17	0	0	0	21	15	45	
	Julia J. P. Jones	3	0	0	0	3	3	9	
12A	Database on hunted species status	1	0	0	0	1	1	1	
14A	Menabe workshop: Oct. 2009. Hunting seminar: Feb. 2010	2	0	0	0	2	2	6	
14B	Student conference on conservation science (Cambridge)	1				1	1	6	
15D	Bangor Press Release	1				1	1	5	
22	Motorcycle	£2,500				£2,500	£2,500		
23	Matched funding NGOs <ul style="list-style-type: none"> • FFEM (IUCN-France) • Conservation International • Rufford Laing Foundation • British Ecological Society • Student Conference on Conservation Science BU overheads and staff time IP salaries and overheads TOTAL							£82,212	£160,000
other	Newsletter contributions	1	0	0	0	1	1	0	
	UK Newspaper and magazine articles	2				2	2	5	

3.4 Progress towards the project purpose and outcomes

We are on course to deliver our project purpose “improved capacity within Madagascar, in terms of scientific and socio-economic understanding, applied to improving the management of harvested endemic species” which we aim to achieve through a combination of supporting Malagasy biologists and collaborating with communities and government. We plan that this project will raise hunting onto the conservation agenda and provide future opportunities for MV to utilize the new capacity it is developing.

The project is based on the following assumptions 1). Sustainable exploitation of natural resources remains a national priority. 2. New protected areas allow the harvest of game species. 3. Communities agree to develop and implement harvest plans for game species. These all are currently met and seem likely to remain relevant. The unsustainable exploitation of natural resources has received international coverage since the onset of political instability in January 2010. Whilst this has on one had led to a

greater awareness about the illegal exploitation of certain animal and plants it has also resulted in a focus on protected species, as opposed to game species. The development of new protected areas continues in Madagascar and most of them aim to allow sustainable exploitation and in that sense, this project is very well timed. We are developing local initiatives with community based associations and this would not have been possible without the Darwin Initiative funding.

3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

There have been little direct progress in this during the first year of the project but this is as expected given the emphasis on training, developing methods and data collection. However we have been successful in raising the awareness of this issue among conservation professionals and relevant government staff in Madagascar which will have an indirect effect and will set us up well for achieving more in the 2nd and 3rd years of the project. We envisage, by the end of the project, positive impacts on biodiversity (reduced illegal hunting) and improved livelihoods (more sustainable hunting).

4. Monitoring, evaluation and lessons

Progress in the various project activities are closely monitored and evaluated by BU and MV. Richard Jenkins (BU) and the MV bushmeat team meet weekly to review the work and the results of these meetings are communicated by email to Julia Jones in the UK. Progresses against the project's objectives are assessed by partners in meetings where we present the objectives-activities-progress-next steps. The main feedback we have received is the need for this project to contribute to government's priorities and, where possible, to orientate activities in line with the priorities. The original proposal in 2008 was supported by the Minister of Environment and Forests but we now need to retain a degree of flexibility regarding emerging issues. In 2010 for example, we have received requests from government to participate in International Year of Biodiversity and World Environment Day celebrations.

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

6. Other comments on progress not covered elsewhere

Difficulties encountered

The poor encounter rate in the field work for the tenrec was a problem and has meant that so far we have had to abandon efforts to estimate population parameters in the field.

Challenges

One of the challenges has been to balance the aspirations of MV, the Malagasy partner, with that of the UK partner. Bangor University, like all UK academic institutions, needs to produce high impact scientific publications and naturally hopes that data collected during Darwin Initiative projects will lead to at least one high quality paper during the duration of the project. A successful project, accompanied by a few high impact publications, will probably increase the chance of the PI and their institution obtaining a future grant from Darwin Initiative. The future grant however, is often likely to be in a different country and with a different host country partner. MV needs to raise its reputation for conducting bushmeat surveys and research. MV is expected to produce many funding reports for its various donors and deliver conservation impact (e.g. reduction in hunting, community involvement) and does not put the same value on journal impact factors.

Risks

The political situation in Madagascar has yet to return to normal and remains unpredictable. Parliamentary elections are planned for May and Madagascar celebrates 50 years of independence in June; both of these events may lead to periods of greater instability.

7. Sustainability

Efforts to promote the project in the first year in Madagascar were kept to a minimum because of the political situation. However, the Darwin Initiative logo was prominently displayed on the wall (painted on large white sheets) at all meetings that we organized, as well as on all outputs and PowerPoint presentations. The project is well timed because there has been an increase in illegal trafficking of species as well as concerns about an increased demand for bushmeat since the coup d'état in March 2009 (Barett, M.A. & Ratsimbazafy, J. (2009) Luxury bushmeat trade threatens lemur conservation. *Nature* 421, 470). The exit strategy is this: to leave MV with enough technical expertise and a good enough reputation so that it will, in the future, be able to conduct bushmeat projects without the need of BU. This is entirely realistic, but so is the scenario where the issues dealt with by this project, such as

disease and poaching, become priorities for MV in the future, and with it the need to work alongside overseas experts and raise new funding. It hopes to acquire new project funding in the future built on the strong foundation developed during this Darwin Initiative grant. In particular, because MV is currently the only organization in Madagascar dedicated to studying hunting and because we are developing a suite of novel techniques for that purpose, it is hopeful of obtaining future bushmeat funding.

8. Dissemination

A number of dissemination events have been held in the host country during the reporting period. All featured the Darwin logo prominently.

1 July 2009

Meeting with Conservational International and Ministry of Environment and Forests in Moramanga about hunting in which project staff presented the results of their survey work. We provided strong evidence that lemurs were being hunted but this did not provoke a significant reaction. Participants included representatives of CI, the ministry of the environment and forests and Moramanga and MV. Evidence: PowerPoint presentation given in the meeting (BU_8)

28 August 2009

Meeting with Ambatovy Projet (AP) mine about hunting in which project staff presented the results of their survey work and discussed the role of the extraction industry in the bushmeat crisis in Africa. This discussion has led to a new project that MV is developing with the mine. Participants included representatives of MV, the mine and local NGOs. Evidence: PowerPoint presentation given in the meeting (BU_19 and BU_20)

25 November 2009

Stakeholder workshop in Morondava in which project staff presented the results of their survey work and legislation review to regional stakeholders. Participants: 34 participants, including people from Madagascar National Parks, Ministry of Environment and Forests (Antananarivo and Morondava offices), mayors and local community leaders. Evidence: PowerPoint presentation given in the meeting (BU_23-24), with list of participants (BU_39),

16 December 2009

Partner workshop in Antananarivo where the general project Darwin Initiative objectives and preliminary results were presented; we received the most feedback about the domestic demand for edible frogs. Participants included representatives of WWF, CI, the University of Antananarivo, and the Ministry of the Environment and Forests. Evidence: List of participants (BU_36).

24 February 2010

Ministry of Environment and Forests organised a meeting for the project team to deliver the results of the legislation review. The official invitations were sent out by the ministry and the meeting we held at their offices. It was decided that the Ministry of Environment and Forests would request that the edible frog trade is dealt with by the Department of the Valorisation for Natural Resources and is no longer the responsibility of the Ministry of Agriculture and Fisheries. Participants included representatives of government, international and national NGOs and hunting groups.

02 March 2010

Stakeholder workshop in Moramanga in which project staff presented the results of their survey work and legislation review to stakeholders in Moramanga District. Participants: 22 (BU_44). Presenters: Julie Razafimanahaka. Evidence: PowerPoint presentation (BU_42).

The project was featured on Bangor University's website and a press release issued (<http://www.bangor.ac.uk/news/full.php?id=960>). This was picked up by one local newspaper (the Daily Post) who wrote an article mentioning the Darwin Initiative. A Welsh language magazine (Golwg) also featured the project (BU_45) and mentioned the Darwin Initiative.

9. Project Expenditure

Table 4 Project expenditure during the reporting period (Defra Financial Year 1 April 2008 to 31 March 2009)

Item	Budget	Expenditure	Variance
Rent, rates, heating, overheads etc			
Office costs (eg postage, telephone, stationery)			
Travel and subsistence			
Printing			
Fieldwork operating costs etc			
Capital items/equipment			
Others (specify)			
Malagasy students			
Stationery			
Computer consumables			
Henipavirus lyssavirus & coronavirus analysis			
Salaries			
Richard Jenkins			
Hanta Razafimanahaka			
F Randrianandrianina			
D Andriafidison			
A Rakotoarivelo			
R Andrianaivoarivleo			
Local Partner Salaries			
TOTAL			

List of evidence supplied

Project code	Description
BU_1	Draft of publication (French) that reviews the hunting legislation in Madagascar
BU_2	Excel species database that brings together information on Red List status and national status
BU_3	Government invitation to partners for the project's seminar on hunting and legislation
BU_4	List of participants to the project's seminar on hunting and legislation
BU_5	List of participants to the project's seminar on hunting and legislation
BU_6	PowerPoint presentation give at the project's seminar on hunting and legislation
BU_7	Official meeting record from the project's seminar on hunting and legislation
BU_8	Presentation on bushmeat to Conservation International in Moramanga
BU_9	Photo of school children involved in bushmeat questionnaire
BU_10	Malagasy student research proposal
BU_11	Malagasy student: work experience report
BU_12	Malagasy student: work experience report
BU_13	Malagasy student skills acquired in year 1
BU_14	Malagasy student skills acquired in year 1
BU_15	IP report to MV
BU_16	Photo of Dr Julia Jones lecture at ESSA-Forets
BU_17	Photo of a local hunter checking a tenrec burrow
BU_18	Photo of a workshop in Anosibe An'ala to launch the community aspect of the project
BU_19	PowerPoint presentation on bushmeat at Ambatovy mine
BU_20	PowerPoint presentation on bushmeat at Ambatovy mine
BU_21	Photo of Julie Razafimanahaka presenting at the Morondava bushmeat seminar
BU_22	Powerpoint presentation at Morondava bushmeat seminar
BU_23	PowerPoint presentation to stakeholders in western Madagascar on bushmeat
BU_24	PowerPoint presentation to stakeholders in western Madagascar on flying foxes
BU_25	MV field mission report on blood sampling
BU_26	Protocol of Collaboration, MV and BU
BU_27	Protocol of Collaboration, MV and Education Authority, Anosibe An'ala
BU_28	Protocol of Collaboration, MV and Education Authority, Moramanga
BU_29	Protocol of Collaboration, MV and Ministry of Environment and Forests, Moramanga
BU_30	Protocol of Collaboration, MV and IP
BU_31	Student recruitment advert
BU_32	Malagasy student, field mission report
BU_33	Malagasy student, field mission report
BU_34	Malagasy student, field mission report
BU_35	Presentation at the Student Conference on Conservation Science, Cambridge 2010
BU_36	Participant list, meeting on December 16 with partners and stakeholders
BU_37	Example of a training certificate issued to community groups involved in bushmeat monitoring
BU_38	First page of participant list from the community meeting in Anosibe An'ala
BU_39	First page of participant list from partner meeting in Morondava
BU_40	MV field mission report on blood sampling
BU_41	DI newsletter with feature about Julie Razafimanahaka
BU_42	PowerPoint presentation to stakeholders in Moramanga meeting
BU_44	Process verbal of Moramanga meeting
BU_45	Welsh language magazine article about the project

Evidence is available at <http://www.bangor.ac.uk/~afs403/evidence/> as 1 combined pdf with dividers giving the BU_codes and a separate excel file (BU_2).

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2009/10

Project summary	Measurable Indicators	Progress and Achievements April 2009 - March 2010	Actions required/planned for next period
<p>Goal: <i>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</i></p> <p><i>The conservation of biological diversity,</i></p> <p><i>The sustainable use of its components, and</i></p> <p><i>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</i></p>		<p>We have focussed on developing novel methods, obtaining large-scale data sets and training in the first year.</p>	<p><i>(do not fill not applicable)</i></p>
<p>Purpose</p>	<p>Improved capacity within Madagascar, in terms of scientific and socio-economic understanding, applied to improving the management of harvested endemic species</p>	<p>To date we have raised awareness about hunting across different levels of stakeholders, from local to national. We are using science to inform management and we are facilitating the development of local policies towards hunting that takes social, legal and biological factors into account.</p>	<ol style="list-style-type: none"> 1. First assessment of bushmeat use in Bongolava (Sofia Region) 2. Stakeholder workshop about illegal hunting 3. Development of community by-laws 4. Ongoing collection and screening for lyssavirus in fruit bats 5. Ongoing assessment of the impact of hunting on fruit bats 6. Submission of 3 publications to journals 7. Five students to graduate
<p>Output 1. Review of vertebrate species that are listed as game under Malagasy law with respect to their distribution, biology, status and the extent to which they are hunted</p>	<p>1.a Report (French & English) 1.b Peer-reviewed publication 1.c Seminar to discuss results 1.d National-level government involvement</p>	<p>Key discrepancies concerning the management and exploitation of game species have been identified and discussed with government.</p>	
<p>Activity 1.1 Collate all available data on biology, conservation and legislation pertaining to</p>		<p>This has been achieved, copies of the text from all relevant legislation was obtained from the government in Antananarivo. Additional information was</p>	

hunted species in Madagascar		received from the CITES Scientific Authority for Animals. A database of all Malagasy terrestrial vertebrates has been produced that provides a quick reference regarding Red List status, CITES Appendix and legal status.
Activity 1.2 Conduct a review of hunting and its impact on animals in Madagascar		See 4.1
Activity 1.3 Present results to the Malagasy authorities responsible for managing wildlife and hunting		See 4.2
Output 2. Determine the factors that influence patterns of exploitation	2.a Field data collected and analysed	Key to the success of this objective, and indeed the whole project, is developing a suite of methods that can be used to obtain data on illegal and sensitive behaviour. MV and BU have successfully piloted two approaches in the first year of the project and now aim to deploy these in focal sites or for focal species. A greater understanding of patterns of exploitation will come from the analysis of our various data sets in the rest of 2010.
Activity 2.1. Confirm location of case-study areas and inform local stakeholders		This was done based on priority sites for MV and its in-country donors and included sites where close relationships already exist with local communities
Activity 2.2. Develop and refine methodology		We have field tested the Random Response Technique and Unmatched Count Technique by comparing the results obtained from these with those from school children and covert monitoring.
Activity 2.3 Training of project personnel (including local associations) to standardise methods		This was completed in September 2009.
Activity 2.4 Field data collection (markets, households, hunts)		We have conducted 695 questionnaire surveys in different sites across Madagascar, from urban settings to learn more about which species are considered <i>fady</i> (taboo). These data complement the existing ca. 4,000 interview results that MV collected from rural settings during 2008 and 2009. These results will be analyzed and presented to partners and stakeholders in the next six months. Covert monitoring in markets and strategic points was also used.
Output 3. Determine the impact of hunting for species that make important contributions to rural livelihoods,	3.a. Data collected on hunting levels and biological parameters and analyzed and published	Significant progress has been made to assessing the impact of hunting on one species of fruit bat. The next phase will see similar assessments conducted for endemic edible frogs and tenrecs.
Activity 3.1 Identify key species for advanced studies on life history and hunting		This was accomplished based on the available literature and the MV database on hunting
Activity 3.2 Field data collection		Three mark-recapture events were completed at four cave roosts for the Near Threatened Madagascar Rousette fruit bat <i>Rousettus madagascariensis</i> , in a

	<p>project co-financed by other donors. Preliminary analyses of this unique data set for Madagascar has confirmed the need to continue this fieldwork and another three mark-recapture events are scheduled for the next reporting period.</p> <p>A field study team was based in the west of Madagascar for 84 days to study the exploitation of the common tenrec <i>Tenrec ecaudatus</i>. This consisted of two student research projects from the University of Antananarivo, one that focussed on assessing regional patterns of tenrec availability in markets and restaurants and the other that concentrated on obtaining information on harvest and consumption of tenrecs by hunters and people. Additional activities in this area sought to determine the density of <i>T. ecaudatus</i> by working with hunters in the forests at night. For this activity we used a variety of different methods and obtained a wealth of information on exploitation levels but found it very difficult to get reliable data on tenrec density. We are currently reviewing the data and will decide by 30 September 2010 whether or not to pursue the assessment of tenrec population densities.</p> <p>Working in close collaboration with the owners of restaurants in the Alaotra Mangoro Region of eastern Madagascar we tracked the purchase of endemic edible frogs and obtained information on body size, hunting locality and price. The trade in these frogs is seasonal, and peaks between January and March, but we would like to maintain this part of the project in the second and final years. Due to the importance of these frogs to livelihoods we also plan to allocate more time to assessing the population size of the frogs in the forests where they are collected.</p>
<p>Activity 3.3 Analyses, report writing</p>	<p>Analysis of the mark-recapture data on the fruit bat began in September 2009 when the project PI visited Madagascar. The lead Malagasy scientist on this part of the project obtained funding to spend three weeks in Bangor University during March 2010 and was able to considerably advance the interpretation of these data and his understanding of the theory behind the different models. This analysis will continue after each subsequent mark-recapture event and a full assessment will be made from February 2011.</p> <p>We are currently compiling all of the various data sets from the west of Madagascar to provide an assessment of the tenrec exploitation. This will take place from May to September 2010.</p>
<p>Output 4. Recommendations for revisions to national legislation prepared with the Malagasy government</p>	<p>4.a Report in French and English produced for the government (national and regional) containing recommendations 4.b Meetings/small workshops held with key staff of relevant government</p> <p>The review is well underway and key elements have been presented to representatives of CBD and project partners. The review highlighted certain discrepancies in current legislation and it was decided to pursue changes to these on a case by case basis rather than a general update to existing legal texts.</p>

	departments	
Activity 4.1 Prepare report based on 1.0		Data collection was completed in January 2010. The next stage is to submit this for publication in the journal Madagascar Conservation and Development.
Activity 4.2 Present results to stakeholders		A meeting was held on 24 February 2010 in Antananarivo and attended by representatives of all project partners and other key stakeholders. A key decision was for the Ministry of the Environment and Forests to request the transfer of edible frogs from the Ministry of Livestock and Fisheries. Project staff will check if /when this formal request was made.
Output 5. Assess the knowledge of rules concerning hunting of wild species among relevant groups	5.a Data collected on knowledge of hunting rules and socio-economic predictors of this knowledge in two regions of Madagascar	This part of the project has proceeded according to plan and data collection is due to finish in May 2010. Government employees have already requested information, resources and training about hunting to support their work, and the results of our data analysis will feed directly into the development of these resources in the second and third years.
Activity 5.1 Training of project personnel to standardise methods		This was completed by October 2009 and included all MV field staff.
Activity 5.2 Field data collection		<p>A student from the <i>Ecole Supérieure des Sciences Agronomiques</i> is conducting this part of the project for her research thesis. She has targetted 100 interviewees from 27 different institutions. To date, 52 people from 10 institutions have been interviewed. This will be completed by the end of May and we aim for a public defence of the thesis in September 2010.</p> <p>A standard questionnaire was desinged by BU and MV in September 2009 that could be quickly adapted for different regions of Madagascar by changing the species (and photo) included. Subsequently, all of MV's field teams, including bushmeat, amphibians, reptiles, bats and baobab trees, have used this questionnaire in different sites throughout Madagascar. In total, we have completed 53 questionnaires from government employees and law enforcement agents.</p>
Output 6. Greater recognition of traditional knowledge incorporated into regional policy	6.a. Local management of hunted populations (eg local <i>dina</i> to protect bat roosts, <i>fady</i> governing timing of hunting) recorded and given regional recognition	<i>Dina</i> and <i>fady</i> are two tools that could be used for conservation benefits. Information from the analysis of survey data will be used to elaborate conservation initiatives based on <i>dina</i> and <i>fady</i> .

<p>Activity 6.1 Meetings with governmental and traditional authorities in study areas</p>	<p>Numerous meetings have taken place in the focal project sites. These have largely been supported by co-financing from other donors. Community engagement requires substantial resources. In four conservation sites where MV has worked since 2008 we recently started to assess the utilisation of wild animals by people (co-financed by IUCN-France). The results of this survey will be presented to communities late in 2010 and local laws (dina) developed thereafter.</p>
<p>Output 7. Analysis of the risk of disease transfer from humans eating bats (Nipah and Corona viruses)</p>	<p>7.a Biological samples collected and analysed 7.b Results communicated to national government on risk level and avoidance 7.c Dissemination plan to hunters designed and implemented with national government</p> <p>This part of the project is one course although we trapped fewer <i>P. rufus</i> than expected. Nevertheless, two MV staff were trained by Institute Pasteur staff and sample collection will continue in the second year of the project.</p>
<p>Activity 7.1 Training for project personnel to sample and preserve fruit bats</p>	<p>Three MV staff were trained and received authorization from the Institute Pasteur to collect blood samples unsupervised</p>
<p>Activity 7.2 Sample (blood) collection</p>	<p>A total of 138 samples were collected during the first year of the project from three species of endemic fruit bats: <i>Pteropus rufus</i> (6), <i>Eidolon dupreanum</i> (72) and <i>Rousettus madagascariensis</i> (55). Additional captures are scheduled for the next reporting period.</p>
<p>Activity 7.3 Screening for viruses</p>	<p>A total of 78 samples were screened for lyssavirus during the first year of the project from two species of endemic fruit bats: <i>Pteropus rufus</i> () and <i>Eidolon dupreanum</i>. Continued screening is scheduled for the next reporting period.</p>
<p>Output 8. Malagasy masters students (five in total) graduated (Diplôme d'Etude Approfondies) and trained in the skills needed to undertake applied research in conservation science. Six undergraduates undertaking work experience with MV</p>	<p>8.a Student proposals 8.b Student field project data 8.c Student theses 8.d Student graduation certificate 8.e Government staff involved in project e.g. as external examiners</p> <p>The training and capacity building component is going well and all five students are expected to complete their theses before the end of September 2010. The project is now recruiting two more students from the <i>Département des Eaux et Forêts, Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo</i> for the final two years of the project.</p>
<p>Activity 8.1 Recruit Malagasy research students</p>	<p>There are currently three <i>Diplôme d'Etude Approfondies</i> (DEA) students from the <i>Département des Eaux et Forêts, Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo</i> engaged in bushmeat research projects. There is one <i>Ingénieur</i> student from the <i>Département des Eaux et Forêts, Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo</i> engaged in a bushmeat research project.</p>

<p>Activity 8.2 Malagasy students masters courses</p>	<p>This is the taught component of the course that this project intended sponsoring. Due to a slight delay in starting the project (it moved from 1 April to 1 May) this was not possible.</p>
<p>Activity 8.2 Malagasy students masters research projects</p>	<p>All three Malagasy students have conducted fieldwork, two are now writing up and third will finish fieldwork at the end of April 2010.</p>
<p>Activity 8.4 Malagasy 3rd year students work experience</p>	<p>Two students from the <i>Département des Eaux et Forêts, Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo</i> completed a three week work experience as part of their course-work in the MV office. They spent some time in the field, attended workshops and helped with data management and entry.</p>
<p>Activity 8.5 Lectures and seminars by visiting teachers</p>	<p>Dr Julia Jones gave three seminars in the MV office to students and staff Dr Julia Jones gave one lecture at the <i>Département des Eaux et Forêts, Ecole Supérieure des Sciences Agronomiques, Université d'Antananarivo</i> Professor Paul Racey gave a lecture on bats and disease at the <i>Département de Biologie Animale, Université d'Antananarivo</i></p>
<p>Activity 8.6 Other training for staff and students</p>	<p>One MV staff member obtained a bursary to study mark-recapture analysis in Bangor University and present his preliminary results in the Student Conference on Conservation Science (March 2010). One Malagasy DEA student completed a GIS training course. One MV staff member was trained by Conservation International in how to write for newspapers and websites. Two MV staff members were trained by the Institute Pasteur to collect blood samples from fruit bats</p>

Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.			
Sub-Goal: Madagascar's hunted endemic species more sustainably managed.	Revised legal framework for sustainable harvesting of game species Sustainable and legal exploitation of wildlife for food explicitly considered in management plans of the new protected areas Traditional rules (<i>dina</i>) receiving regional recognition	Copies of research outputs (reports and papers). Agenda, meeting records and management plans. Evidence from outputs of workshops and government committees Copies of <i>dinas</i> signed by traditional authorities and government officials	
Purpose Improved capacity within Madagascar, in terms of scientific and socio-economic understanding, applied to improving the management of harvested endemic species.	Policies developed, advocated and implemented to improve management of bushmeat Exploitation of game species included within management plans of new protected areas Traditional management given greater recognition Students in a position to be recruited to responsible positions MV able to attract funding in the future and influence policy	Project reports, management plans for new protected areas, student records and theses, MV annual report	Sustainable exploitation of natural resources remains a national priority. New protected areas allow the harvest of game species. Communities agree to develop and implement harvest plans for game species
Outputs 1 Review of vertebrate species that are listed as game under Malagasy law with respect to their distribution, biology, status and the extent to which they are hunted	1.a Report (French & English) 1.b Peer-reviewed publication 1.c Seminar to discuss results 1.d National-level government involvement	Copies of reports, publication, seminar and workshop attendance record and agenda	Government representatives are available and willing to engage
2. Determine the factors that influence patterns of exploitation	2.a Field data collected and analysed	Copies of data, student theses, publications	Cooperation of the general public

3. Determine the impact of hunting for species that make important contributions to rural livelihoods	3.a Data collected on hunting levels and biological parameters and analyzed and published	Copies of data, student theses and publications	Cooperation of the general public, field logistics allow planned data to be collected
4 Recommendations for revisions to national legislation prepared with the Malagasy government	4.a Report in French and English produced for the government (national and regional) containing recommendations 4.b Meetings/small workshops held with key staff of relevant government departments	Reports and meeting records	Assumes that our research does find some areas which need revision
5 Assess the knowledge of rules concerning hunting of wild species among relevant groups	5.a Data collected on knowledge of hunting rules and socio-economic predictors of this knowledge in two regions of Madagascar	Copies of questionnaires, data, student thesis and publication.	Willingness to participate in the surveys among local people
6. Greater recognition of traditional knowledge incorporated into regional policy	6.a Local management of hunted populations (eg local <i>dina</i> to protect bat roosts, <i>fady</i> governing timing of hunting) recorded and given regional recognition	Signing of locally agreed <i>dina</i> with regional recognition.	Support of local communities, that appropriate <i>dinas</i> and <i>fady</i> are operating in the study area (preliminary data suggests they are)
7. Analysis of the risk of disease transfer from humans eating bats (Nipah and Corona viruses)	7.a Biological samples collected and analysed 7.b Results communicated to national government on risk level and avoidance 7.c Dissemination plan to hunters designed and implemented with national government	Publication, copies of meeting records with government, evidence of the dissemination plan implemented (radio broadcast, posters)	Institute Pasteur continues to be independently funded, government dissemination plan only required if risks are detected
8. Malagasy masters students (five in total) graduated (Diplôme d'Etude Approfondies) and trained in the skills needed to undertake applied research in conservation science. Six undergraduates undertaking	8.a Student proposals 8.b Student field project data 8.c Student theses 8.d Student graduation certificate 8.e Government staff involved in project e.g. as external examiners	Copies of theses, certificates and lists of external examiners/advisors, work experience reports	That high quality masters candidates can be found who want to undertake projects in line with the priorities of the project, that undergraduates want to undertake the work experience offered.

work experience with MV			
<p>Activities (details in work plan)</p> <ul style="list-style-type: none"> 1.1 Collate all available data on biology, conservation and legislation pertaining to hunted species in Madagascar 1.2 Conduct a review of hunting and its impact on animals in Madagascar 1.3 Present results to the Malagasy authorities responsible for managing wildlife and hunting 2.1 Confirm location of case-study areas and inform local stakeholders 2.2 Develop and refine methodology 2.3 Training of project personnel (including local associations) to standardise methods 2.4 Field data collection (markets, households, hunts) 3.1 Identify key species for advanced studies on life history and hunting 3.2 Field data collection 3.3 Analyses, report writing 4.1 Prepare report based on 3.0 4.2 Present results to stakeholders 5.1 Training of project personnel to standardise methods 5.2 Field data collection 5.3 Analyses, report writing 6.1 Meetings with governmental and traditional authorities in study areas 7.1 Training for project personnel to sample and preserve fruit bats 7.2 Sample (blood) collection 7.3 Screening for viruses 7.4 Reporting to authorities 8.1 Recruit Malagasy research students 8.2 Malagasy students masters courses 8.3 Malagasy students masters research projects 8.4 Malagasy 3rd year students work experience 			
<p>Monitoring activities: The progress, through lessons, assignments and research projects, of Malagasy students. The extent to which hunting has become an important issue in protected area management planning. The quality of the research outputs being produced. The progress towards traditional management of bat roosts gaining increased and formal recognition</p>			