Darwin Initiative – Final Report

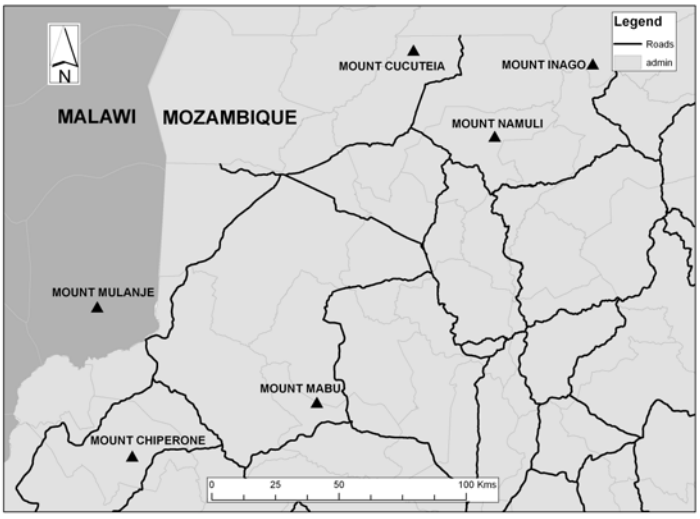
*(To be completed with reference to the Reporting Guidance Notes for Project Leaders (http://darwin.defra.gov.uk/resources/reporting/) - it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin project information

Project Reference	15/036
Project Title	Monitoring and Managing Biodiversity Loss in South-East Africa's Montane Ecosystems
Host country(ies)	U.K., Malawi, Mozambique
UK Contract Holder Institution	Royal Botanic Gardens, Kew
UK Partner Institution(s)	Royal Botanic Gardens, Kew BirdLife International
Host Country Partner Institution(s)	Mulanje Mountain Conservation Trust (MMCT); Forestry Institute of Malawi (FRIM); Mozambique National Institute of Agrarian Research (IIAM).
Darwin Grant Value	£198,632
Start/End dates of Project	July 2006 to July 2009
Project Leader Name	Dr Paul P. Smith
Project Website	www.kew.org/science/directory/projects/DarwinMozambique.html
Report Author(s) and date	Paul P. Smith, Jonathan Timberlake & Julian Bayliss

1 Project Background

The main purpose of this project has been to gather information and develop tools and skills to enable the monitoring and management of biodiversity loss in montane ecosystems in Malawi and Mozambique (see map).



The project has (1) Carried out field surveys of this biodiversity-rich montane archipelago of SE Africa, (2) Equipped and trained a team of Malawian and Mozambican nationals to gather and utilize data for monitoring and management purposes, (3) Developed an ecological monitoring programme (EMP) for the selected mountains, (4) Developed species and habitat recovery plans, and (5) Made recommendations for conservation management of selected areas based on field results.

2 Project support to the Convention on Biological Diversity (CBD)

Mozambique signed the CBD in June 1992, and ratified in August 1995. The first national report was produced in 1997 and states "there is a profound lack of information regarding Mozambique's biological diversity, and no Red Data books exist for either the flora or fauna". Malawi signed the CBD in June 1992, and ratified in February 1994; the first national report was produced in 1997 and the second in 2001. Both reports emphasize the need to conserve and enhance the country's biological diversity, and identify conservation of forest biodiversity as a high priority, although recognizing that national capacity in these areas is weak.

This project has supported many of the CBD articles and has significantly assisted the host countries in the areas of weakness identified above. Specifically it has addressed Articles 5, 7, 8, 12, 13, 14, 17 and 18. The project has primarily supported an ecosystems approach to mountain biodiversity management by developing a baseline set of biodiversity indicators as the basis for monitoring and management (see achievements, below). Mozambique's Minister of Science and Technology endorsed this project at the final workshop in Maputo, and Mozambique's CBD focal point was an attendee.

3 Project Partnerships

This project is built upon the partnerships that the Royal Botanic Gardens Kew has had with Mulanje Mountain Conservation Trust (MMCT), the Forest Research Institute of Malawi (FRIM) and the Mozambique National Institute of Agrarian Research (IIAM) over the past six to seven years. The project stemmed from the urgent need identified by MMCT and IIAM to investigate and protect montane massifs in parts of Mozambique adjacent to Mount Mulanje. Consequently, the success of this project has greatly strengthened these partnerships, particularly with IIAM with whom this has been our first substantial collaboration. All project partners have been directly involved in project planning and decision making, starting with the development of MoUs with the main project partners MMCT and IIAM, and including an inception workshop and planning meetings throughout the project. Even more importantly, this Darwin project has forged strong institutional and personal relationships between the institutions and people involved. This is particularly the case for those individuals who participated in the field expeditions and training courses. The involvement of Birdlife International has strengthened the project outputs, and we have seen a great deal of value added by other organisations and individuals who have joined the expeditions, e.g. Bob and Francoise Dowsett Lemaire (birds), Bill Branch (reptiles) Colin Congdon, Steve Collins and Ivan Bampton (African Butterfly Research Institute).

4 Project Achievements

4.1 Impact: achievement of positive impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

This project is expected to have an extremely positive impact on biodiversity in Mozambique by raising international, national and local awareness of the unique montane ecosystems studied. At the final workshop (*see Folder 1: Maputo Workshop Recommendations and Conclusions*) in Maputo, which was attended by two cabinet ministers, the Minister of Science and Technology concluded that more of this kind of biodiversity survey work is needed; that it is essential that this type of research feeds into development decisions; that partnerships are the key to success; and that IIAM will be the national co-ordinating organisation for this work in the future. More importantly, the workshop participants agreed that a national programme for the conservation of montane ecosystems, coastal forests and other habitats would be developed. It

was also recognised that 'It is important that local communities are actively involved in sustainable use practices and management if biodiversity conservation is to succeed'. The reports for each of the mountains surveyed also reflect this, with specific recommendations for encouraging sustainable use by local communities.

The project has demonstrated fair and equitable sharing of benefits throughout its duration. Information exchange and training activities have ensured that both knowledge and data have been freely exchanged.

4.2 Outcomes: achievement of the project purpose and outcomes

The project purpose was to gather information and develop tools and skills to enable the monitoring and management of biodiversity loss in montane ecosystems in SE Africa. This was achieved through the specific outputs indicated below. Significant project outcomes include a much greater awareness of the biodiversity value of the mountains surveyed. The Mozambican Minister of Science and Technology and Minister of Tourism both said at the Maputo workshop in June 2009 that this project had helped them to understand the global importance of Mozambique's unique plants, butterflies and reptiles – in a country where the importance of wildlife is usually assessed by the presence or absence of the 'big five' – elephant, lion, leopard, rhino and buffalo. A second significant outcome is the access that the Malawian and Mozambican partners have to baseline data. A huge amount of information was gathered for the mountains surveyed – much from world experts. It is now available in a useful format, and Mozambican and Malawian scientists have been trained to use it for future monitoring and management purposes.

4.3 Outputs (and activities)

Output 1: **Ecological monitoring programmes put in place on five mountains. Achieved.** Full ecological surveys were carried out on Mounts Chiperone (Nov-Dec 2006); Namuli (May and Nov 2007); Mchese (May-June 2008); and Mabu (Oct 2008 and May 2009) (*See Folder 2: Trip reports*). Reconnaissance surveys to Mount Inago were carried out in April 2008 and May 2009. No major problems were encountered. The effort put in to surveying each mountain, and the timing of expeditions, was altered throughout the project depending on our findings. For example, the extent of degradation on Mount Inago meant that a full expedition would not have been productive. Instead, extra effort was put in to Namuli and Mabu, where the extent of intact habitat and biodiversity exceeded all expectations.

Output 2: IUCN Red Data Listings. Partially achieved. Gathering of relevant data has been achieved. We have all we need to make much better informed decisions about the conservation status of the birds, reptiles, butterflies, small mammals and plants in this region. However, the IUCN red listing process is a lengthy procedure, and there is a significant backlog within IUCN. It is therefore extremely unlikely that full assessments will be made and accepted in the near future. Instead, we will use the information we have to publish preliminary conservation assessments. Further funding and time will be sought to upgrade these to full IUCN assessments.

Output 3: GIS Biodiversity database. Achieved. Specimen data collected on the expeditions have been geo-referenced and entered into a GIS that incorporates species information, specimen data, vegetation information and remote sensing imagery. These data have been distributed to partner organisations, and form the basis of the Ecological Monitoring Programmes on Mounts Mchese, Chiperone, Mabu and Namuli. Data includes localities and population information on rare species, information on habitat intactness and information on habitat extent.

Output 4: Management strategies, including species recovery programmes, developed. Achieved. Detailed reports, incorporating management strategies and recommendations, have been produced for Mounts Chiperone, Namuli and Mchese (draft). The Mabu report is currently being drafted as identifications come in, although preliminary reports on birds and butterflies have been produced (*see Folder 3: Technical Reports*). For Mount Inago, which is severely degraded, a less detailed report has been compiled, but nevertheless incorporating main findings (*also in Folder 3*). Detailed information on threatened species and threats has been compiled for all of the mountains, and the overall findings and management recommendations

have been presented to policy makers in Mozambique and Malawi. The specific management strategies developed for each of the mountains surveyed have been consolidated into a summary document that makes recommendations for the montane archipelago as a whole (*see Folder 1: Main findings*). This document was presented to policy makers, including two Mozambican cabinet ministers and one Permanent Secretary, at the Maputo workshop in June 2009 (*see Folder 1: Maputo Workshop Recommendations and Conclusions*).

Output 5: Trained personnel. Achieved. This output has been exceeded. Against a target of 12 Mozambican/Malawian nationals being trained in plant identification techniques and ecological monitoring, a total of 16 people were trained in the former and seven in the latter, giving a combined total of 21 different people (*See Folder 4 Training reports*). In addition, a total of 14 different Mozambicans and 8 Malawians benefited from informal training on the expeditions (see 4.6 Capacity building, below).

4.4 Project standard measures and publications

All project standard measures were achieved or exceeded (see Annex 4).

Two scientific papers have resulted from the project in peer-reviewed journals so far, one on birds and one on reptiles – others are expected to follow (*see Folder 5: Publications*). In addition, articles on the project have appeared in *Darwin News*, *Kew Scientist*, *Kew Magazine* and the *Hellenic Museum magazine*. Four posters have been produced, and were presented at the final workshop in Maputo.

4.5 Technical and Scientific achievements and co-operation

The main technical and scientific findings for the mountains surveyed are summarised as follows:

Mount Chiperone

- An isolated steep-sided mountain in Milanje District, historically associated with the larger Mt Mulanje in Malawi; highest point 2054 m.
- Intact good-quality range of moist forest from around 1000 m altitude to just below the peak.
- Around 1600 to 1700 hectares of good quality moist forest is present from an altitude of 1000 to 2000 metres. It is primarily of the medium-altitude type, with a smaller area of montane forest above 1600 metres. There is a very limited area of other habitats present.
- There has been a loss of forest cover of over one-third between 1969 and 2002 owing to expanding cultivation, mostly on the S and SE slopes.
- 229 plant species were recorded from above 800 m altitude, 3 of which are new records for Mozambique. No new plant species were found.
- The forests are an important habitat for two globally threatened bird species, the Thyolo Alethe and White winged Apalis. Mt Chiperone is designated as an Important Bird Area, one of only 15 in Mozambique.
- 56 species of butterfly were recorded, including 6 new records for Mozambique.
- Apart from clearance for cultivation, the major threat is from wild fires, especially along the forest margins and in gullies.
- The forest and woodland cover are very important in the provision of a year-round water supply to the villages below. Water is now a critical issue here.

Mt. Namuli

- The Namuli massif in Gurué District covers 200 square kilometres. The main plateau is at 1800–1900 m and the main peak is 2419 m high.
- Namuli is surrounded on the western and southern sides by extensive tea plantations, which are now being rehabilitated.
- There are around 15,000 people living in the area.

- Moist montane forest covers around 1100 hectares, most of it above 1700 m altitude. There are only 135 hectares of species-rich medium-altitude forest in small patches below 1600 m.
- Although there has been minimal loss of forest cover over the last 40 years, most of this is of the scarce medium-altitude type.
- There are over 300 hectares of wet upland grassland, a scarce and important habitat. These grasslands are where many of the most important species for conservation are found.
- 16 plant species are known only from the Namuli area, plus one small mammal (a squirrel) and 7 butterflies, showing its major global conservation significance.
- 530 plant species have been recorded above 1000 m altitude, with 26 of them being new Mozambique records. The project discovered 5 species thought to be new to science.
- 155 bird species have been recorded, including Mozambique's only endemic bird, the Namuli Apalis. In addition to the Apalis, Mt Namuli supports good populations of 5 other globally threatened species (Thyolo Alethe, Green Barbet race *belcheri*, Dapple-throat, Spotted Ground Thrush and White-winged Apalis). It is a recognised Important Bird Area.
- A new species of dwarf chameleon has been found on Namuli, along with 4 other lizards that until now were thought to only occur on Mt. Mulanje in Malawi. This shows the biological link between these mountains.
- 126 butterfly species were found across the Namuli massif, including 7 new to science. This is the Mozambican mountain with the highest number of endemic species, and probably the best-recorded mountain for these insects in the country.
- The most important habitats for conservation are the upland peat grasslands, which support a large diversity of wild flowers, the extensive patches of moist montane forest and the few remnant patches of medium-altitude and riverine forest. It is recommended that the area above 1500 m altitude is recognised as an important conservation area.
- There are increasing threats to biodiversity, principally logging of certain trees for timber and clearance of small areas in the forest for potato cultivation. Other threats are the destruction of vegetation by semi-wild pigs, cattle grazing of some grasslands, bushmeat hunting, and wild fires destroying the forest margins. A conservation programme is urgently required.
- The potentials for ecotourism are high. Namuli has wonderful scenery and views, spectacular waterfalls, trekking and wildlife.

Mchese

- Mt Mchese in south-eastern Malawi is an outlier of the Mt Mulanje massif, and is often regarded as part of that mountain. Mt Mchese is heavily dissected with deep, almost inaccessible gorges separated by narrow precipitous spurs. The main peak is at 2289 m.
- Both Mt Mulanje and Mt Mchese were gazetted as forest reserves in 1927. The main types of vegetation on Mchese are miombo woodland forming an apron around the mountain sides, Coleochloa covered rocky vegetation, fire-maintained bracken, gully forest and some moist forest on the west facing slopes and ‘crater’ immediately north of the main peak.
- There is evidence of moderate to high levels of wood utilization in the miombo woodlands up to an altitude of 1200 m. Evidence was widespread, and exploitation in places appears unsustainable, i.e. extraction exceeds growth and regeneration.
- 225 plant collections were made during this study, of which 156 taxa had not previously been recorded on Mchese. More interestingly, 31 taxa were not previously recorded on Mulanje or Mchese.
- Three plant taxa in this list are new to Malawi: *Cuscuta cassytoides*, *Ximenia americana* (possibly) and *Chionanthus foveolatus* subsp. *major* have been recorded from surrounding countries, but not previously from Malawi.

- Two plant taxa – *Gnidia chapmanii* and *Widdringtonia whytei* – have a localised distribution and are listed as Endangered according to IUCN conservation assessment criteria (IUCN 2004). Evidence of limited regeneration of *Widdringtonia* and lack of local seed sources suggests its conservation assessment will need to be upgraded, at least for the Mchese population.
- In an attempt to determine utilization within the Forest Reserve in relation to distance from the reserve boundary up the lower slopes of the mountain, a 1 km long disturbance transect was put in by the Darwin Initiative team on the southern slopes of Mchese in the Fort Lister Gap. *Brachystegia manga, Uapaca kirkiana, Pterocarpus angolensis* and *Pericopsis angolensis* were most heavily utilised.
- Tree density was significantly higher in the lower half of the transect, probably owing to coppicing from earlier cutting. In addition, the woodland appears to naturally thin out at around 1230 m altitude as slopes get steeper and soils thinner, with an associated change in species composition.
- The montane moist forest on the upper slopes generally remains in a good state, probably owing to the steepness of the terrain. There is no evidence of significant change in extent over the last 40 years. However, the main threat is selective felling of trees, in particular *Widdringtonia whytei.* Very few adult trees above 40 cm dbh appear to remain, and there is much evidence of cutting of stems down to 20 cm diameter. There is significant concern in that no seed trees are seen to remain on Mchese and hence no seed will be available for natural regeneration.
- On the lower slopes, there is significant cutting of forest and woodland trees. Streams of people were seen at various times carrying cut planks or poles up to 10 cm in diameter along paths where they exit the Forest Reserve.
- Another threat is from wild fires. The main conservation threat is when fire gets into steep-side gullies, destroying the thick vegetation, or where it occurs at the forest edge or in grassy areas within the upland forest. Gully vegetation in the dry season can become very dry and fire-prone. Fire here destroys both the plants and the moister microclimate, hence inhibiting regeneration of moisture-requiring species.

Mabu

- The extensive forest covering Mt Mabu in Tacuane District, was previously virtually unknown and unexplored scientifically. This project carried out the first biological survey of the area.
- Mt Mabu comprises an elevated area of forest-covered ridges and peaks with the highest point at 1710 metres altitude. The total extent is around 140 square kilometres. There are a number of old abandoned tea estates on the southern slopes.
- The extent of moist forest is over 6900 hectares, mostly between 1000 and 1600 metres, making it possibly the largest forest at this altitude in southern Africa. All the forest is in very good condition.
- Identification of the 500 plant specimens collected has not been completed, but the list of species will be at least 250, of which 2 are new records for Mozambique.
- 126 bird species were recorded, including 5 that are globally threatened (Spotted Ground-thrush, Thyolo Alethe, Swynnerton's Robin, Dapplethroat, Green Barbet race *belcheri*). The Namuli Apalis, Mozambique's only endemic bird, was found, the first record away from Mt Namuli. Particularly important globally are the populations of Thyolo Alethe and Green Barbet.
- A new species of snake, a forest viper (*Atheris*), was found along with another 2 possibly new snakes and a chameleon. It is likely that other as yet unknown small animal species remain to be found.
- 156 butterfly species were recorded, of which 5 are new to science. 32 of these are new records for Mozambique.
- Forest cover is very important in providing a perennial supply of water for settlements, particularly for Limbué and similar settlements on the southern slopes.
- There are few threats to the forests on Mt Mabu at present, although frequent wild fires are destroying the forest margin in places and bushmeat hunting has reduced wildlife

numbers. No evidence of tree cutting was seen. However, the forest is likely to be threatened if the tea estates reopen or if any other large-scale commercial agriculture takes place around the mountain.

Inago

- The area of wet forest on Inago has been severely degraded to patches ranging between 1 and10 hectares.
- A wild population of Cycad (*Encephalartos* sp) was found growing on rock faces between 800-1300 metres – this is currently unidentified and may be a new species.
- Four significant butterflies were caught. One new species *Leptomyrina* sp (also found on Mts Namuli and Mabu), 1 new subspecies *Neocoenyra bioculata* ssp. (also found on all of the other project sites), 1 Malawi endemic *Alaena lamborni*, and a previous Mt. Mulanje endemic *Charaxes margaretae* (now found on all of the project mountains).
- A total of 101 birds were recorded including several threatened species such as the Thyolo Alethe *Alethe choloensis*, and Gunning's Akalat *Sheppardia gunningi*.
- Several specimens of pygmy chameleon (*Rhampholeon* sp) were also collected from the forest fragments and await identification.

The overall recommendations for the conservation of this south east African montane archipelago (including Mount Mulanje) are as follows:

- There is much nationally and internationally significant and exciting biodiversity still to be found in Mozambique, especially in the northern Provinces. The levels of diversity are higher than previously thought, and there is still much to be discovered.
- Important and spectacular biodiversity can include plants, small vertebrates and insects, as well as the more obvious larger animals.
- There is a significant number of species – plants, birds, reptiles and insects – that are found only on one or more of these mountains and nowhere else in the world. The Mozambique Government has particular responsibility for the conservation of these species under the Convention on Biological Diversity.
- The isolated mountains of northern Mozambique are globally important areas for conservation, forming part of a series of biodiversity "stepping stones" between the mountains of eastern Zimbabwe, southern Malawi and the highlands of southern Tanzania for birds and plants. At present none of these mountains in Mozambique are formally protected and their often unique biodiversity is often unrecognised. Several have a good potential for ecotourism.
- Conservation of these scattered montane areas could also be addressed through trans-border initiatives, in particular with Malawi. Such initiatives would build on regional expertise, experience and partnerships, and would allow for greater international recognition and support.
- Conservation areas do not have to be very large or formal, such as designation as a National or Transfrontier Park, in order to conserve important biodiversity. For example, Important Plant Areas – specific areas with particularly rich or special biodiversity or habitats – can be a very useful way to expand a network of national conservation areas, without necessarily altering people's ways-of-life.
- Biologists, foresters, herbaria and natural history museums have historically had an important role to play in conservation, and should be fully involved in all conservation projects and initiatives. Such institutions and professionals have a wealth of knowledge that needs to be better utilised.

As can be seen from the summary above, and the technical reports from which these details are taken (*Folder 3: Technical reports*), this project has produced an enormous amount of biodiversity related data that can be used as a baseline for monitoring, management and further study. This wealth of information has largely been generated because of the high level of technical co-operation achieved through this project (*see 4.6. Capacity building, below*).

4.6 Capacity building

Significant capacity was built through the training offered to Mozambican and Malawian scientists during the course of this project. Sixteen people were trained in plant identification techniques in Mulanje in November 2006 via a two day formal course given by two Kew botanists. Seven other people were trained in remote sensing techniques applied to ecological monitoring on a three day formal course held in Maputo in November 2007 hosted by a Kew GIS scientist supported by her Malawian and Mozambican counterparts. Informal training in survey, identification and specimen collection was given by Kew, Birdlife and other experts on the expeditions. A total of 14 different Mozambicans and 8 Malawians benefited from this training on the expeditions. A total of 16 different international experts (i.e. not from Malawi or Mozambique), covering birds, butterflies, reptiles, mammals and plants, participated in the expeditions, and shared their knowledge.

In addition to the training offered, a major capacity building output was the huge amount of biodiversity data generated by the project. These data incorporate information on the localities and status of rare species, intactness of vegetation and extent of habitats. A large number of new records were generated and, taken as a whole, the information gathered forms a comprehensive baseline data set for the mountains studied.

4.7 Sustainability and Legacy

The sustainability and legacy of this project will relate to a number of its outputs and outcomes:

- The biodiversity information generated. Some of this information has been published in the scientific literature (*see Folder 5*) and more will follow. However, the majority of the information resides in the technical reports in hardcopy and on the web (*Folder 3*) and in the GIS database owned by the project partners. We believe that the information in the technical reports needs a wider audience, and will be applying to the Darwin Initiative for follow up funding to publish this more widely. The information in both the technical reports and the GIS database is a tremendous basis on which to monitor, manage and study the biodiversity of this montane archipelago in the future.
- The people trained, and the relationships developed. As mentioned under 4.6 above, this has been a project founded on technical co-operation. As a result of the training that has taken place and the relationships forged in this project, new areas of co-operation are being actively pursued. For example, RBG Kew is developing a project with MMCT and FRIM that aims to solve the propagation problems of the Mulanje Cedar. Kew is also actively working with IIAM on a coastal forests project and a seed bank collaboration. There has been some interest in Mount Namuli from several NGOs, and IIAM are currently discussing a carbon-credit based project with Envirotrade.
- The awareness raised. This element of the project was more successful than expected. The international and UK media interest generated by the discovery of around 7000 hectares of intact forest on Mount Mabu from satellite imagery (*see Folder 6: Media Coverage*) led to a great deal of national interest in Mozambique, culminating in the attendance of two cabinet ministers (Tourism and Science & Technology) at our Final Workshop in Maputo. The attendance at the meeting of Kew's Director and the British High Commissioner also helped to stimulate interest and will lead to stronger links between Kew and our Mozambican partners. The recommendations that came out of that workshop (*Folder 1: Maputo workshop recommendations and conclusions*) make it clear that the Government of Mozambique is keen to explore conservation options for these montane areas. The timing was fortuitous too, coinciding with wide-ranging discussion in the country on a new conservation policy and establishment of a national conservation trust. IIAM have been invited to contribute to this document. They are now also responsible for taking the lead in developing a conservation programme for montane, coastal forest and other biodiverse areas. Finally, Dr Chilima, representing the Malawian Forestry Department, announced to the meeting that the Government of Malawi would be keen to talk to the Government of Mozambique about a cross-border conservation initiative.

The legacy of this project to the conservation and sustainable use of the Malawi/Mozambique montane archipelago studied could be substantial. However, formalising and implementing protection and management measures remains to be accomplished. The UK partners will continue to work with our African counterparts to make sure that all this effort and momentum is not wasted, and that concrete policy and practical measures are put in place.

5 Lessons learned, dissemination and communication

The main lessons learnt from this project are as follows:

(1) The montane archipelago of this part of Mozambique and Malawi is extremely rich in biodiversity, and includes rare and unique flora and fauna that urgently needs some kind of protection (see main recommendations above).

(2) Knowledge of the less charismatic species (plants, reptiles and insects) is sparse in Mozambique and Malawi, and their value is consequently underestimated within formal protection and management frameworks.

(3) The publicity generated by the 'Google Earth' Mount Mabu story in the media has raised the profile of these mountains and their biodiversity in Government ministries in both Malawi and Mozambique. This increased awareness must now be turned into action.

(4) Technical government institutions, such as IIAM in Mozambique, are all too often seen as irrelevant to the development agenda and to policy formulated by their own governments. Through this Darwin project, IIAM has demonstrated that, with the right support, it has an essential role to play in developing conservation policy and in understanding the factors that need to be taken into account when designing conservation strategies for particular sites.

(5) The knowledge gained by IIAM and FRIM through the formal training and experience gained from this Darwin project, together with the recognition by their governments that they have an important role to play, will enable them to fully participate in developing conservation policy and actions for these montane ecosystems in Malawi and Mozambique.

Dissemination has been a strong point of this project. This has occurred through scientific publications, posters, magazine articles (*see Folder 5: Publications*) and through the media (*see Folder 6: Media coverage*). The fact that this is a Darwin Project, sponsored by the Darwin Initiative has been acknowledged and emphasized throughout. We have been successful in getting our messages through to scientists, the general public and policy makers.

The details in the trip reports and technical reports (*Folders 2 and 3, respectively*) have been published via the project website but these are not as accessible or widely available as we would like. It is therefore our intention to seek additional funding to synthesize these reports and recommendations into a book that will be widely available to conservation practitioners and policy makers in southern Africa. We would like the results of this project to be published as a permanent legacy of the efforts of all the project participants after project completion.

We hope to include in this publication an epilogue detailing the conservation actions that have been put in place to secure the future of the massifs that were studied during this project.

5.1 Darwin identity

This project has been acknowledged as a distinct Darwin project throughout. This is clearly articulated through text and use of the Darwin logo on the project website and in all the publicity and scientific materials produced. The media coverage generated by this project for the Darwin Initiative has been immense. The British High Commissioner in Mozambique made it clear in the final workshop that this was a project supported by the British Government, and the value of this international collaboration was acknowledged publicly by the Mozambican Minister of Science and Technology.

6 Monitoring and evaluation

We have learnt from our experiences as this project has progressed. This is manifest in the changes that we made to the original programme. We had to move expeditions around according to phenology and logistical issues such as accessibility and the weather. We also modified our target mountains from the original list of five mountains in Mozambique (Namuli, Chiperone, Mabu, Inago and Cucutea) to four main mountains in Mozambique and Malawi - Chiperone, Namuli (two expeditions), Mchese and Mabu (two expeditions) – and shorter trips to Mount Inago. These changes are largely the result of our reconnoitre work enabling us to differentiate and prioritise the areas of highest diversity. An encouraging feature of the project has been the feedback we have received from experts who have received specimens collected by the team, and participation on expeditions by experts in different fields.

6.1 Actions taken in response to annual report reviews

The annual reviews have been helpful and supportive. We have taken into account the recommendations made by reviewers as the project has progressed. These have not resulted in any major changes to project outputs, activities and indicators – in fact, the logical framework for the project has remained robust and useful.

In the last annual review (Year 2) it was suggested that we should try to increase our engagement with the authorities and policy makers in both Malawi and Mozambique. We have made a concerted effort to do this in the last year of the project, and have had considerable success in this respect (see above).

Ultimately the success of this project will be determined by the policy changes and actions required to secure the long term security of the biodiversity documented during the project. We are determined that the attention and momentum that we have achieved should now be turned into action, and will continue to work with our counterparts in Malawi and Mozambique to make this happen.

7 Finance and administration

7.1 Project expenditure

Project expenditure is given in the table below.

Costs	Grant	Claimed
Staff costs		
Rent, rates, heating, lighting, cleaning		
Postage, telephone, stationery		
Travel and subsistence		
Printing		
Conferences, seminars etc		
Capital items		
Others (please specify)		
TOTAL		

Our overspend on staff costs largely relates to the amount of time the technical reports have taken to compile. We believe that the high quality of these reports shows that this money has been well spent. In addition, the lead author, Jonathan Timberlake, has put in a substantial amount of his own time on this task.

The slight overspend on travel and subsistence reflects the large number of people who participated on the expeditions.

The underspend on conferences and seminars was made up for elsewhere, for example from Kew and IIAM's own budgets. No conference activities were cancelled or reduced.

As indicated in the Year 2 report, the 'Others' budget line was primarily due to unforeseen GIS software costs for our African partners. In addition, postage costs were higher than expected due to the necessity of using courier services rather than the postal service, which is unreliable for urgent or valuable items.

7.2 Additional funds or in-kind contributions secured

In addition to the £173,000 in matched funding indicated in the budget, a substantial amount of additional support was found. For example, of the 16 international experts who participated in the expeditions (and who spent considerable time identifying specimens and writing up their results), 15 made this contribution with no charge to the project. In addition, the Kew ecologist, Jonathan Timberlake, has put in far more time than that allocated in the original budget – largely due to the large amount of data generated and the need to collate and synthesize it. Also, as indicated above, both Kew and IIAM covered many of the costs associated with the Final Workshop in Maputo.

7.3 Value of DI funding

The Darwin Initiative funding allowed all of the cash-related activities to take place. For example, although a large amount of in kind support was provided through staff time, all other expedition costs were covered through Darwin. The Darwin funding also enabled us to provide some travel funding to the world experts who joined the expeditions, and to cover their subsistence requirements whilst in the field. In short, we were able to make the Darwin funding go a very long way, but we could not have carried out these activities without it.

Annex 1 Report of progress and achievements against final project logframe for the life of the project

Project summary	Measurable Indicators	Achievements
Goal: 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 • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources		Greatly improved public awareness about the importance of Mozambique and Malawi's montane ecosystems and their biodiversity, including amongst policy-makers. Much improved capacity for Mozambican and Malawian partners to monitor and manage biodiversity on these sites.
Purpose To gather information and develop tools and skills to enable the monitoring and management of biodiversity loss in montane ecosystems in SE Africa	Ecological Monitoring Programmes in operation. Management strategies for focal areas. Protection through increased awareness, knowledge and status. Trained personnel.	Ecological Monitoring Programmes, based on thorough ground survey work and using the model developed on Mount Mulanje have been put in place for Mounts Chiperone, Namuli, Mchese and Mabu. In addition, two reconnaissance surveys to Mount Inago have gathered important qualitative information. Management recommendations have been developed for all of the mountains surveyed. Awareness has been increased about the value of these mountains as a whole, and a huge amount of knowledge has been generated and shared.
Output 1. Ecological Monitoring Programmes	Repeatable field-based plant and bird surveys carried out on 5 mountains: Mts Namuli, Chiperone, Mabu, Mchese and Inago by project end.	Achieved. Ecological monitoring on Mt Mulanje (the model) started before this project began and continues under the auspices of MMCT. Five other mountains have been surveyed and ecological data gathered during the course of this project (see below).
Activity 1.1 Ecological Surveys		Full ecological surveys were carried out on Mounts Chiperone (Nov-Dec 2006); Namuli (May and Nov 2007); Mchese (May-June 2008); and Mabu (Oct 2008 and May 2009). Reconnaissance surveys to Mount Inago were carried out in April 2008 and May 2009.
Output 2. IUCN Red Data Listings	Determination of species-population information. Conservation assessments for all threatened species entered into GIS.	Partially achieved. Gathering of relevant data has been achieved. We have all we need to make much better informed decisions about the conservation status of the birds, reptiles, butterflies, mammals and plants in this region. The IUCN red listing process is a lengthy procedure, and there is a significant backlog within IUCN. It is therefore extremely unlikely that full assessments will be made and accepted in the near future.

Activity 2.1. Red Listing		Species and population information has been gathered for plants, birds, mammals, reptiles and insects on all the mountains surveyed. Using GIS, preliminary conservation assessments will be made and published pending full assessments in the future.
Output 3. GIS biodiversity database	All field data to go into GIS throughout project. Design and publish GIS online by end June 2008. Database also available on CD.	Achieved. These data are not available on line due to the sensitive nature of the information. In the wrong hands, information on the localities of rare species may lead to over-collecting. Plants (e.g. cycads), butterflies and reptiles are particularly vulnerable to the trade in endangered species. The database is available to partner organisations on CD.
Activity 3.1. GIS mapping and database	Specimen data collected on the expeditions have been geo-referenced and entered into a GIS that incorporates species information, specimen data, vegetation information and remote sensing imagery. These data have been distributed to partner organisations, and form the basis of the Ecological Monitoring Programmes on Mounts Mchese, Chiperone, Mabu and Namuli. Data includes localities and population information on rare species, information on habitat intactness and information on habitat extent.	
Output 4. Management strategies, including species recovery programmes, developed.	Management strategies produced for 5 mountains; recommendations presented to users and government implementation agencies. Identification of threatened species, threats, along with management recommendations to ensure recovery.	Achieved. Detailed reports, incorporating management strategies and recommendations, have been produced for Mounts Chiperone, Namuli, Mchese and Mabu. For Mount Inago, which is severely degraded, a less detailed report has been compiled. Detailed information on threatened species and threats has been compiled, and the overall findings and management recommendations have been presented to policy makers in Mozambique and Malawi.
Activity 4.1. Management strategies developed	Specific management strategies have been developed for each of the mountains surveyed, and these have been consolidated into a summary document that makes recommendations for the montane archipelago as a whole. This document was presented to policy makers, including two Mozambican cabinet ministers, at the Maputo workshop in June 2009.	
Output 5. Trained personnel	At least 6 Malawian/Mozambican nationals trained in each of plant identification, field survey techniques, and EMP development by June 2008.	This output was exceeded, with a total of 21 different Malawian/ Mozambican nationals receiving training in two formal courses on plant identification (November 2006) and EMP development (October 2007). In addition, 22 different people (14 Mozambicans and 8 Malawians) received informal training from a total of 17 international experts who participated in the expeditions.
Activity 5.1. Training Workshops	Sixteen Malawian and Mozambican personnel were trained in plant identification techniques by two Kew botanists in November 2006, and seven people were trained in remote sensing GIS techniques as applied to ecological monitoring in Maputo in November 2007.	

Annex 2 Project's final logframe, including criteria and indicators

OUTPUTS	ACTIVITIES
1. Ecological monitoring programme	**1.1 Carry out plant and bird inventory work in each of 5 montane areas.**
	1.2 Carry out basic vegetation survey in each of 5 montane areas. Establish baselines.
	1.3 Assess & document main conservation threats for each site & across study areas.
	1.4 Prepare collection field guide to endemic & threatened plant species across study sites.
	1.5 Prepare technical reports of findings (historical & current) for each montane area.
2. IUCN Red Data listings	**2.1 Determine & assess status of endemic, rare & threatened plant species for each study site and across area.**
	2.2 Determine & assess status of endemic, rare & threatened bird species for each study site and across area.
	2.3 Carry out conservation assessments for selected species across N Mozambique / S Malawi area using GIS.
	2.4 Submit conservation assessments to IUCN for incorporation into global RDL
3. GIS biodiversity database	**3.1 Establish GIS for study areas in Maputo & Kew; populate with basic data.**
	3.2 Enter all field data (vegetation, collections) into GIS.
	3.3 Produce and make available GIS data on CD and on-line.
4. Management strategies & species action plans	**4.1 Document threats, issues & potential conservation interventions for each massif.**
	4.2 Develop species management plans for endemic & threatened plant & bird species across 5 study sites.
	4.3 Carry out advocacy at District, Provincial & national levels on biodiversity significance of montane areas and for implementation of appropriate conservation interventions
	4.4 Present main findings & recommendations to users and government implementation agencies.
5. Training personnel	**5.1 Training of at least 6 Mozambique/Malawi nationals in plant identification.**
	5.2 Field training of at least 6 Mozambique/Malawi nationals in plant collecting, vegetation survey & bird survey.
	5.3 Training of at least 4 Mozambique/Malawi nationals in remote sensing analysis & GIS techniques.

Annex 3 Project contribution to Articles under the CBD

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	40	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	5	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		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		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	15	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	10	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		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		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

Article No./Title	Project %	Article Description
		and equitable way of results and benefits.
16. Access to and Transfer of Technology	10	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 assess and joint development of technologies.
17. Exchange of Information	10	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		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.
Other Contribution		Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	
1b	Number of PhD qualifications obtained	
2	Number of Masters qualifications obtained	
3	Number of other qualifications obtained	
4a	Number of undergraduate students receiving training	
4b	Number of training weeks provided to undergraduate students	
4c	Number of postgraduate students receiving training (not 1-3 above)	
4d	Number of training weeks for postgraduate students	
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(ie not categories 1-4 above)	
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	Formal training: 21 people Informal training: 22 people
6b	Number of training weeks not leading to formal qualification	13 weeks (informal and formal)
7	Number of types of training materials produced for use by host country(s)	1 collection guide and 1 set of plant identification materials
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	14 weeks
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	5
10	Number of formal documents produced to assist work related to species identification, classification and recording.	3
11a	Number of papers published or accepted for publication in peer reviewed journals	2
11b	Number of papers published or accepted for publication elsewhere	4
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1
12b	Number of computer-based databases enhanced (containing species/genetic	

Code	Description	Totals (plus additional detail as required)
	information) and handed over to host country	
13a	Number of species reference collections established and handed over to host country(s)	>1000
13b	Number of species reference collections enhanced and handed over to host country(s)	>1000
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	4
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	
15a	Number of national press releases or publicity articles in host country(s)	6
15b	Number of local press releases or publicity articles in host country(s)	
15c	Number of national press releases or publicity articles in UK	14 (+ ca. 90 international)
15d	Number of local press releases or publicity articles in UK	2
16a	Number of issues of newsletters produced in the host country(s)	
16b	Estimated circulation of each newsletter in the host country(s)	
16c	Estimated circulation of each newsletter in the UK	
17a	Number of dissemination networks established	1
17b	Number of dissemination networks enhanced or extended	
18a	Number of national TV programmes/features in host country(s)	
18b	Number of national TV programme/features in the UK	2
18c	Number of local TV programme/features in host country	
18d	Number of local TV programme features in the UK	
19a	Number of national radio interviews/features in host country(s)	
19b	Number of national radio interviews/features in the UK	2
19c	Number of local radio interviews/features in host country (s)	
19d	Number of local radio interviews/features in the	

Code	Description	Totals (plus additional detail as required)
	UK	
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	
21	Number of permanent educational/training/research facilities or organisation established	
22	Number of permanent field plots established	
23	Value of additional resources raised for project	
Other Measures used by the project and not currently including in DI standard measures		

Annex 5 Publications

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Journal	*Spottiswoode, C.N.,Patel, I.H., Hermann, E. & Bayliss, J. (2008) Threatened bird species on two little-known mountains (Mabu and Chiperone) in northern Mozambique.	Ostrich (South Africa)	http://ajol.info/index.php/ostrich	
Journal	Branch, W.R. & Bayliss, J. (2009). A new species of Atheris (Serpentes: Viperidae) from Northern Mozambique	Zootaxa 2113, 41-54	http://www.mapress.com/zootaxa	
Poster	Timberlake, J.R. (2009). Conservation findings from Mozambique mountains	RBG Kew	Jonathan Timberlake, The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, U.K.	
Poster	Timberlake, J.R. (2009). Scientific findings from Mozambique mountains	RBG Kew	Jonathan Timberlake, The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, U.K.	
Poster	José Monteiro e Hermenegildo Matimele (2009). Descrição preliminar da vegetação do monte Inago	RBG Kew	Jonathan Timberlake, The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, U.K.	
Newsletter	Paul Smith & Julian Bayliss (2009). Darwin Project discovers virgin rainforest in Mozambique	Darwin Initiative	http://darwin.defra.gov.uk/newsletter	
Newsletter	Jonathan Timberlake (2009). Important forest areas discovered	RBG Kew	www.kew.org	

	on Mount Mabu.			
Magazine	J. Timberlake. Mountain mission. Kew magazine, Winter 2007. pp48-49.	RBG Kew, London	www.kew.org	

Annex 6 Darwin Contacts

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