CEPF Final Project Completion Report

Instructions to grantees: please complete all fields, and respond to all questions, below.

Organization Legal Name	*Royal Botanic Gardens, Kew*
Project Title	In From The Cold: Providing The Knowledge Base For Comprehensive Biodiversity Conservation In The Chimanimani Mountains, Mozambique. Botanical Survey Component
CEPF GEM No.	63512
Date of Report	11th August 2016

CEPF Hotspot: Eastern Afromontane

Strategic Direction: 2 – Improve the protection and management of the KBA network throughout the hotspot.

Grant Amount: $69,415

Project Dates: 01 June 2013 – 30 June 2016

1. Implementation Partners for this Project *(list each partner and explain how they were involved in the project)*

The following report details the outcomes of the botanical component of a joint project with the Micaia Foundation, Mozambique, comprising two counterpart CEPF grants, the second of which (CEPF project 62603) has been reported on separately in 2015. The main partners are:

Royal Botanic Gardens, Kew (London, U.K.) – led on the design and implementation of the botanical survey of the Mozambique portion of the high Chimanimani massif and the subsequent conservation assessment of the endemic and range-restricted flora and its associated habitats, and the writing of a technical report for use by the Chimanimani Trans-Frontier Conservation Area (further TFCA) and Micaia Foundation in the management of the biodiversity of the Chimanimani region. Provided technical training in field survey, plant identification and species red-listing to partners from IIAM, Harare Herbarium and Micaia. Provided technical input into Micaia's work with the communities of the Chimanimani region.

Micaia Foundation (Chimoio, Mozambique) – led counterpart project 62603; had overall responsibility for liaising with local communities in the Chimanimani region and with the TFCA authorities and local government. Also provided logistical and technical support to the botanical field surveys in 2014 and 2016 and held the budget for all in-country activities in years 1 & 2 of the project. Organised and led the project stakeholder workshop in April 2015.

Instituto de Investigação Agrária de Moçambique (IIAM) (National Herbarium, Maputo and Forestry Research team, Sussundenga, Mozambique) – provided technical input into the design

and implementation of the three field surveys and assistance with the identification of the resultant plant specimens and sending of the material to Kew. Were responsible for facilitating the issuing of the necessary research permits for the field surveys and provided most of the botanical survey equipment used in the expeditions. Ms Inês Chelene of the National Herbarium, IIAM, conducted a 2-week research visit to Kew in May/June 2015, including participation in the 4-day species red-listing workshop. Contributed to the botanical technical report.

In addition, the following institutions were involved, to a greater or lesser extent, in the implementation of the project, though were not official partners:

National Herbarium of Zimbabwe (Harare Botanic Garden, Zimbabwe) – Anthony Mapaura participated in all three of the field surveys, providing botanical expertise in view of his knowledge of the Zimbabwe side of the Chimanimani massif and its flora. Mr Mapaura also conducted a 2-week research visit to Kew in May/June 2015 in conjunction with Ines Chelene of IIAM, including participation in the 4-day species red-listing workshop. Contributed to the botanical technical report.

Birdlife Zimbabwe – were running the CEPF project "Stakeholder Capacity Building for Key Biodiversity Area Management Planning in the Chimanimani–Nyanga Mountains" 2013-2015. As part of this work, Birdlife and Micaia liaised regularly on project progress and plans to identify synergies and complementarity in the two projects. Attended and contributed to the project stakeholder workshop in April 2015.

Chimanimani TFCA authorities and National Directorate – were consulted regularly and kept informed of all project activities throughout by Micaia and also held discussions with Kew and IIAM project staff during the 2016 field survey. Attended and contributed to the project stakeholder workshop in April 2015. Micaia also worked closely with a number of other important local stakeholders (see report 62603).

Conservation Impacts

2. Describe how your project has contributed to the implementation of the CEPF investment strategy set out in the ecosystem profile

The Chimanimani-Nyanga Mountains were highlighted in the CEPF Eastern Afromontane investment strategy as being one of six priority corridors for CEPF focus on the basis that these mountains have very high biodiversity value, while having almost no investment at present. Two key reasons for inclusion of this hotspot as a priority were to enhance the knowledge base and develop much needed conservation action, recommendations that are echoed in the existing Chimanimani Trans-Frontier Conservation Area (TFCA) management plan. The trans-border (Zimbabwe-Mozambique) Chimanimani Mountains form the largest single block of this hotspot.

In the case of plant diversity (for which the Chimanimani Mountains are most famous), the existing knowledge base was much stronger on the relatively small Zimbabwe side of the massif than on the much larger Mozambique side. Further, whilst the Zimbabwe side is reasonably well protected through the Chimanimani National Park, there was anecdotal evidence that the Mozambique part of the massif was coming under considerable threat from illegal artisanal gold

mining, that this human impact may be threatening the unique biodiversity of this area, and that although designated National Reserve status in Mozambique, this was not providing the level of protection required. This project was therefore designed specifically to (a) close the significant knowledge gap with regard to the plant diversity of the Mozambique Chimanimani and the threats to the key habitats; and (b) translate these findings into conservation and management recommendations that could be readily adopted by both national and local authorities as well as civil society organisations with an interest in the environment and biodiversity of the Chimanimani Mountains. We were specifically addressing strategic direction 2 of the ecosystem profile*: to improve the protection and management of the KBA network throughout the hotspot*.

Through conducting a full botanical survey of the Mozambique Chimanimani Mountains (focusing on the species-rich grasslands and rock outcrops over 1000 m altitude), this study has greatly increased our knowledge of the endemic and range-restricted species of Chimanimani, their distribution, habitat requirements and the range of potential threats. The study has both confirmed and greatly increased our understanding of the high importance of the whole Chimanimani range (both in Zimbabwe and Mozambique) within the Eastern Afromontane ecosystem for its exceptional plant diversity and endemism. By engaging with local communities, local authorities and the TFCA and National Reserve authorities throughout the project (work led by Micaia Foundation – see counterpart project report 62603), the findings and recommendations of the botanical surveys will be translated into informed and sustainable management decisions. This work therefore provides an important contribution to all three of the investment priorities under strategic direction 2 of the ecosystem profile:

2.1. Increase the protection status (via creation or expansion of protected areas) ***and/or develop, update and implement management plans for terrestrial priority KBAs****.* The botanical technical report will provide recommendations which Micaia will take forward together with the TFCA authorities, hopefully contributing to a revised Chimanimani TFCA Management Strategy.
2.2. ***Support the role of civil society organizations in the application of site safeguard policies and procedures****, including the strengthening of environmental impact assessment implementation in order* ***to address ongoing and emerging threats to priority KBAs*** *,including freshwater KBAs.* The botanical survey work, led by Kew and IIAM, has enabled Micaia to work with local communities and other key stakeholders to make informed decisions when developing sustainable management practices and reducing threats to the biodiversity of the Chimanimani region.
2.3. ***Advance the identification and prioritization of KBAs in Africa*** *and the Arabian Peninsula*. As noted above, this project has greatly increased our knowledge of, and the profile of, the plants of the Chimanimani Mountains, a site that should be recognised as one of the most important KBAs (IPAs) in the Eastern Afromontane region.

This project (combining the Kew and Micaia components) has led to significant additional investment in the Chimanimani area through CEPF small grants and other funders (most notably the Mozbio Chimanimani fund of $1.75m – see Micaia report for more details), primarily in livelihoods and development of sustainable use of natural products in the surrounding lowlands. The knowledge base is now much firmer, more scientifically-based, which gives confidence both to funders and implementers (Micaia).

3. Summarize the overall results/impact of your project

The Kew-led botanical component of this project has shown that:

- the unique plant diversity known primarily from the Zimbabwe side of the Chimanimani Mountains is equally present on the much larger Mozambique side of the massif;
- the high levels of endemism have been confirmed, and indeed a number new endemic species were found – in total, 71 taxa are recorded as endemic to the high Chimanimani, 8 to the Chimanimani foothills and a further 22 taxa are near-endemic to the Chimanimani range;
- the ecological determinants for the plant species of interest have been clarified and confirmed for the Mozambique side; by far the majority of endemic and near-endemic species are confined to outcrops of Chimanimani quartzite and sandstone and associated grasslands, whilst the more nutrient-rich schistose grasslands have only a few endemic species;
- the impacts on plants of small-scale gold mining, so prevalent on the Mozambique side, are not as deleterious as had been feared and this mining activity is in decline;
- the impacts of this mining on hydrology and aquatic life in the streams would appear to be much more severe, but were not specifically looked at in this study;
- the high Chimanimani still retains its ecological integrity and populations of most plant species are not being lost through habitat destruction, and that any negative changes are still reversible;
- the human impact in the foothills of the Chimanimani in Mozambique is much more severe and the threat to forest habitats in particular is very high, driven by habitat destruction for agriculture, excessive burning and spread of invasive plant species;
- the Chimanimani Mountains are one of Mozambique's most important areas for endemic or range-restricted plant species and need more conservation attention than has been given in the past. The national and regional profile of the importance of the Chimanimani Mountains for conservation has been raised.

Planned Long-term Impacts - 3+ years (as stated in the approved proposal)
The threats to biodiversity of the highland areas of the Chimanimani TFCA within the Eastern Afromontane Ecosystem will be greatly reduced and conservation and management actions in the Chimanimani Mountains will be targeted and based on sound data regarding plant species.

4. Actual progress toward long-term impacts at completion

This project has greatly increased our knowledge of the distribution, abundance, ecology and threats to the unique plant species and habitats of the Chimanimani massif. This, in turn, has provided a much clearer understanding of the conservation and management priorities in the region. The recommendations and improved knowledge base have helped focus attention and possible activities for the local and TFCA authorities in Mozambique, and we envisage that these data will feed into a more informed and scientifically rigorous long-term management and conservation plan for the core Chimanimani TFCA. Through subsequent grants and linkages with Birdlife Zimbabwe this will hopefully also be transferred to the Zimbabwe authorities.

Micaia have engaged in a very positive and constructive way with key stakeholders including local communities, local authorities and TFCA ground staff, throughout this joint project. In doing so, the project has raised the awareness of the biodiversity importance of this region and

of the potential impacts that a range of land use practices can have on the unique habitats and species (see Micaia report for further details). Micaia's long-term commitment to working with local stakeholders to balance livelihoods and conservation in this region will hopefully ensure that the long term impacts of the project will be met, informed by the scientific findings.

The detailed documentation of the botany and ecology of the mountains in the technical report, and the development of a resource centre at Micaia where this information will be available to key stakeholders and visitors, will allow conservation and development decisions, especially those relating to ecotourism development, to be soundly based. This joint project, together with the linked Darwin Initiative project (discussed below), have also raised awareness of the conservation importance of the Chimanimani Mountains at local, national and international levels.

A positive outcome of the project is the finding that one of the key habitats in the Chimanimani Mountains for rare and unique plants, that of species-rich herbaceous and bushland communities on quartzite outcrops, is not directly threatened by human activity including artisanal gold mining. Hence the majority of species restricted to this habitat are assessed as not threatened and of Least Concern in terms of their current conservation status. However, we also acknowledge that in the longer term, human-induced climate change could significantly impact these sensitive and highly range restricted plant communities and that long-term monitoring is required to gain a better understanding of this impact.

Data gathered during this project will also contribute significantly to a proposal under discussion to push for the Chimanimani Mountains to be designated as a World Heritage Site.

Planned Short-term Impacts - 1 to 3 years (as stated in the approved proposal)
a. Baseline botanical survey data for the Mozambique highland portion of the Chimanimani TFCA
b. All local stakeholders better informed and better able to act on biodiversity conservation priorities.
c. Improved communication and collaboration between civil society organisations and formal governmental bodies in Mozambique and Zimbabwe in the context of the Chimanimani TFCA.

5. Actual progress toward short-term impacts at completion

Between Micaia and Kew, the short-term impacts have mostly been achieved:
(a) The detailed baseline botanical survey has been completed, and is in the process of being formally documented for publication. Based on the extensive data gathering from pre-existing herbarium specimens from the region, and the collections and field observations made during the three field expeditions to Chimanimani, the available botanical data on endemics and other species of conservation interest from the Mozambique side is now greatly increased, possibly fourfold in terms of specimen-based data. These data will be made publically available at the end of the project via the Kew Herbarium Catalogue at www.kew.org. Of additional note, the 86 plant species IUCN conservation assessments generated through this work, will provide a significant contribution to the Mozambique government's commitments under the CBD's Global Strategy for Plant Conservation (GSPC) Target 2. The wealth of data gathered on the plant species and habitats will also allow us to identify Important Plant Areas in this region and to

provide recommendations for their protection, enabling the Mozambican government to work towards GSPC Target 5.

(b) Through Micaia, many local stakeholders have been made more aware of the conservation importance of the Chimanimani and are in liaison, including across the international border – see section 4 above and the Micaia CEPF project report for further discussion.

(c) Improved communication between government authorities and NGOs / civil society organisations is in progress, partly through additional CEPF small grants to Micaia and the IUCN Mozambique office.

6. Describe the success or challenges of the project toward achieving its short-term and long-term impacts

From a botanical perspective, the most significant success of this project in meeting its short-term and long-term impacts is the hugely expanded knowledge base we now have available on the plants of this important region. These data will provide a sound basis for plant (and wider biodiversity) conservation and other activities such as ecotourism development in the region in the future. For the first time, a full assessment of the range of threats to the unique plants, and the resultant conservation status of the large majority of the unique species, has been documented and made publicly available. A full technical report outlining the botany, ecology, conservation threats and the conservation significance of the Chimanimani Mountains is nearing completion. Additional scientific products (papers, descriptions of new species) are in preparation. Together, these will greatly increase the awareness of the biological importance of the Chimanimani Mountains both within the scientific community and within policy and land management spheres.

Perhaps the main challenge of a project of this nature is to compile and assess the necessary botanical data and draw conclusions on the findings whilst leaving sufficient time to integrate the findings within conservation / land-use practices and deliver conservation action within a 3-year timeframe. As is the case in many parts of the tropics, we were starting from a low base-point in terms of available botanical data for the Chimanimani Mountains. The processes of (i) databasing and georeferencing existing species data; (ii) collecting field data and associated specimens, and post-fieldwork identification and databasing; (iii) surveying and assessing threats to individual species and their habitats, and (iv) carrying out species conservation assessments, are all hugely time-consuming exercises that also require high levels of accuracy and care. Yet without this time investment in this essential groundwork, it would be very difficult to provide effective conservation and management recommendations to key stakeholders. Indeed, recommendations based on incomplete data could result in negative conservation consequences. We found that much of the project time was taken up by these activities, such that the outcomes and recommendations for the TFCA authorities are only now being finalised. As a result, although we have maintained a positive dialogue with the TFCA throughout, most of the long-term conservation action that we hope to result from our work will only be implemented post-project. That said, Micaia are ideally placed to take these recommendations forward and to build on the strong working relationship with the TFCA, and are committed long-term to balancing livelihoods and sustainable management of natural resources in the Chimanimani region.

The difficulties of fieldwork in challenging terrain with only access on foot, where everything has to be portered-in was a challenge, as was regular inclement weather. This resulted in a smaller area of coverage per field expedition than had been planned for, but this was countered by the receipt of additional funding by CEPF for a third expedition in 2016. We are confident that the data compiled on plant species diversity, key habitats and threats are robust and applicable across the Chimanimani region.

A potential challenge identified at the onset of the project was that the communities and individuals operating within the core TFCA zone (artisanal miners and associates) were doing so illegally and so may be hostile to the survey teams. However, this issue was handled with great sensitivity by Micaia staff, who liaised with the Nyahedzi community and guides to ensure that there was a cordial relationship with the mining community encountered in the highlands.

7. Were there any unexpected impacts (positive or negative)?

The Mozambique national park authorities (which includes management of National Reserves) under the Ministério da Terra, Ambiente e Desenvolvimento Rural are now more receptive to technical advice from third parties than they had been previously, partly as Micaia have recently been very active across the area.

Project Components and Products/Deliverables

Component 1 (as stated in the approved proposal)

Plan, prepare and carry out a botanical survey and inventory of the Mozambique portion of the upland Chimanimani area, with specific focus on the quartzite grasslands and scrublands, and on those species of restricted distribution (mostly endemics and near-endemics).

The following 8 products/deliverables were associated with this Component of the project:

1.1 Produce a clear and detailed assessment of the conservation threats to the range-restricted or threatened species and their habitats, with particular reference to the threats arising from artisanal mining.

1.2 Produce a series of preliminary conservation assessments for the recorded endemic/near-endemic or threatened species for submission to the IUCN Red List Authority, further justifying the importance of the KBA. (See also 1.7)

1.3 Produce a set of evidence-based recommendations for presentation to the Mozambique and TFCA authorities on appropriate conservation actions that could be taken.

1.4 Some hundreds of fully labelled and georeferenced plant specimens will be collected for the Maputo, Kew and Harare herbaria, which will also provide a basis for a preliminary listing of species and locations for future targeted seed collection under a joint Micaia/community/Kew Millennium Seed Bank project aimed at ex situ propagation and conservation.

1.5 Produce a comprehensive report documenting all findings, which will be presented at a joint workshop held with Birdlife Zimbabwe to assist in dissemination of findings and conclusions.

1.6 As a result of training from RGB Kew, staff members from IIAM, Harare Herbarium and MICAIA will be more capable of conducting botanical surveys

1.7 Hold a 5-day species red-listing workshop at RBG Kew, to be attended by project staff from RBG Kew, IIAM, Harare herbarium and Mr Bart Wursten from Botanic Garden Meise, in May/June 2015 in order to help meet deliverable 1.2.

1.8 Conduct an additional botanical field survey in April/May 2016 to cover the southern portion of the Chimanimani massif and to seek additional material of the several potentially new species to science collected during the first two field surveys. Further evidence-based recommendations will be produced on appropriate conservation actions that could be taken in the southern sector, for presentation to the Mozambique and TFCA authorities.

8. Describe the results from Component 1 and each product/deliverable

1. *Assessment of the threats to species and habitats.* Three botanical and habitat surveys, each of 2-3 weeks, were conducted in the Mozambique portion of the Chimanimani massif in April 2014, October/November 2014 and April/May 2016 (see also deliverable 8). As per the goals of component one, the surveys focused on the upland flora (over 1000 m) of the Chimanimani massif, investigating the species-rich grasslands and scrublands over both quartzite and schist substrates. These surveys specifically targeted (a) the conservation priority (endemic and range-restricted) species identified through a review of the available botanical literature and expert knowledge of the region (see deliverable 2); (b) the impact of artisanal gold mining and associated human footprint within the core TFCA which was identified as the most likely source of threat to the priority plant species and their habitats. All available field data on the priority species and the potential threats was gathered during these surveys. The first expedition focused on the northern portion of the main massif, the second expedition on the central portion and the third expedition included a survey of the southern portion such that the majority of the massif was covered. For the first two trips, we enlisted the expertise of Bart Wursten, an independent field botanist with unparalleled expertise on the Chimanimani flora.

   The threat assessment for the Chimanimani flora and habitats is detailed in the accompanying technical report. Here we summarise the findings:

   a) The main habitat for the priority plant species are the rock outcrops and cliffs, 'rock gardens' composed of white quartzite rock and associated patches of grassland, which are found across the mountain range. The extensive grasslands on soils derived from schist rocks support many fewer species of interest, although they are rich in ground orchids.
   b) The threat to the priority plant species from illegal artisanal gold mining is limited in scale and is diminishing from its peak in the late 2000s when mining activity was at its highest. The direct impact is largely restricted to within a few metres each side of the watercourses. That said, the impacts of illegal gold panning over the last 12 years are having a large effect on upland hydrology and on aquatic organisms and ecology, possibly reducing the value of the area as a water catchment.
   c) There is a possible indirect impact on the patches of shrubby vegetation on rocky slopes due to the increased frequency of wildfires, and perhaps also on some of the woody grassland species found in extensive grassland areas. However, much of the important habitat is partly protected from fire owing to the many crevices and gaps in the rocks that stop it spreading. There is also evidence of fire 'eating into' the margins of the small moist forest patches across the mountain, slowly making them smaller.

Other potential indirect impacts include degradation of habitat due to transient human settlement, most notably in caves where the cave-dwelling flora (e.g. *Streptocarpus* species) are potentially impacted, and increased harvesting of woody species for fuelwood. These impacts are currently considered to be small in scale and reducing as the mining community diminishes, but even small-scale disturbance may threaten some of rarest and most localised plant species on the massif.

d) In general, the Core Zone of the Chimanimani TFCA is ecologically intact and adequate for conservation of the unique flora of the Chimanimani Mountains, as long as all illegal activities can be controlled.

e) The human footprint within the TFCA buffer zone in Mozambique including the large areas of lowland moist forest (surveyed in more detail through a related project funded through the Darwin Initiative, U.K.) is much greater, with widespread habitat destruction through a combination of slash-and-burn agricultural practices, excessive fire frequency caused by deliberate and indiscriminate burning, and the rapid invasion of the alien shrub *Vernonanthura phosphorica* into areas where forests have been destroyed or damaged for agriculture. Whilst there are far fewer endemic species in the Chimanimani foothills, these areas nevertheless hold important populations of a number of species of conservation concern and some of the most important stands of lowland forest in Mozambique.

2. *Species conservation assessments.* For this study, we focused on five main groups of species or subspecies: (a) strict endemics to the high altitude (usually over 1200 m) Chimanimani Mts (71 taxa); (b) strict endemics to the low altitude (less than 1000 m) Chimanimani Mts (8 taxa); (c) near-endemics to the Chimanimani Mts (22 taxa); (d) Manica Highlands endemics for which Chimanimani is an important part of their range (32 taxa); and (e) endemics of the Umkondo sandstones of the Chimanimani region, not strictly on the Chimanimani massif (7 taxa). For these 140 taxa, all available data was gathered through herbarium, literature and online searches, all known localities were accurately georeferenced wherever possible and the species were searched for and surveyed during the three field expeditions (see deliverables 4 and 8).

   From the priority taxa, 86 were selected for full assessment of their conservation status using the categories and criteria of IUCN. Three red-listing workshops were held (see deliverable 7) and the results were entered into the IUCN Species Information System (SIS). 83 assessments were submitted for review in early July 2016. A further three assessments form a part of an MSc. project at the University of Reading being conducted by Ms. Toral Shah in conjunction with this CEPF project and will be submitted to IUCN in September 2016. The only major plant group for which assessments have not yet been carried out are the orchids; we will assess the conservation status of 11 species of orchid later in 2016.

   Of the 86 assessments made, nearly half (41 spp) are assessed as of Least Concern and the majority of these are strict endemic highland Chimanimani species, reflecting the findings in deliverable 1. Of the remainder, 3 spp are assessed as Near Threatened, 28 spp as Vulnerable, 9 spp as Endangered and 1 sp as Critically Endangered. Only 5 spp were considered to be Data Deficient, because they are known from only one or two records and the habitat requirements are not fully delimited. Of the species assessed as Threatened, the majority are not strict Chimanimani endemics; they are range-restricted species either of the wider Chimanimani region or the Manica Highlands, and the majority of the threats

to these species lie in other localities beyond Chimanimani. However, there are two groups of threatened species within the mountains: (a) those species restricted to the lower altitudes of the massif, which are threatened by habit loss through deforestation, excessive burning and rapid spread of the invasive alien *Vernonanthura phosphorica* as noted in (1) above – this group includes the single Critically Endangered species *Streptocarpus acicularis*; (b) species from higher altitudes that are naturally rare and are potentially impacted, albeit at a small scale, by human activity associated with the artisanal mining – for these species it is the inherent scarcity that leaves them vulnerable to even low-level environmental perturbations.

We are confident that the 86 assessments conducted give us a strong indication of the conservation status of the total endemic and range-restricted flora of this region, allowing us to draw firm conclusions on the range of threats to the flora of the Chimanimani Mountains and adjacent highland areas. A summary of the species conservation findings will be published in a forthcoming scientific paper.

3. *Recommendations to TFCA for conservation action*. Recommendations for conservation action are detailed within the accompanying technical report. Draft recommendations were presented to the TFCA authorities at the Chimanimani stakeholder's workshop in 2015 (see 5 below). Later, summarised recommendations were discussed with the warden of the National Reserve and then written up and submitted in a written form (June 2016, see below). The key recommendations are summarized as follows:
    i) The destructive actions of artisanal gold miners need to be regulated, but it is recognised that this is difficult. Control of the digging out of stream beds is of particular concern for the conservation of aquatic ecology and hydrological processes.
    ii) There is an urgent need to control the expansion of forest clearance for subsistence agriculture on the eastern and southern slopes of the lower Core and Buffer Zones of the TFCA, especially as this is usually accompanied by extensive wildfires and accelerated soil erosion. Existing agricultural practices in the TFCA Buffer Zone need to be made more sustainable as a matter of urgency.
    iii) There needs to be some control on the extent and frequency of wildfires, especially around forest and shrubby patches on the main Chimanimani massif. Control could perhaps be best achieved through awareness-raising and education of the communities living along the footslopes and of the gold miners.
    iv) At medium altitudes (800–1200 m) a programme for the control of invasive alien species will be required, particularly for *Vernonanthura* which is expanding rapidly and invading damaged moist forest patches.
    v) The routes of tourist trails should be determined mostly by logistics and accessibility, scenery, water supply and suitable camps or caves to stay in. For plants, the attractive and species-rich "rock gardens", containing many of the endemic plants, are widespread across the montane area on both sides of the international border and are not confined to particular areas.
    vi) Many caves suitable for staying in overnight are found, but most appear to have been heavily used by gold miners in recent years. There are blackened roofs, scattered rubbish and weeds at the entrance. If tourists and visitors are to use them, the caves will need to be cleaned out. Tourists and communities should also be made aware of the ecological importance of these sites for shaded rock specialist plants.

vii) Although most management and conservation activities in the montane areas can now proceed without any necessary additional research, it would be useful to investigate whether there has been any population decline in some of the important plant species, or if there is any developing threat resulting from human activities. The long-term impacts of increased fire frequency are of particular concern and should be carefully monitored.

viii) There is a requirement for a biological monitoring programme to be set up that would focus on the populations of any species that might be under threat from human activity or environmental changes, including. Such a programme should also cover the extent and condition of the scattered moist forest patches across the mountains and the spread of alien invasive species.

4. *Plant specimens collected*. Through the three field expeditions in 2014 and 2016, 927 plant specimens were collected together with accompanying detailed notes on locality (including georeferencing), habitat and frequency. The majority of these collections were of the targeted conservation priority species (see deliverable 2), for which we produced an informal field guide including images and known locality and habitat data to aid field identification. Wherever possible these collections were made in sets of 3 or 4, the first set being housed in the National Herbarium of IIAM, the second at Kew, the third at the Harare Herbarium and the fourth at the National Botanic Garden of Belgium. The collections made on these three trips is believed to have approximately quadrupled the number of plant specimens in herbaria from the Mozambique side of the Chimanimani massif.

   Eleven of the 63 endemic species of the high Chimanimani massif were recorded for the first time in Mozambique during these surveys. We also identified seven potentially new species or subspecies to science, all of which are currently under further investigation.

   In addition to the field collections, all data on the priority plant taxa held at the Kew and Harare herbaria and all records from available literature were collated in a Brahms database and the localities (where sufficiently accurate – many old records state only "Chimanimani Mountains" as the locality) were georeferenced. This added 1426 records of the priority plant species in addition to those collected in the 2014 and 2016 surveys. This database was used as the basis for the species conservation assessments detailed in deliverable (3).

   A large number of photographic images of plants observed on the 2014 expeditions, including many of the endemic and range-restricted species, have been uploaded to the Flora of Mozambique and Flora of Zimbabwe websites http://www.mozambiqueflora.com/ and http://www.zimbabweflora.co.zw/ This will help to increase the public access to user-friendly information on the unique plants of Chimanimani and so potentially promote interest in this important site from naturalists and tourists.

   Using existing published and unpublished checklists from Zimbabwe and our new collections, we estimate there are over 900 plant species and subspecies found in the mountains above 1200 m altitude. This checklist will be published in a forthcoming paper.

5. *Detailed technical report produced.* The detailed technical report was finalized in August 2016 and will be made freely available via the web. A summary of the key findings is presented in (1)-(4) above. See item 10 below for details of the dissemination of this report. Interim conservation recommendations based on the botanical survey work were presented at the Chimanimani stakeholders' workshop by Jonathan Timberlake in April 2015. This meeting was also attended by representatives from the TFCA authority, Micaia Foundation and BirdLife Zimbabwe, who were running a CEPF project on the Zimbabwe side of the Chimanimani massif. Further details can be found in the report from Micaia on their CEPF grant.

6. *Building capacity in botanical survey work.* Staff members from IIAM, Harare Herbarium and Micaia attended all three of the field expeditions and were trained (where required) in field botanical skills including survey methods, plant collecting and drying, plant identification and data gathering. Ines Chelene (IIAM) and Anthony Mapaura (Harare Herbarium) subsequently conducted a research visit to Kew between 31/05/2015-13/06/2015 in which they participated in the species red-listing workshop (see (7) below), assisted with inputting the resultant data into the IUCN SIS system, and helped complete specimen identifications under the guidance of I. Darbyshire.
   This project forms a part of a wider collaboration between Kew and IIAM in building the knowledge base on the plant diversity in Mozambique and its conservation status.

7. *Hold a 5-day species red-listing workshop at RBG Kew*. The Chimanimani species red-listing workshop was held at Kew on 1st-4th July and again on 10th July 2015, attended by I. Darbyshire, J. Timberlake (both Kew), I. Chelene (IIAM) and A. Mapaura (Harare herbarium) with some input from other Kew staff members. Bart Wursten was unfortunately unable to attend but data posted by him on the Flora of Mozambique website was used in the workshop to help produce the assessments. During this workshop, we assessed 55 priority species. Two shorter subsequent workshops were held at Kew on 21 March and 22-23 June 2016 to assess further Chimanimani priority species; these were attended by I. Darbyshire, J. Timberlake, J. Osborne, S. Dhanda and T. Shah (all Kew, except T. Shah: Univ. Reading). These workshops contributed to our success in deliverable (2), detailed above.

8. *Conduct an additional botanical field survey in April/May 2016*. The third field survey was conducted in April/May 2016 as planned. The two main aims of this work were to (a) visit and assess the threat status and flora of the southern sector of the Chimanimani massif; (b) collect additional specimens of and data on the potential new species to science uncovered during the 2014 surveys. The former aim was achieved through a subgroup of the survey team leading a 5-day excursion to the south. Large schist grassland areas were visited, and a number of the endemic species were found in the central part of the massif, showing their wide distribution. Artisanal mining activity here was more widespread, and included use of explosives away from the streams at one site. The latter aim was achieved in part, as additional material of the potentially new *Cyanotis* species and the new *Olinia* species were found, the latter in conjunction with Toral Shah's M.Sc. project (see below). Unfortunately, some of the potentially new species could not be relocated. The specimens collected during this final expedition are currently being identified / verified.
   Through securing additional sources of funding, three additional achievements were made during this field expedition:

a) Toral Shah of the University of Reading was able to conduct detailed field surveys of four Chimanimani endemic species (*Impatiens salpinx*, *Morella chimanimaniensis*, *Olinia* sp. nov., *Xerophyta argentea*) for her M.Sc. thesis. Her data have contributed to the technical report and to the forthcoming paper on the conservation status of the Chimanimani flora.
b) Neil Brummitt of the Natural History Museum, London participated to gather data on species included within the IUCN Sampled Red List Index for Plants, focusing on fern species in the forest patches on the massif.
c) Cacilda Chirindzane from IIAM Maputo and Valdemar Fijamo of IIAM Sussundenga attended with the specific remit to collect seeds of the endemic and range-restricted species where available, for incorporation in the national Seedbank and Kew's Millennium Seed Bank (MSB) as an ex situ conservation measure. 15 seed collections were made during this expedition.

9. Repeat point 8 above for each Component in your approved proposal

Please refer to the Micaia Foundation project report CEPF 62603 for outcomes of the other components of this joint project.

10. If you did not complete any component or deliverable, how did this affect the overall impact of the project?

All project deliverables within component one (botanical survey) were completed.

11. Please describe and submit any tools, products, or methodologies that resulted from this project or contributed to the results

Standard methodologies were applied in the botanical field surveys, capturing of collections-based data and species conservation assessments. The primary products of the botanical component are:

a) The detailed technical botanical report: Timberlake et al. (2016) "Botanical conservation across the Chimanimani Mountains" Royal Botanic Gardens, Kew. This report is submitted together with this CEPF report, and we are happy for this to be published online through the CEPF website. It will also be available electronically via the authors on request and hard copies will be available at Micaia offices in Chimoio, Kew Library and IIAM offices in Maputo.
b) The 86 species conservation assessments, which will be publically available via http://www.iucnredlist.org/ following review; we hope these will be available before the end of 2016.
c) The additional 927 plant specimens collected from the Mozambique Chimanimani, which will be available via the IIAM, Kew and Harare herbaria for future research on these plant species.

Benefits to Communities

12. Please describe the communities that have benefited from CEPF support

*Please report on the size and characteristics of communities and the benefits that they have received, as a result of CEPF investment. Please provide information for all communities that have benefited **from project start to project completion**.*

Note: data here is taken from Micaia Foundation project report 62603.

	Community Characteristics											Nature of Socioeconomic Benefit								
								Size of Community												
Community Name	**Subsistence economy**	**Small landowners**	**Indigenous/ ethnic peoples**	**Pastoralists / nomadic peoples**	**Recent migrants**	**Urban communities**	**Other***	**50-250 people**	**251-500 people**	**501-1,000 people**	**Over 1,001 people**	**Increased access to clean water**	**Increased food security**	**Increased access to energy**	**Increased access to public services (e.g. health care, education)**	**Increased resilience to climate change**	**Improved land tenure**	**Improved recognition of traditional knowledge**	**Improved representation and decision-making in governance forums/structures**	**Improved access to ecosystem services**
Nyahedzi	X	X	X								X		X					X	X	X

*If you marked "Other" to describe the community characteristic, please explain:

N/A

Lessons Learned

13. Describe any lessons learned related to organizational development and capacity building.
As is to be expected, communications between different organizations in geographically different localities (London, Chimoio, Maputo, Harare) can be very challenging and it has not always easy to co-ordinate project activities. Nominating specific individuals to be responsible is important, and significant lead-in times are required for major activities such as fieldwork planning - we found that this improved as the project progressed. Built-in flexibility and back-up plans in the face of changes in personnel, unavailability locally of specific items or bad weather are also essential for effective implementation.
A significant factor in the scientific capacity building element of the botanical work was the potential language barrier, as not all the Kew team are fluent in Portuguese. However, this was overcome by careful explanation of key points together with practical demonstration, coupled with translation from other team members when necessary.

14. Describe any lessons learned related to project Design Process *(aspects of the project design that contributed to its success/shortcomings)*
Although the project was well designed and communication between the lead partners was good throughout, it would have benefitted from focused discussions between all participants as to expectations and requirements of each partner during project development. A planning workshop would have been an ideal way to achieve this, though this is difficult in view of the geographic remoteness of the partners. Communication and planning was much easier when all the partners were physically together before and after fieldwork – in future, we would build in a little more time post-fieldwork for these discussions.

The initial project proposal was, at CEPF's request owing to practical financial issues, spilt into two components - one executed by Kew and reported on here, and one executed by Micaia, reported on separately. Kew carried out the technical studies while Micaia focused on advocacy in local communities and with the District-level and TFCA authorities. It is the combining of these two strands that will lead to greater impact and longevity. The overall conservation impact and lessons learned will only become apparent when the two reports are combined.

15. Describe any lesson learned related to project Implementation *(aspects of the project execution that contributed to its success/shortcomings)*
As this was the first time in which Kew have operated in the Chimanimani region of Mozambique, we relied heavily upon the logistical support and expert local knowledge and community relations of Micaia. It was critical was to have a dedicated Micaia staff member to lead on all the logistical arrangements both in Chimoio and during the field trips, such as purchase of supplies, ensuring transport and porters were in place and informing the local communities of the proposed work beforehand. This, and the use of a camp cook/guard as well as good trained local guides, ensured the scientists were able to focus on the fieldwork, and not on organizational issues. Given the difficult logistics, access to a reliable vehicle/s at all the necessary times was essential.

Although the main partners, Micaia and Kew, approached the project from different perspectives, both were equally committed to combining the two elements of the project such that we were able to generate scientifically robust data that is of relevance to the range of local stakeholders. The

implementation approach taken (e.g. in terms of fieldwork and workshop timings and logistics) was sufficiently flexible to overcome any challenges faced (see 13 above).

As discussed in item 6 above, the main implementation challenge faced was to both build up the scientific evidence base and influence conservation practices within the 3-year timeframe, as the first needs to be completed before the latter can be effective.

16. Describe any other lessons learned relevant to the conservation community

It would seem that although the Chimanimani National Reserve has been gazetted in Mozambique for a number of years, there was inadequate scientific data to underpin effective management interventions. For example, the actual impact of small-scale mining on the ecology and biodiversity of the mountains was not previously well understood or documented. Good conservation action needs to be underpinned by a reasonable technical knowledge of the locality in question. But if this information is to be used effectively and widely, it needs to be communicated repeatedly and clearly to the decision-making authorities, in appropriate formats and forums. This is best done by a nationally-based and highly respected professional NGO, preferably one with local community acceptance, rather than by outside scientists. However, most local NGOs cannot be expected to have that scientific knowledge base, let alone an international conservation perspective. Therefore, a good partnership between civil society organisations (providing credibility and local application) and scientists (to provide a confident and international knowledge base) is required. We feel that this balance was achieved in the current project through the collaboration of Kew, Micaia and IIAM.

Sustainability / Replication

17. Summarize the success or challenges in ensuring the project will be sustained or replicated

The main challenge, after completion of the necessary scientific papers and documentation, is to ensure this information feeds into the decision-making process effectively. This will be achieved by Micaia, through a number of other funding sources. It is important to keep up the momentum towards more effective conservation, at District, national and trans-frontier levels. There needs to be greater liaison between the Zimbabwe and Mozambique portions of the TFCA, which in the past has been minimal - this process has started through the Kew, Micaia and Birdlife Zimbabwe CEPF projects and will continue through Micaia's work in the region.

In addition, if larger tourist numbers could be encouraged, particularly to the Mozambique side of the TFCA (whether entering from Zimbabwe or Mozambique is perhaps not that important), this will help in both raising the perceived importance of the Chimanimani Mountains to the Mozambique authorities and discouraging the remaining small-scale miners in the mountains, who do not tend to operate in areas that are visited frequently. It would also, of course, bring in some much-needed revenue to local communities at the base of the mountains. New income streams such as this could be one way in which local communities are encouraged to adopt more sustainable management of the natural resources of the Chimanimani Mountains, as the economic benefits of preserving these areas will be apparent.

18. **Summarize any unplanned activities that are likely to result in increased sustainability or replicability**

Micaia is establishing a resource centre (partly virtual) where as much published documentation on the biodiversity and management of the Chimanimani region as possible is available for any interested party

to access. This is going ahead under a different funding stream from this CEPF project. As mentioned above, increasing tourist numbers, especially encouraging trans-frontier visits, would help reduce mining activity as well as increase the profile of conservation in the Chimanimani Mountains.

Safeguards

19. If not listed as a separate Project Component and described above, summarize the implementation of any required action related to social and environmental safeguards that your project may have triggered

The Kew component of the CEPF project was related only to survey and documentation work, aimed at informing others to take appropriate actions and did not trigger social or environmental safeguard actions.

Additional Funding

20. Provide details of any additional funding that supported this project and any funding secured for the project, organization, or the region, as a result of CEPF investment

Donor	Type of Funding*	Amount	Notes
Royal Botanic Gardens, Kew	A	£25,500 ($38,250)	Estimated core staff participation beyond that funded by CEPF, and associated overheads – included salary for c. 6 months of sandwich-year student (Jeneen Hadj-Hammou) who worked on botanical data compilation, production of field guide and participation in fieldwork (CEPF grant covered 10 days of her time).
B. A. Krukoff Fund for the study of African Botany (administered by Kew)	A	£8,012 ($12,000)	Covered salary costs for participation of I. Darbyshire in years 1 & 2
IIAM	A	[not specified]	Core staff participation beyond per diem allowance: c. 2.5 months
Harare Herbarium	A	[not specified]	Core staff participation beyond per diem allowance: c. 2 months
Bentham-Moxon Trust	A	£3,070 ($4,600)	Participation of Bart Wursten (April 2014) and Toral Shah (April 2016) in fieldwork
Darwin Initiative	A (and in part B)	Total grant = £291,180 ($436,750)	Joint Kew-Micaia-IIAM project focusing on lowland forests of TFCA buffer zone in Mozambique. This project provided complementary data for the technical report, plus some financial and logistical synergies including funding of Hercilia Chipanga as Micaia project officer
Private Donor to Kew Foundation	B	£30,000 ($45,000)	Purchase of Kew-owned vehicle to support CEPF and Darwin projects; part of a

			larger grant supporting wider Kew-Micaia-IIAM collaboration

** Categorize the type of funding as:*

A Project Co-Financing (other donors or your organization contribute to the direct costs of this project)
B Grantee and Partner Leveraging (other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF funded project)
*C Regional/Portfolio Leveraging (other donors make large investments in a region because of CEPF investm*ent or successes related to this project)

The success of this project was in part due to the contribution of a range of additional funding sources and staff time commitments form the partners and contributing institutions and individuals. In particular, the synergies with the Kew-Micaia-IIAM Darwin Initiative project, and the additional private funding that this helped to leverage, allowed us to have the resources in place to conduct the field surveys. As discussed in section 6, the gathering of sufficient data to make informed conservation decisions, through both historical collections-based data-mining and field surveys, is a time-consuming and labour-intensive task and the length of time required for this work was under-estimated in the original CEPF proposal. Hence the co-funding (mainly through provision of core staff time) provided from Kew and partners was vital to the completion of the scientific work to a high standard.

Micaia, together with IUCN Mozambique, have also secured additional funding for conservation work in the Chimanimani region following the CEPF award (category C above), including Mozbio World Bank funding of $1,750,000 to support community development projects in the TFCA buffer zone; see Micaia report for further details.

Additional Comments/Recommendations

21. Use this space to provide any further comments or recommendations in relation to your project or CEPF

This project report should be read in conjunction with that of project 62603 by Micaia Foundation.

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

Please include your full contact details below:

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