CEPF FINAL PROJECT COMPLETION REPORT

I. BASIC DATA

Organization Legal Name: University of Cape Town

Project Title (as stated in the grant agreement): *Vulnerability of a Key Iconic Species, Aloe Dichotoma, to Past and Future Climate Change*

Implementation Partners for this Project: South African National Biodiversity Institute

Project Dates (as stated in the grant agreement): September 1, 2007 - December 31, 2008

Date of Report (month/year): 2 March 2009

II. OPENING REMARKS

Provide any opening remarks that may assist in the review of this report.

The project was essentially co-managed between SANBI and ADU, and provided a very healthy collaboration that allowed us to tackle a challenging work program within a very tight timeline.

III. ACHIEVEMENT OF PROJECT PURPOSE

***Project Purpose**: To guide conservation authorities, land managers and land owners in applying tools and approaches that facilitate the persistence of key vulnerable species and rare genotypes in situ in the face of climate change.*

Planned vs. Actual Performance

Indicator	Actual at Completion
Purpose-level:	
***1.** Conservation authorities consult with ADU and SANBI for advice on planning for persistence of wild populations in the face of climate change at regular (annual) intervals*	*SANBI and ADU are now being consulted by regional (e.g. CapeNature), national (e.g. Dept Environmental Affairs and Tourism) and science stakeholders (individuals) on guidance on planning for persistence.*
***2.** Aloe dichotoma data sets are used in the SANBI monitoring program, and ultimately as one of the few from the southern Hemisphere in 2012 in the Fifth Assessment report of the Inter-governmental Panel of Climate Change to demonstrate the impacts of climate change in the succulent Karoo.*	*A. dichotoma data sets are curated at SANBI. They form the basis for a monitoring program. Further analyses based on methods developed during the current project will quantify the effects of climate change on A. dichotoma, and provide one of a few clear examples from the southern Hemisphere (outside Antarctica) and of arid ecosystems in general. We hope to leverage these data sets to source further funding from a variety of donors to expand this function.*
***3.** South African stakeholders from both public and private domains are provided information on the state of Aloe dichotoma in the wild.*	*A popular booklet summarizing our research and the state of A. dichotoma has been written. This booklet will be widely disseminated through SANBI and ADU channels. We will also communicate the results through the SANBI website, and will list this project on the developing South African risk and vulnerability atlas.*

4. *Local land owners and stakeholders engage in active protection of Aloe dichotoma populations on their land in at least the southern core area of its range.*	*Preparations to launch an A. dichotoma network are completed. The network will consist of a scientific working group and maintain the contacts that we established with landowners and stakeholders during the current project. It will provide a mechanism to provide scientific support to conservation authorities and enable them and landowners to make informed decisions about the protection of A. dichotoma. We will soon circulate our booklet to this network and engage them in a program by which data can be submitted to us, using additional funding we are now sourcing from an international donor.*

Describe the success of the project in terms of achieving its intended impact objective and performance indicators.

Overall we have achieved our objectives, and indeed are happy that we now have a basis on which further work can be usefully done, not only in science terms, but also in communication.

Were there any unexpected impacts (positive or negative)?

No

IV. PROJECT OUTPUTS

Project Outputs*:*

Planned vs. Actual Performance

Indicator	Actual at Completion
Output 1: Spatially explicit demographic model useful for identifying key vulnerable stages in the life cycle of Aloe dichotoma and potential solutions to overcome local extinction risk (e.g. through improved connectivity)	A Bayesian spatially explicit demographic model has been developed. The results indicate that the recruitment phase is critical for persistence, and there is an indication that failure of fruit set may be contributing to a lack of recruitment in some areas. This may be related to night-time temperatures exceeding a critical limit. If this is the case, then interventions are limited to highly intensive off site germination of seeds and introduction into the field. However, further work is required to understand the interventions necessary to overcome local extinction risk. We aim to develop this aspect further with the use of additional funding sourced in the future.
1.1. *A spatially explicit demographic model is available for the use of conservation authorities, and is capable of being adapted for any threatened plant species.*	We have developed a Bayesian spatially explicit demographic model that can be parameterized from a combination of individual- and population-level demographic data. It is capable of being adapted to other species. It is coded in the shareware statistical software R. We are still validating the model and are writing a scientific publication after which we are happy to share it with interested parties. At the moment, however, no user-friendly interface exists.
Output 2: Expanded monitoring program using Aloe dichotoma populations to indicate climate change impacts	We have gained the scientific basis to initiate an effective monitoring program. The current project allowed us to refine the protocol and to execute a

	power analysis. We decided to collect more individual level data (see "Lessons learned", below), and have the knowledge to select the most appropriate populations for continued sampling.
2.1. *Long term data sets from at least twenty populations distributed from southern to northern parts of the species' range are formalised and curated, and then gathered annually and analysed and archived by SANBI*	We currently have data on 41 populations. We also developed novel statistical tools to analyze them. We have finished preparations for installing a monitoring program. Regular analyses of the data using these tools are planned.
Output 3: Information and education booklet summarising climate change challenges and potential solutions in the winter rainfall hotspots of South Africa, using Aloe dichotoma as a case study	The booklet has been written.
3.1. *2000 copies of the booklet are distributed to stakeholders by end December 2008*	The distribution of the booklet has been delayed, but we anticipate to being distributing it in April 2009, and will continue to distribute it for at least 12 months beyond this time.

Describe the success of the project in terms of delivering the intended outputs.

Providing the best possible scientific support for nature conservation is an ongoing endeavor. As we reach new understanding, the management recommendations constantly need to be refined. In this cycle between making scientific progress and translating them into practical recommendations, we have made better than expected progress on the former stage, but have been challenged in achieving the latter within the time frame of this grant. The reasons for this provide a useful set of "lessons learned". Demographic data analysis has been more complex than anticipated, and has taught us much. Notwithstanding, we have developed a novel statistical approach and gained a much clearer understanding of the future data needs. Our experiences and latest results are presented in the popular booklet to be distributed shortly. The grant has also allowed us to prepare for a long-term monitoring program and *A. dichotoma* network to be put in place. We will therefore soon have the structures for effectively communicating our findings to conservation authorities and other stakeholders.

Were any outputs unrealized? If so, how has this affected the overall impact of the project?

All major outputs were realized.

V. SAFEGUARD POLICY ASSESSMENTS

Provide a summary of the implementation of any required action toward the environmental and social safeguard policies within the project.

Not applicable

VI. LESSONS LEARNED FROM THE PROJECT

Describe any lessons learned during the various phases of the project. Consider lessons both for future projects, as well as for CEPF's future performance.

The project involved a complex interplay of intensive field research followed by data analysis and interpretation. It relied heavily on a key individual, Graeme Ellis, skilled in data collection, and was

thus fortunate to be able to draw on that resource. Any repeat of such an effort would require a lead-in phase of training and skilling to achieve the outcomes that we have accomplished. It would have been ideal to shadow this key individual with a developing scientist, but this was not possible given the time frame and funding limitations. Nonetheless we maintain an excellent relationship with Graeme Ellis for future possible skilling and even data collection needs.

It would have been ideal to manage a further field effort after carrying out initial modeling efforts, as these provided guidance on some key phases that require further detail. However, we will pursue this through the network we have access to through the work already done. We especially learned that demographic transitions require a far more effective process of marking individual trees, and that reliance on GIS identification is insufficient. We hope in future to build a suite of marked individuals across all size classes to enhance our understanding.

Project Design Process: (aspects of the project design that contributed to its success/failure)

Demographic data can be collected at the population level (age structure) or at the individual level (survival, growth, and reproduction). While the first one is much easier to collect, the second one allows for more detailed analyses. Individual level data also only unfold their full power if collected over some time (so that mortality and growth can be observed). Given that we needed to sample many populations across the whole range of *A. dichotoma* we decided to collect population level data on a sample of 100 individuals and individual data on 25 individuals per population. This choice was also motivated by the desire to be able to compare the data to an earlier sample taken from the same populations in 2002, and using a similar design. While the chosen design has been successful for the present purpose, we now wish we had identified more individuals so that we could collect more individual level data during the coming decade. With only 25 marked (by taking their exact GPS position) individuals per population, we are only able to find relatively large differences in survival when we monitor them over the next few years. We are planning to mark many more individual trees at the first opportunity. Nevertheless, the current project has allowed us to develop the necessary statistical tools and to get an estimate of how many trees we will have to mark so that we can conduct more detailed analyses in the future.

Project Execution: (aspects of the project execution that contributed to its success/failure)

Critical to our success was that we were able to employ Graeme Ellis, a key resource, as a field worker. Graeme was part of the field team who collected similar data in 2002. This ensured that field methods were comparable to the earlier data, and he was also able to find the exact sampling sites in all populations. This would have been difficult to achieve without Graeme's help and his excellent spatial memory because the GPS coordinates taken during the earlier trip proved to be unreliable. They had been taken during a time where GPS systems were still subject to considerable spatial error. Graeme and his team also proved very effective at liaising with stakeholders and landowners. This allowed us to engage with these persons much more effectively than by holding meetings as we originally planned.

VII. ADDITIONAL FUNDING

Provide details of any additional donors who supported this project and any funding secured for the project as a result of the CEPF grant or success of the project.

Donor	Type of Funding*	Amount	Date Received	Notes
		$		
		$		
		$		

		$		
		$		
		$		
		$		
		$		

Additional funding should be reported using the following categories:

- ***A*** *Project co-financing (Other donors contribute to the direct costs of this CEPF project)*
- ***B*** *Complementary funding (Other donors contribute to partner organizations that are working on a project linked with this CEPF project)*
- ***C*** *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)*
- ***D*** *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

Provide details of whether this project will continue in the future and if so, how any additional funding already secured or fundraising plans will help ensure its sustainability.

Yes, it will continue. We have approached key international donors to source additional funding, and discussions are underway. However, in addition, SANBI will provide its own institutional support for the continuation of aspects of this project, a step that would not have been possible if CEPF funding had not provided the initial impetus.

VIII. ADDITIONAL COMMENTS AND RECOMMENDATIONS

VIII. INFORMATION SHARING

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned and results. One way we do this is by making programmatic project documents available on our Web site, www.cepf.net, and by marketing these in our newsletter and other communications.

These documents are accessed frequently by other CEPF grantees, potential partners, and the wider conservation community.

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