CRITICAL ECOSYSTEM PARTNERSHIP FUND

Environmental Impact Assessment
and
Environmental Management Plan

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CEPF Grant 65861

Grantee: Missouri Botanical Garden

Project Title
Promoting the Self Sufficiency of Reserves in the Ramena Complex, Antsiranana, by Conceiving, Developing, and Testing New Tourism Products

Sub-project Title

« Give Something Back » Tourism: Oronjia NAP, Ramena Complex

Project Location

Oronjia NAP

Grant Summary

1. Grantee organization. Missouri Botanical Garden (MBG), Madagascar Research and Conservation Program
2. Grant title. Promoting the Self Sufficiency of Reserves in the Ramena Complex, Antsiranana, by Conceiving, Developing, and Testing New Tourism Products
3. Grant number. 65861
4. Grant amount (US dollars). 85,513
5. Proposed dates of grant. 01/01/2016 – 31/12/2017
6. Countries or territories where project will be undertaken. Madagascar
7. Summary of the project.

This project aims to promote the self-sufficiency of three new protected areas (NAP) within the Ramena Complex by conceiving and developing a "Give Something Back" tourism experience at each site that certain types of client will purchase. The products will be specially tailored for each of the three sites and will not only provide a safe, informative and enjoyable experience for the clients but will also positively contribute to the conservation management of the site. The products will be provided, at each site, by two locally recruited and specially trained "experience animators".

The development of each product will require an Environmental and Social Impact Study that will be presented to CEPF for approval. No on-the-ground actions will be begun until approval by the CEPF grant director is obtained. The results of the study for the product "Supporting sustainable use of *Delonix velutina*", proposed for the Oronjia new protected area (or NAP), are presented here.

8. Date of preparation of this document. 15/08/2017

9. **Status of area to be impacted:** This section should describe the applicant's understanding of the site.

The proposed "Give Something Back" tourism product "Supporting sustainable use of *Delonix velutina*" will be developed in Oronjia NAP that was designated as a reserve in May 2015. More specifically the product will be provided in the Zone of Sustainable Use (or ZUD) of the NAP where the nursery will be installed and where the young plants of *Delonix velutina* will be planted.

During the period from the end of 19th C to the Second World War the whole of Oronjia Peninsula hosted a diversity of military infrastructures and a large number of military personnel. The natural vegetation of Oronjia, dry deciduous Forest, was no doubt severely impacted by such intensive military activities. While the use of the site by the military has such diminished, parts of the site are still used for military training to this day. However, much more damaging to the vegetation than such activities were the activities of charcoal production and shifting cultivation that were permitted by the military until the intervention of MBG at the site in 2009. At this time the original forest vegetation had been reduced to thicket and shrub-land. Since MBG's intervention at the site these two activities have almost entirely stopped and the vegetation is regenerating rapidly – despite the continuing presence of goats, sheep and cattle at the site.

10. **Approach**: This section will describe proposed actions during the project. Specifically, what do you intend to do and how will you do it?

The main economic activity for the community living around the Oronjia Forest is traditional fishing. This is done using a canoe that is made from local resources. The most important of these resources is a large tree trunk that is required for the hull of the canoe. Although, hitherto, local people have been able

to request a permit extract such a trunk from the zone of sustainable use of the Oronjia NAP, our recent study of this activity (see Appendix 1) has revealed that now only one species in the forest, *Delonix velutina*, can provide sufficiently large stems for the hull, and currently the demand for this item exceeds the supply i.e. exploitation of this species at this site is not sustainable. This is of particular concern because *D. velutina* is a local endemic to the far north of Madagascar and is classified as Endangered. Various measures are proposed to balance the demand for stems of *D. velutina* and the supply including: the provision of fiber-glass canoes, increasing the lifespan of traditional canoes using paint and wood preservatives, and enriching the ZUD with seedlings of the *D. velutina* and making sure that they are well protected from browsing livestock. The participative tourism product proposed here concerns the last of these actions. Specifically, we will seek paying volunteers to facilitate the sustainable exploitation of *D. velutina* by propagating and planting young plants of this species in the ZUD of the NAP.

Depending on the time of the year, the volunteers will be involved in an array of activities including: collection of seeds from wild plants of *D. velutina*, propagation of seeds and care of seedlings in the nursery, planting of seedlings, fencing of seedlings to protect them against grazing livestock, and monitoring the survival and growth of the seedlings. The seeds will be sown and the seedlings nurtured at a nursery specially installed adjacent to the ticket office for the protected area. This land is within the ZUD and supports no natural vegetation. A well will be dug as a source of water for the nursery. No chemicals will be used in the nursery and the propagation benches will be made using the wood of non-native species.

11. **Anticipated impact:** this section will describe the impact and how this impact has been determined.

11.1. *Collection of seeds of wild plants will reduce the number of propagules that will be naturally dispersed*
Seeds for propagation will be collected from wild *Delonix velutina* trees. This action will reduce the number of propagules naturally dispersed.
11.2. *The barriers erected to protect the newly planted seedlings from grazing by livestock will restrict access by livestock to areas where the currently graze*.
Parts of the Oronjia Forest are used for grazing and browsing by cows, goats and sheep. Where the structure of the vegetation remains open these animals can circulate freely and will eat most tree seedlings that they encounter. Thus to prevent the loss of young plants of *D. velutina*, it will be necessary to protect them from grazing by these animals. This will be done by erecting a barrier made from old fishing nets around the areas where the plants of *D. velutina* have been planted. This will reduce the access to grazing.

12. **Mitigation measures**: Describe measures that will be taken to mitigate negative impacts.

12.1. *Collection of seeds of wild plants will reduce the number of propagules that will be naturally dispersed*
Naturally most of the seeds produced by *Delonix velutina* fall below the parent tree where most are predated by rodents. Any seeds that survive and germinate will normally die due to strong competition for resources from other seedlings and from the parent tree. Thus the seeds collect from wild plants would normally naturally perish. However, following good seed collection practice (e.g. as proposed by the Royal Botanic Garden Kew's seed collection guidelines see https://www.kew.org/sites/default/files/English_kppcont_035653_A%20field%20manual%20for%20seed%20collectors.pdf) we would never collect more than 10% of the seeds from any one parent plant. In any case it is desirable to propagate seeds from many different parent plants to maintain the genetic diversity of the wild population.

12.2. *The barriers erected to protect the newly planted seedlings from grazing by livestock will restrict access by livestock to areas where the currently graze*.
The areas where grazing will be restricted will be small area only – approximately two hectares per year. As the delegated managers of Oronjia NAP, MBG staff are already obliged to respond to free-roaming livestock in this manner and such actions are not an innovation dependent on this project. During the process to designate the Oronjia Forest as a New Protected Area it was necessary to provide a *Plan de Gestion Environnementale et Sauvegarde Sociale* (PGESS) that included consideration of the social impact of restricting grazing of livestock within the protected area. This document is included in Appendix 2.

13. **Actions to ensure health and safety**: Describe actions that will be taken to ensure the health and safety of workers as well as the site. Include a description of waste management and/or disposal.

The two animators of this experience will be tasked with gathering waste generated by the nursery and by the volunteers and removing to MBG's site-based office from whence it will be transported to Diego town for final disposal.

14. **Monitoring and Evaluation**: This section aims to outline what steps the proponent will take to monitor and evaluate the impact of the proposed intervention.

None proposed.

15. **Permission of the landowner**: Please verify permission of the landowner to undertake actions on the site, and verify that you have the required permits to undertake this work.

The conservation management of the Oronjia NAP has been delegated by the Malagasy Government to Missouri Botanical Garden. The management plan for this site includes the development of nature tourism as a means of generating income for site management and for improving livelihoods for the local population. The nursery will be installed on land already accepted by the local population as ZUD.

16. **Consultation**: This section aims to outline the range of informed consultations that the grantee has had both with experts to optimize the potential for success, and with stakeholders, particularly local communities, who are potentially affected by the proposed actions. Include dates of consultations.

The activities proposed here were conceived by Chris Birkinshaw on the basis of research conducted by Jimmy Razafitsalama to describe the current sustainability of *Delonix velutina* exploitation in the ZUD of the Oronjia Forest NAP. This research was participative and its results formed the basis for reflection by all stakeholders, but most particularly the local fishermen, the future management of this tree. A summary of this study is presented in Appendix 1 and this includes the actions proposed by the community to balance the supply of this resource and the demand.

17. **Disclosure**: CEPF requires that safeguard documents are disclosed to affected local communities and stakeholders prior to project implementation. Please describe efforts to disclose this impact assessment and environmental management plan and provide dates.
The animators will explain during village meeting the need for a « temporary enclosure » to protect the young *Delonix velutina* seedlings against grazing.

18. **Grievance mechanism**: All projects that trigger a safeguard are required to provide local communities and other interested stakeholders with means by which they may raise a grievance with

the grantee, the relevant Regional Implementation Team, the CEPF Secretariat or the World Bank. Affected local communities should be informed of the objectives of the grant and the existence of a grievance mechanism. Contact information of the grantee, the Regional Implementation Team and the CEPF Grant Director should be made publicly available, through posters, signboards, public notices or other appropriate means in local language(s). Grievances raised with the grantee should be communicated to the Regional Implementation Team and the CEPF Grant Director within 15 days, together with a proposed response. If the claimant is still not satisfied following the response, the grievance may be submitted directly to the CEPF Executive Director via the dedicated email account (cepfexecutive@conservation.org) or by mail. If the claimant is not satisfied with the response from the CEPF Secretariat, the grievance may be submitted to the World Bank at the local World Bank office. Please describe the grievance mechanism that you will use for your project, and how you will ensure that stakeholders are aware of it.

The creation and management of new protected areas in Madagascar requires the creation and operation of a grievance mechanism. Such a mechanism, as defined in the Cahier de Charges (see Appendix 3, Article 43) was established as part of the Oronjia's creation process and is now operational. This existing mechanism will be used to detect and report any issues arising from the implementation of this project. In additional, as requested by the donors we will reinforce this grievance mechanism by reformulating the signs posted at Communal and Fokontany offices to include contact information of the grantee, the Regional Implementation Team and the CEPF Grant Director. At the launch of the project a radio broadcast will also be made explain the project and introducing the grievance mechanism. Care will be required in drafting the message so as not to cause unnecessary alarm.

Appendix 1. Summary of study on the current supply and demand for *Delonix velutina* at the Oronjia NAP

CURRENT BALANCE BETWEEN DEMAND AND SUPPLY OF LARGE TRUNKS FOR THE CONSTRUCTUION OF CANOES AT THE ORONJIA FOREST, ATSINANANA

Study Site

The Oronjia Forest is a 1648 ha fragment of dry deciduous forest located on a sand-covered limestone peninsula overlooking the huge natural harbor of Antsiranana in northern Madagascar. Following decades of unsustainable exploitation of the forest to provide timber and charcoal, as well as clearance for manioc and maize cultivation, the forest is now very degraded. Despite its condition the site still supports a diverse flora and fauna that includes several threatened and locally endemic species. The Oronjia Forest was designated as a new protected area (IUCN type VI) in May 2015. The forest is valued by the local population as a source of wild yams and timber and the reserve includes an 855 ha zone in which the sustainable exploitation of natural resources is permitted (i.e. ZUD). Most of those living around the reserve rely in fishing for their livelihoods for which they require canoes. Traditional canoes require a large trunk for the hull and this critical resource is extracted from the ZUD.

Objective of study

To describe the balance between local demand for large trunks for the construction of canoes and the supply of this resource by the Oronjia Forest.

Methods

Demand: To estimate the demand by fishermen for large trunks originating from Oronjia Forest information was required on: a) number of fishermen dependent on this forest; b) the preferred species for the construction of the canoe; c) the dimensions of stem required for the hull; and d) duration of the canoe. All this information was obtained from communal records and a survey of 80 families from the two main villages adjacent to the reserve.

Stock: The survey showed that only one tree species was still available of adequate dimensions to be used for the construction of pirogues: *Hazondrangola* or *Delonix velutina*. Stock of this species was estimated by counting individuals in various size class intervals along 5 parallel transects placed regular intervals within the reserve.

Growth: Stem growth of *Delonix velutina* was estimated by installing dendrometer bands on 27 individuals selected to represent a diversity of stem diameter classes. Circumference growth was measured using a calliper 12 months after installation and these values divided by π to obtain and estimate of mean annual growth in dimeter.

Results

Demand: Communal records show that the two fokontany adjacent to the Oronjia Forest (Ramena and Ankorikihely) include a total of 568 households and of these 90% rely on fishing as a principle source of income. Among 41 fishermen interviewed 37 constructed their canoe using wood extracted from the Oronjia Forest. Thus we estimate that 568*0.90*(37/41) = 461 families rely on the Oronjia for wood to make their canoes. The survey also revealed that one large trunk with a dimeter ≥40 cm diameter is required to make the hull of the canoe and this has an average duration of 2 years. Thus the annual need for large diameter stems for the construction of canoes is 461*1*0.5 = 230.5. Those interviewed informed us that in the past they used three species for the hull of the canoe: *Gyrocarpus americanus*, *Broussonetia geveana*, and *Delonix velutina* but now trunks of adequate size can be found for *D. velutina* only – presumably the decline of the other two species is due to over-exploitation.

Stock: The stock of *D. velutina* in various stem dbh classes per hectare and within the entire ZUD (= 855 ha) is shown in the table below.

	DBH Class (cm)								
	[1-5[	[5-10[	[10-15[	[15-20[	[20-25[	[25-30[	[30-35[	[35-40[	>40
Average no. per hectare	5	6	5.4	5	1.2	0.4	0.2	0.4	0.6
Total no. in ZUD	4275	5130	4617	4275	1026	342	171	342	513
	20,178								528

Growth: The average annual growth in stem dbh for *D. velutina* was 0.343 cm/year
Supply: If the stem diameter increases at 0.343 cm per year, then the smallest diameter stem (1cm) will take (40-1)/0.343 = 114 years to attain a diameter of 40 cm. Thus during a period of 114 years all the stems in the ZUD that are currently too narrow to be exploited (=20,178) will attain exploitable size. Thus on average the number of stems that can be exploited annually = 20,178/114 = 177.

Implications of study for the sustainable management of stems for construction of canoes
In this study the demand for large stems of *D. velutina* (=230.5/year) exceeds the supply (= 177/year). If these two parameters cannot be brought into balance then this species will likely meet the same fate as *Gyrocarpus americanus* and *Broussonetia geveana*, that were once exploited but now no longer remain as large individuals at this site. It should be noted that *D. velutina* is locally endemic to northern Madagascar and is classified as Endangered by the IUCN and therefore the reserve managers have a special responsibly to conserve this species. However, on the other hand, many local people are entirely dependent on traditional canoes for their livelihoods. Various options are available to balance demand and supply including: reinforcing the population by propagating and planting seedlings of *D. velutina* and indeed *Gyrocarpus americanus* and *Broussonetia geveana* too; reducing seedling mortality from goat browsing; providing alternative canoes (e.g. made of fiber glass); and providing wood preservatives to prolong the life of canoes.

Improvements to study
This study would have been improved by: a) estimating density of *D. velutina* in the ZUD alone and not for the entire reserve (i.e. including the zone of strict conservation); and b) increasing the number of transects that were surveyed to describe stock.

Acknowledgements
The data presented in this study was collected by MAMINIAINA Jeanne Baptistine as part of his Masters study at the University of Antananarivo.

Appendix 2. ***Plan de Gestion Environnementale et Sauvegarde Sociale – Oronjia NAP***

Appendix 3. ***Cahier de Charges Environnementales – Oronjia NAP***