CEPF SMALL GRANT FINAL PROJECT COMPLETION REPORT

I. BASIC DATA

Organization Legal Name: Wildlife Conservation Society

Project Title (as stated in the grant agreement): *Assessment of the Potential to Restore and Increase the Connectivity of Zanzibar's Coral Forests*

Implementation Partners for This Project:

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

Date of Report (month/year): June 2009

II. OPENING REMARKS

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

Prior to this small grant project, WCS worked with CARE Tanzania and the Zanzibar Department of Commercial Crops Fruits and Forestry on another CEFP funded project in 2006 – 2007. The objective of that project was to reduce the extinction risk of all of Zanzibar's endangered and endemic species through improved habitat protection, while ensuring that local communities participated in and benefited from conservation activities. The community sensitization and government and community capacity building that was conducted during this prior grant was essential to achieving the goals of this project.

III. NARRATIVE QUESTIONS

1. What was the initial objective of this project?

Our ultimate long-term goal is to better conserve the biological diversity, the threatened and endangered endemic species, and the ecosystem services of the forests of Zanzibar, including but not limited to catchment services, climate mitigation and ecotourism. The objective of this project was to explore the potential for the development of a protected areas network in Zanzibar to include Jozani-Chwaka Bay National Park, Kiwengwe Pongwe Forest Reserve, Muyuni Forest and the remaining Southern and Eastern coral forests, and to assess the potential for corridor development among these areas.

2. Did the objectives of your project change during implementation? If so, please explain why and how.

No

3. How was your project successful in achieving the expected objectives?

This project was very successfully executed. As will be elaborated below we have now identified and mapped all of the areas of importance for wildlife remaining on the island of Unguja, Zanzibar. In addition, we have identified, surveyed and mapped three wildlife corridors that will link all of the important wildlife areas into one island-wide protected areas network. Throughout this process, we have worked with all local communities and the Zanzibar Government, Department of Commercial Crops, Fruits and Forestry (DCCFF). Communities and DCCFF staff now have improved wildlife survey and monitoring capacity, are well informed of the importance of habitat corridors, and are supportive of their development. In the coming months, we will continue to gather detailed data on species presence and abundance in and human use of the newly identified important wildlife areas and the proposed corridors. These data will then feed into the formal protected areas network proposal to be submitted to the Government of Zanzibar.

Activities and Methods

In order to explore the potential to create a protected areas network on the island of Unguja, we conducted the below activities. The project team consisted of the WCS Zanzibar Project staff, three members of the DCCFF GIS team, and the village ecological monitoring volunteers. As explained above, prior to this study, WCS worked with DCCFF and CARE Tanzania on another CEFP funded project to establish ecological monitoring programs in 16 community managed forests across the island. To establish and conduct these monitoring programs each communities' Village Conservation Council (VCC) chose two volunteers who worked with the WCS team to establish the monitoring programs and continue to work with the WCS team on a monthly basis to conduct the monitoring programs. As most of the proposed corridors overlap these community forests, the partnerships that we have developed with the communities have been invaluable for accomplishing the below activities and for gaining support for the proposed corridors.

Activity 1. Conduct GIS analysis of aerial photographs to determine all of the remaining wildlife areas on Zanzibar and to identify potential corridors among these areas.

In 2004, a complete series of aerial photographs was taken of the island of Unguja. The first step of this project was a thorough analysis of this series to locate all of the remaining forest areas across the island and to explore the potential to connect these areas via corridors.

Activity 2. Conduct reconnaissance surveys to ground truth the areas identified by GIS work as potential yet currently unprotected wildlife areas and corridors.

Following the identification of forest patches and corridors, reconnaissance surveys were conducted to determine the current state of the habitat, the current management of the areas, and the importance of these areas for wildlife. In the potential corridors, reconnaissance lines were sampled. Along the length of these lines and in circular plots every 200 meters along the lines, data were collected on forest cover and condition, and wildlife signs (mainly terrestrial and arboreal large mammal species although opportunistic data on three bird species were also collected). Additional surveys were

also conducted to determine and refine the current-day width of the corridors that were proposed from the 2004 aerial photographs. Often the corridors identified from the 2004 aerial photos were found to differ on the ground in 2008; the most common difference was encroachment into potential corridors, thereby decreasing their width.

Activity 3. Camera trap the areas proposed as potential corridors to verify their importance to wildlife.

Following the reconnaissance surveys, camera trapping was (and continues to be) conducted in the corridors. These data are allowing us to further determine the importance of these corridors to Zanzibar's wildlife Nine traps were placed in a relatively even pattern within the northern-most part of a corridor and left active for 14 days. At the end of the 14 days, the cameras were moved south to trap the next block of the forest. During this project we were able to trap the entirety of one of the three identified corridors and 1/3 of the second corridor We are currently finishing the trapping of the 2nd corridor and will then move on to the 3rd corridor.

Activity 4. Build the capacity of the DCCFF GIS team and community partners.

Throughout this project, emphasis was placed on building the capacity of government and community partners. The GIS work, reconnaissance and camera trapping are being led by the WCS Zanzibar team and the DCCFF GIS team. During this project. WCS's GIS specialist from Tanzania mainland has worked (and continues to work) with the DCCFF team to build their GIS skills. In addition both DCCFF and WCS team members learned new survey techniques including the use of camera traps, and strengthened their skills in biological surveys and data analysis. Community members (in particular the village monitoring volunteer teams) similarly increased their capacity as they were involved throughout the field work part of this project.

Activity 5. Increase the awareness of the importance for the development of a protected areas network and develop community and government support for this process.

As discussed above, DCCFF and community members were involved in all steps of this project. In addition, meetings were held with each community whose land overlaps with the proposed corridors to increase their understanding of and develop their support for the development of corridors.

Results

In the GIS analysis of the 2004 aerial photographs all government protected areas (Jozani Chwaka-Bay National Park-JCBNP, Kiwengwa-Pongwe Forest Reserve-KPFR, Kichwele Forest Reserve, Masingini Catchment Forest, and three government plantations) and community forest reserves were mapped. Of the government areas, the main two of significance to wildlife are JCBNP and KPFR. In addition to these government areas and the community forest reserves, four additional areas of forest were determined to be potentially important for wildlife (Michamvi forest, Ukongoroni forest, Kibuteni-Makunduchi forest, and Mtende-Makunduchi forest) (Figure 1). Three

potential corridors (North, South West and South East) were identified that could link all of these remaining forest patches thus forming a comprehensive protected areas network (Figure 2).

The three corridors that were identified from the aerial photographs lie completely on community lands. Some of these areas were already protected by communities as community forest reserves and low impact use zones (Figures 1 and 2). However, a large portion of the identified corridors lies outside of these zones, and although currently being covered by a forest mosaic, they are zoned for future use by communities.

PROTECTED ARES, CORRIDOR AND FOREST PARTCHES AND COMMUNITY FORESTS MAP.

Indian Ocean

Chaani Plantation Forest

Kichwele Forest Reserve

Kiwengwa Pongwe Forest Reserve

North Corridor

Masingini Catchment Forest

Michamvi Forest Partch

Dunga Jendele Plantation Forest

Ukongoroni Forest Partch

Indian Ocean

Kibele Plantation Forest

Jozani Chwaka Bay National Park

South East Corridor

Kibuteni-Makunduchi Forest Partch

Mtende-Makunduchi Forest Partch

Legend

Community forest_south

- Community Forest Reserves
- Community Low impact zones
- Forest Partches
- Potential corridor
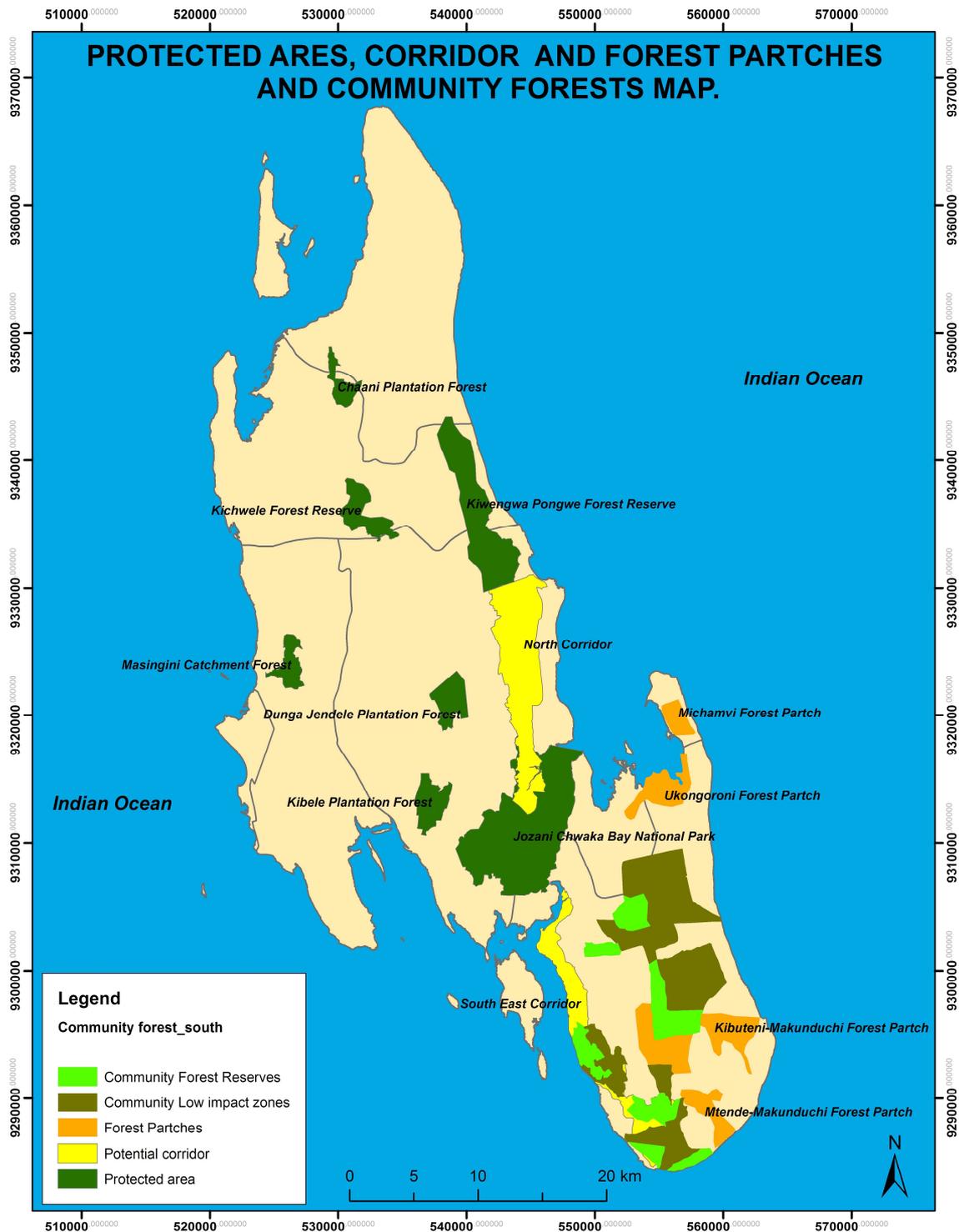- Protected area

0   5   10   20 km

N

Figure 1. Map of Unguja Island, Zanzibar showing existing government and community protected areas, additional potential forests for inclusion in a protected areas network (in orange), and two of the three proposed corridors.
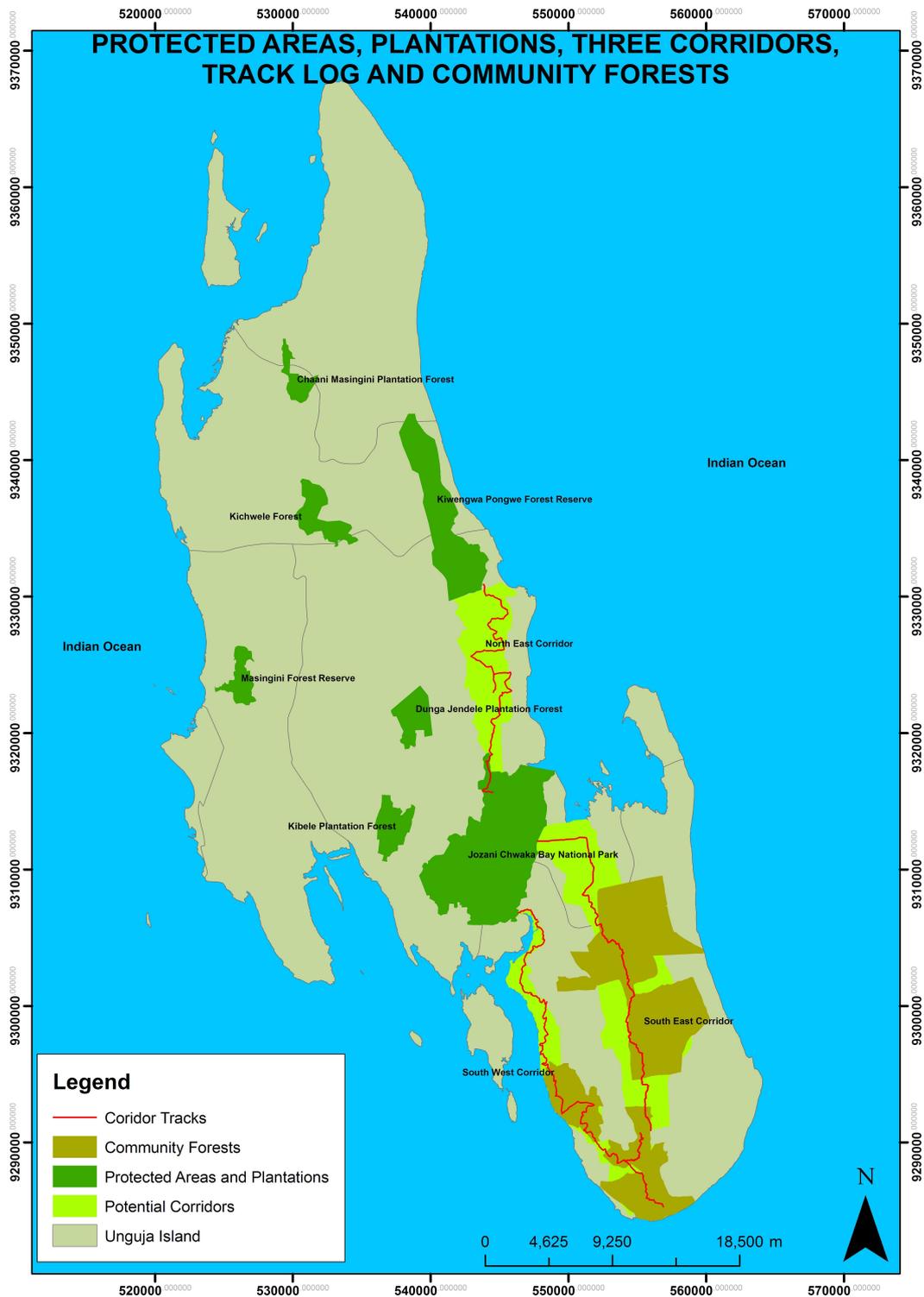
Figure 2.   Map of Unguja Island, Zanzibar showing existing government and community protected forests, the three proposed corridors, and the reconnaissance survey tracks in the corridors.

The North corridor is approximately 14 km stretching from KPFR in the north to JCBNP in the center of the island. The corridor varies from 1 to 4.5 km in width. The South West corridor is approximately 22 km and links JCBNP in the north and the forests of Mtende Village at the southern tip of Unguja. It ranges in width from a very narrow 0.5 km at its northern limit around Kitogani Village to 4 km further south. The South East corridor is the longest at approximately 25 km and links the community forests of Makunduchi at the south to JCBNP at the north. This corridor is also the widest ranging from 1 to 7 km from east to west.

All identified corridors are a mosaic of habitat types. In the North Corridor a reconnaissance line of 27.39 km was sampled (Table 1). Along this line a total of five habitat types were documented (high coral rag forest, low coral rag forest, mixed thicket, shrub, and agriculture – listed in order of least to most disturbed). The vast majority of this corridor consists of low coral rag forest.

Table 1. Reconnaissance line data from North Corridor. Total distance sampled, 27.39 km.

Habitat	Species	Number of signs	Dist sampled per habitat	Index (# sign per km sampled)
Agriculture	sykes monkey	9	4.42	2.04
	african civit	1	4.42	0.23
	duiker (unidentified spp)	5	4.42	1.13
High coral rag forest	squirrel (unidentified spp)	1	4.80	0.21
	helmeted guineau fowl	3	4.80	0.63
	sykes monkey	13	4.80	2.71
	red colobus monkey	27	4.80	5.63
	crested guineau fowl	1	4.80	0.21
	elephant shrew	5	4.80	1.04
	bush pig	1	4.80	0.21
	duiker (unidentified spp)	82	4.80	17.10
	vervet	1	4.80	0.21
Low coral rag forest	squirrel (unidentified spp)	1	15.89	0.06
	helmeted guineau fowl	1	15.89	0.06
	sykes monkey	8	15.89	0.50
	crested guineau fowl	3	15.89	0.19
	elephant shrew	4	15.89	0.25
	bush pig	2	15.89	0.13
	duiker (unidentified spp)	77	15.89	4.85
	Aders' duiker	8	15.89	0.50
	all duiker spp	85	15.89	5.35
Mixed thicket	squirrel (unidentified spp)	1	1.98	0.50
	helmeted guineau fowl	20	1.98	10.08
	bush pig	1	1.98	0.50
	duiker (unidentified spp)	13	1.98	6.55
Shrub land	red colobus monkey	1	0.31	3.27
	duiker (unidentified spp)	1	0.31	3.27

In the South West Corridor a reconnaissance line of 39.12 km was sampled (Table 2). This area was more diverse with 7 habitat types identified within the corridor. In order of

least to most disturbed the habitats in this corridor ranged from high forest, mangrove, high coral rag forest, low coral rag forest, mixed thicket, shrub, and *Casuarina* plantation. This corridor was predominantly low coral rag forest and mixed thicket.

Table 2. Reconnaissance line data from South West Corridor. Total distance sampled, 39.12 km.

Habitat	Species	Number of signs	Dist sampled per habitat	Index (# sign per km sampled)
Casuarina plantation	duiker (unidentified spp)	2	1.79	1.12
	sykes monkey	1	1.79	0.56
	red colobus monkey	1	1.79	0.56
High coral rag forest	squirrel (unidentified spp)	3	5.07	0.59
	helmeted guineau fowl	3	5.07	0.59
	sykes monkey	12	5.07	2.37
	red colobus monkey	47	5.07	9.27
	crested guineau fowl	3	5.07	0.59
	elephant shrew	3	5.07	0.59
	bush pig	4	5.07	0.79
	duiker (unidentified spp)	13	5.07	2.56
	Aders' duiker	1	5.07	0.20
	all duiker spp	14	5.07	2.76
	hyrax	7	5.07	1.38
High forest	sykes monkey	1	1.39	0.72
Low coral rag forest	squirrel (unidentified spp)	1	13.99	0.07
	helmeted guineau fowl	1	13.99	0.07
	sykes monkey	3	13.99	0.21
	red colobus monkey	3	13.99	0.21
	crested guineau fowl	7	13.99	0.50
	elephant shrew	2	13.99	0.14
	bush pig	20	13.99	1.43
	duiker (unidentified spp)	96	13.99	6.86
	Aders' duiker	3	13.99	0.21
	all duiker spp	99	13.99	7.08
Mangrove	elephant shrew	1	0.97	1.03
Mixed thicket	red colobus monkey	4	15.12	0.26
	duiker (unidentified spp)	9	15.12	0.60
Shrub land	elephant shrew	1	0.79	1.27

In the South East Corridor a reconnaissance line of 31.06 km was sampled (Table 3). Of all three corridors, the South East Corridor contained the most intact forest cover. The corridor was mainly high coral rag forest and low coral rag forest with very small areas being classified as mixed thicket and shrub

Table 3. Reconnaissance line data from South East Corridor. Total distance sampled, 31.06 km.

Habitat	Species	Number of signs	Dist sampled per habitat	Index (# sign per km sampled)
High coral rag forest	slender mongoose	1	10.32	0.10
	squirrel (unidentified spp)	5	10.32	0.48
	helmeted guineau fowl	1	10.32	0.10
	sykes monkey	5	10.32	0.48
	red colobus monkey	11	10.32	1.07
	crested guineau fowl	4	10.32	0.39
	African civit	1	10.32	0.10
	elephant shrew	11	10.32	1.07
	bush pig	18	10.32	1.74
	duiker (unidentified spp)	113	10.32	10.95
Low coral rag forest	Zanzibar giant rat	1	19.30	0.05
	slender mongoose	10	19.30	0.52
	squirrel (unidentified spp)	1	19.30	0.05
	helmeted guineau fowl	6	19.30	0.31
	red colobus monkey	1	19.30	0.05
	crested guineau fowl	2	19.30	0.10
	African civit	3	19.30	0.16
	elephant shrew	16	19.30	0.83
	bush pig	28	19.30	1.45
	duiker (unidentified spp)	74	19.30	3.83
	suni	28	19.30	1.45
	all duiker spp	102	19.30	5.28
	four-toed elephant shrew	2	19.30	0.10
Mixed thicket	sykes monkey	2	0.55	3.64
	elephant shrew	1	0.55	1.82
	bush pig	2	0.55	3.64
	duiker (unidentified spp)	5	0.55	9.09
Shrub land	bush pig	1	0.89	1.12
	duiker (unidentified spp)	5	0.89	5.62
	four-toed elephant shrew	1	0.89	1.12

In these corridors, eighteen mammal and three bird species were identified from signs and direct observations along reconnaissance lines and from camera trapping data. A total of 577 camera trap days were sampled between October and December 2008; 465 days in the North Corridor and 112 days in the South West Corridor (Table 4). The camera trapping data continue to be collected to date in the South West and South East Corridors. To date in the corridors, data have been collected on 18 species from six orders of mammals: Macroscelidea, Primates, Carnivora, Hyracoidea, Artiodactyla, and Rodentia. These 18 species found in the corridors represent the vast majority of the larger bodied terrestrial and arboreal mammal species recorded for Unguja Island, Zanzibar. There are two Macroscelidea recorded for Zanzibar (the four-toed shrew and the black and rufous elephant shrew) both of which were found to utilize the three corridors. Of the five primates recorded for Zanzibar (greater galago, lesser bushbaby, vervet monkey, sykes monkey and Zanzibar red colobus), only one the lesser bushbaby (*Galago senegalensis*) has not yet been recorded in the corridors. Four of the five indigenous carnivores recorded for Zanzibar were also found to use the corridors (bushy tailed mongoose, slender mongoose, African civit, and servalin genet). Carnivores not

yet found in the corridors include the Zanzibar leopard (*Panthera pardus adersi*) (which is thought to be extinct) and two introduced species previously recorded in Zanzibar, the banded mongoose (*Mungos mungo*) and the Javan civit (*Viverricula indica rasse*). The one species of Hyrocoidea and four species of Artiodacryla recorded for Zanzibar were all found to utilize the corridors. Of the smaller mammals (Rodentia), three of the six species recorded for Unguja have been found in the corridors. Both squirrels and the Zanzibar giant rat were recorded; not reorded were the house mouse, common rat and house rat. This is not surprising as visual reconnaissance and camera trapping surveys are not the chosen methodology for surveying rodents.

Table 4. Eighteen terrestrial mammal (and three bird) species were observed to use the three potential corridors on Zanzibar (data from reconnaissance and camera trapping surveys). Species without a record for "number of captures/trap day" were only recorded during reconnaissance surveys. Data are from 577 camera trap days between October and December 2008; 465 days in the North Corridor and 112 in the South West Corridor.

Order	English name	Latin name	No Captures/ trap day
Macroscelidea			
	Four toed shrew	*Petrodromus tetradactylus zanzibaricus*	0.127
	Black and rufous elephant shrew	*Rhynchocyon petersi*	0.113
Primates			
	Greater galago	*Otolemur garnettii garnettii*	0.009
	Sykes monkey	*Cercopithicus mitis albogularis*	0.043
	Zanzbar red colobus	*Procolobus kirkii*	
	Vervet money	*Cercopithecus aethiops*	
Carnivora			
	African civit	*Civettictis civetta*	
	Zanzibar bushy tailed mongoose	*Bdeogale crassicauda tenuis*	0.005
	Zanzibar servalin genet	*Genatta servaline archeri*	0.002
	Slender mongoose	*Herpestes sanguineus rufescens*	
Hyracoidea			
	Zanzibar tree hyrax	*Dendrohyra validus neumanni*	
Artiodactyla			
	Aders' duiker	*Cephalophus adersi*	0.003
	Blue duiker	*Cephalophus monticola sundevalli*	0.005
	Bush pig	*Potamochoerus porcus*	0.005
	Suni	*Neotragus moschatus moschatus*	0.057
Rodentia			
	Red bush squirrel	*Paraxerus palliatus frerei*	0.012
	Red legged sun squirrel	*Helioscurus rufobrachium dolosus*	0.003
	Zanzibar giant rat	*Cricetomys gambianus cosensi*	0.007
Other (Class - Aves)			
	Crested guineau fowl	*Guttera pucherani*	
	Helmeted guineau fowl	*Numidea meleagris*	
	White browed coucal	*Centropus superciliosus*	0.003

Of the 18 mammal species, 15 of these species/species groups were identified in the reconnaissance surveys. When signs were found from two species groups - duikers (three species) and squirrels (two species) we were often not able to identify the sign to the species level. Of the 18 total species identified in the corridors, 14 of these species were also identified in the camera trapping. The most commonly trapped species were four toed shrew (0.127 captures/trap day), elephant shrew (0.113 captures/trap day), suni (0.057 captures/trap day) and sykes monkey (0.043 captures/trap day) (Table 4).

In the North and South West Corridors signs of 10 and 9 species/species groups were recorded along the reconnaissance lines, respectively. In the more intact corridor, the South East Corridor, signs of 12 species/species groups were identified. In all three corridors along the reconnaissance lines signs of duikers were the most abundant, and in two of the three corridors, duikers had a higher index of abundance in high coral rag forest than in low coral rag forest: 17.1 signs/km sampled in high coral rag vs. 5.35 signs/km sampled in low coral rag in the North Corridor, and 10.95 vs. 5.28 signs/km sampled in the South East Corridor. Signs of Zanzibar red colobus were high in the high coral rag forests of the North Corridor (5.63 signs/km sampled) and of the South West Corridor (9.27 signs/km sampled).

Conclusions and Recommendations

As elaborated above, the project successfully achieved the expected objectives. We have proposed a network of government and community protected areas connected by a series of three corridors. Data from GIS analysis of aerial photographs were used to locate and map all remaining forests thought to be of importance to wildlife on Unguja Island and the corridors that could be created to link these areas to ensure wildlife movements and gene flow which are necessary for long term species survival. Reconnaissance surveys and camera trapping were then used to fine tune the proposed protected areas network, by determining the current state of the forests and proposed corridors and their importance for wildlife. Reconnaissance surveys and camera trapping showed that although the three proposed corridors varied immensely in habitat quality both within and among corridors, the vast majority of the indigenous larger bodied terrestrial and arboreal mammal species recorded for Unguja Island were found to use these corridors (15 of 17 or 88% of the previously recorded indigenous large bodied mammals were found in the corridors; 18 of 23 or 78% if rodents are also included).

This project was undertaken in partnership with government and communities (across whose land the proposed corridors will lie). By working with these partners at all stages of this project we have been able to build their capacity to survey and monitor wildlife, increase their understanding of the importance of developing a network of multiple protected areas linked by functional corridors, and garnered their support for the next step, the development and implementation of the protected areas network plan.

There are two ongoing activities that need to be completed before the protected areas network plan can be finalized. We are currently finishing the camera trapping in the South West Corridor; once this is finished we will camera trap the South East Corridor. Secondly, reconnaissance surveys and camera trapping need to be undertaken in the four currently unprotected but potentially important forest patches for wildlife. These forest patches (Michamvi, Ukongoroni, Kibuteni-Makunduchi, Mtende-Makunduchi, see Figure 1) were identified via the aerial photographs, and were quickly surveyed to

determine if they did still exist. However, a more systematic reconnaissance and camera trapping are still needed to determine the value of these areas to Zanzibar's wildlife and if they should indeed be included in the proposed protected areas network.

From this project it is very evident that all of the proposed corridors will completely overlap community lands. Thus, as explained above in order for this proposal to succeed it was crucial that communities not only understood but supported the development of corridors. Moving forward these relationships will be increasingly important. For example for the North Corridor we will need to work with the communities of this region to develop Resource Use Management Agreements (as was done with the communities South of JCBNP) in which community areas are divided into use zones. We need to ensure that during this zoning process all community lands that overlap the identified corridor are zoned as community reserves (ideally) or at least low impact use zones. Similarly it will be important to work with the communities South of JCBNP whose lands overlap the South East and South West Corridors, to perhaps rezone their lands so that all proposed corridors are provided a higher level of protection (i.e., community forest reserve or low impact use zones).

In other community areas, for example at the very northern section of the South West Corridor where the corridor thins to less than 0.5 km we will need to explore more intensive management with the communities such as enrichment planting of tree species that provide cover and food for wildlife, but which are ideally also of use to the communities. As we move toward implementation of the plan, these sorts of activities will have to be expanded in order to achieve success on the ground.

4. Did your team experience any disappointments or failures during implementation? If so, please explain and comment on how the team addressed these disappointments and/or failures.

None.

5. Describe any positive or negative lessons learned from this project that would be useful to share with other organizations interested in implementing a similar project.

The main lesson learned was the importance of involving partners, government and particularly communities, at every step of the way when proposing new protected areas and/or corridors. If not involved from the start, but only brought into the planning at a later stage or once the project has been completed, there will inevitably be a black lash as communities will feel divorced from the process and will have little interest in its success. However, if brought in from the beginning and involved in the process, not only do communities develop an understanding for the process and learn how the project outcomes are beneficial for them and for their future livelihoods, but also they develop a sense of ownership for the project and will be essential partners in the project's success.

6. Describe any follow-up activities related to this project.

As explained above, there are two ongoing activities that need to be completed before the protected areas network plan can be finalized. The camera trapping must be completed in the South West and South East Corridors. In addition, reconnaissance surveys and camera trapping need to be undertaken in the four currently unprotected but potentially important forest patches for wildlife (Michamvi, Ukongoroni, Kibuteni-Makunduchi, Mtende-Makunduchi) to determine the value of these areas to Zanzibar's wildlife and if they should be included in the proposed protected areas network.

7. Please provide any additional information to assist CEPF in understanding any other aspects of your completed project.

All information is contained in the above sections.

IV. 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	Notes
Private Donor	C	$20,000	Funds provided to supplement the CEPF small grant for corridor exploration, and will continue to be used to assist with the development and management of corridors across Unguja .
		$	
		$	
		$	

*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.)*

V. ADDITIONAL COMMENTS AND RECOMMENDATIONS

See conclusions and recommendation section above.

VI. 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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