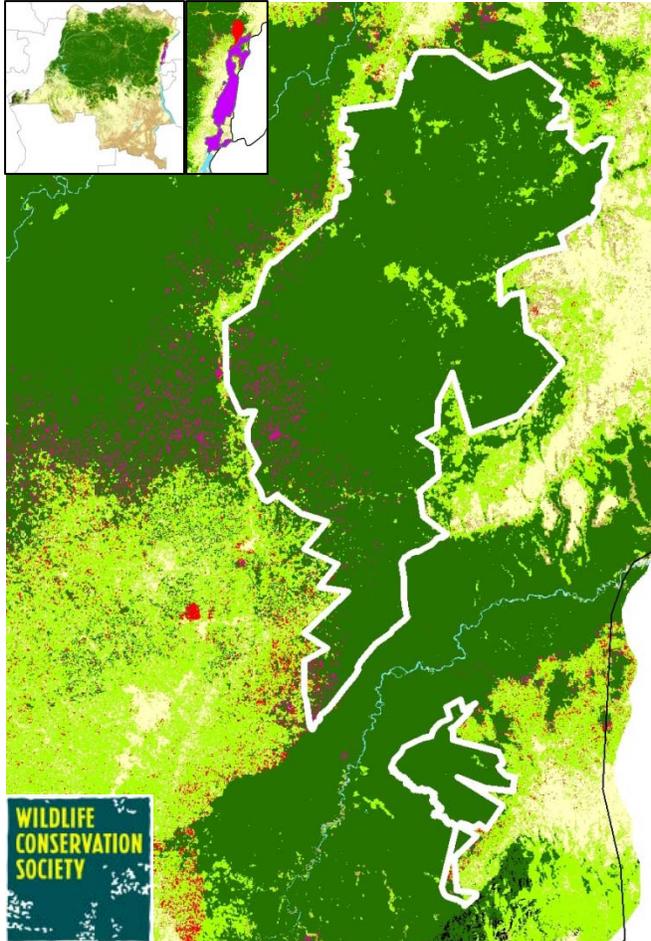


## Assessment of the Potential Carbon Financing of A REDD project in the Mt Hoyo-Virunga Corridor, Eastern Democratic Republic of Congo



**Figure 1:** The Mt Hoyo corridor area (red) north of Virunga NP (purple) in Google Earth (top left), Close up of this area (right) with corridor boundary (white line) overlaid on the forest loss map of DRC (source: Hansen et al. 2010).

### Wildlife Conservation Society

#### The Mt Hoyo Reserve Corridor project

In collaboration with Zoological Society of London (ZSL), ESCO-Kivu and Original Beans

#### A Reduced Emissions from Degradation and Deforestation (REDD+) project

Through carbon credit sales from avoided deforestation, the Mt Hoyo Corridor Project will protect a corridor of forest from Virunga National Park to the Mt Hoyo Natural Reserve, maintain ecosystem functions and services, conserve rainforest with significant biodiversity and support improved livelihoods for local communities. It will conserve habitat to maintain viable populations of chimpanzees, elephants and Okapis amongst other species. The establishment of the Mt Hoyo Forest Corridor is based on an integrated approach to reduce human threats to the region's forests, while at the same time addressing the needs of the local communities and engaging these communities in the management of the protected area. The project combats the principal cause of deforestation in the area—slash-and-burn agriculture, driven by subsistence and cash income—as well as threats from extraction of timber.

### Project Location: Democratic Republic of Congo (DRC)

The Mt Hoyo Corridor lies north of Virunga National Park in eastern DRC and represents the last remaining link between the Virunga Park and the Congo Basin lowland rain forest. Species such as chimpanzees, okapis and elephants require this forest corridor to maintain viable populations. The forests of Mt Hoyo Corridor are a key link between Virunga Park and the Mt Hoyo Natural Reserve, conserving over 1,000 km<sup>2</sup> of forest for wildlife and the communities that rely on it for ecological services.

**Project Area:** 135,701 ha of which 135,562ha are forest and 139 ha are woodland

**Current Greenhouse Gas emissions:** 269,664 tons of CO<sub>2</sub>e per year from deforestation

**Total emission reductions over 20 year project lifetime:** 5.4 million tons of CO<sub>2</sub>e by 2031.

Assuming 15% leakage and 90% successful reduction of deforestation this project would generate 20.6 million USD for the site at a carbon price of 5 USD/tCO<sub>2</sub>e.

**Carbon calculations**

Future green house gas emissions are determining by the carbon density of the forest and the rate of deforestation. The historic deforestation rate is used to project deforestation over a minimum project life time of 20 years.

The carbon density was determined by measuring all trees with a diameter above 5cm at breast height in 188 circular plots with a 20m radius in the Watalinga forest of Virunga Park. While we acknowledge that there is a need to measure the carbon stocks in the actual corridor region this preliminary assessment is to help guide whether a carbon project should be started in the region. We believe that using data from just to the south of the area is valid for this purpose. The algorithm of Baker *et al.* 2004 was used to calculate biomass of all trees in the plot, which was converted to carbon by multiplying it by 0.5 (C) and converted to carbon dioxide by multiplying it by 3.67(CO<sub>2</sub>e), divided by 1000 (tCO<sub>2</sub>e) to obtain tonnes carbon dioxide and multiplied by 7.96 to convert it to one hectare (tCO<sub>2</sub>e/ha) (Table 1.).

The rate of deforestation was determined overlapping in GIS the DRC forest loss map of Hansen *et al.* 2010, and the outline of the site (white line in Figure 1). Within the site boundary, forest lost during the period 2000-2005 and 2006-2010 was calculated and used to calculate the mean annual deforestation rate (ha/yr) (Table 2). This rate was used to calculate the projected deforestation over the project life time.

The yearly emissions from deforestation were calculated for primary and secondary forest, and woodland separately; inside the proposed corridor and in a 5km buffer zone (Table 3). Deforestation inside the corridor was used as a conservative estimate of emissions. Deforestation in the buffer zone was used to calculate a more realistic estimate of emissions. Deforestation of forest in the corridor is higher than in the buffer zone, but the difference is small, 422 and 377 ha per year respectively. Deforestation of woodland in general is very low, close to zero and 6 ha per year, respectively.

A conservative estimate based on deforestation inside the corridor gives a current emission of 269,664 tCO<sub>2</sub>e per year, a total emission of 5,393,289 tCO<sub>2</sub>e over 20 years, regenerating a gross revenue of 26,966,398 USD at a carbon price of 5USD per tCO<sub>2</sub>e and a net revenue of 20,629,294 M USD. A more realistic estimate based on deforestation in the buffer zone gives a current emission of 302,839 tCO<sub>2</sub>e per year, a total emission of 6,056,772 tCO<sub>2</sub>e over 20 years, regenerating a gross revenue of 30,283,862 USD at a carbon price of 5USD per tCO<sub>2</sub>e and a net revenue of 23,167,155 USD (Table 4).

Table 1. Mean carbon density in Mt Hoyo Corridor (tCO <sub>2</sub> e/ha) based on 87 plots.		
Trees with a	dbh*>10cm	dbh>30cm
Primary forest	627	492
Secondary forest	209	164
Woodland	157	123

\*dbh=diameter at breast height

	2000-2005	2006-2010	2011	Annual (ha/yr)
Primary forest	-198	-2,112	130,328	-422
Secondary forest	-107	-115	5,234	-23
Woodland	-1	-1	139	-0

	Deforestation (ha/yr)		Emissions (tCO2e/yr)	
	inside	buffer	inside	buffer
Primary forest	422	377	264,815	236,148
Secondary forest	23	315	4,815	65,820
Woodland	0	6	34	870

	conservative	realistic
<u>Emissions (tonnes CO<sub>2</sub>)</u>		
Annual	269,664	302,839
Project	5,393,280	6,056,772
<u>Revenue (\$US)</u>		
Gross	26,966,398	30,283,862
Net	20,629,294	23,167,155

### Project Description

In 2009, Wildlife Conservation Society (WCS) started the initiative to outline a 123,567 ha Mt Hoyo Forest Corridor Area and to finance it through carbon markets. We believe that for the assessment of forest loss we should include the forest within a buffer of 5 km of the boundaries (fig 1) because they were drawn to exclude areas of major forest loss and yet the loss in the surrounding areas is likely to reflect probable future pressure in the corridor. A socio-economic study was made with the communities on the western side of the corridor which identified the main agents and drivers of deforestation and assessed the willingness of the local population to establish a protected area. At that time about 50% of households and 75% of village management committees were willing to conserve the forest for the long term. Successful, establishment will ensure a reduction in green house gas emissions, bring rural sustainable development and reduce the loss of biodiversity.

### Causes of deforestation

- **Slash and burn agriculture:** Slash and burn agriculture is the immediate cause of deforestation principally for subsistence and partially for cash income. Forests or fallow are, cut burned and planted with rain-fed crops. After a few years the fields are usually abandoned and cultivation moves elsewhere. Slash and burn agriculture can be sustainable in tropical forests and does not require clearing of old growth forest as long as fallow periods are long enough and human population density remains low.
- **In-migration:** Over the last few years as the region has become more secure the rural population has migrated along the main road along from Beni to Bunia in the Mt Hoyo region in search of unclaimed forest. As settlements increase the zone of deforestation and degradation widens eroding the link with

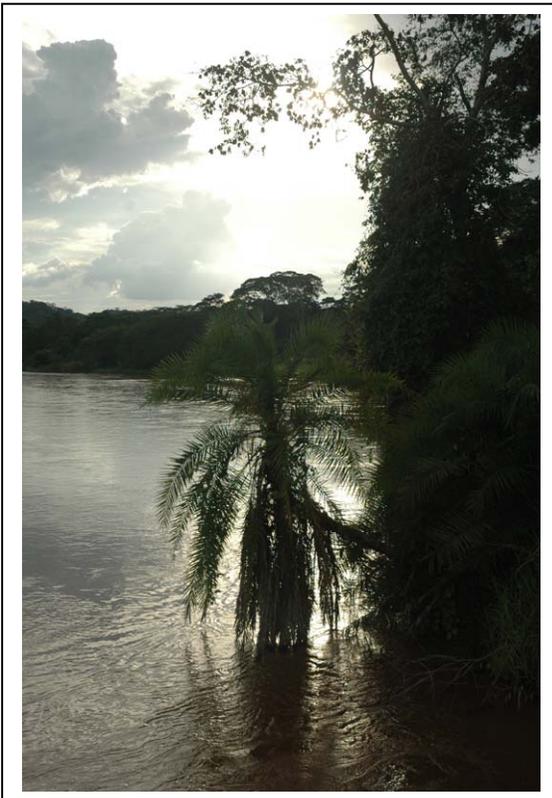
the Congo Basin. An east-west road in between the core area of Mt Hoyo Reserve and Virunga Park is facing a similar scenario of deforestation and degradation leading to the overall increased isolation of Mt Hoyo.

- **Timber harvesting:** some areas of the forest are being logged to supply timber for Beni and Bunia as well as to export it to Uganda and on to Kenya or Rwanda. This market is increasing leading to increased licenses being supplied for the timber.

Underlying these activities are factors such as open access to forest resources, increasing pressure from settlers from over-populated areas, poverty and insecurity that are driving unsustainable resource use. The Mt Hoyo Corridor Project focuses its interventions at keeping immigrants out and improving local farmer welfare and empowerment to address these underlining causes of forest clearance.

### Climate benefits

The Mt Hoyo Corridor Project will prevent more than 5.4 million tCO<sub>2</sub>e of greenhouse gas emissions over the course of 20 years. From 2006 to 2010, forest has been lost at a rate of 445 ha per year. This is close to an eleven fold increase of the deforestation rate from 2000 to 2005. Without the Mt Hoyo Corridor Project, 8908 ha of forest – 7 % of the project area – would be deforested based on the business as usual scenario. This analysis is based on plot data for trees with diameter at breast height (dbh) of 10 cm and above and a carbon density of 627 tons CO<sub>2</sub>e/ha, and a historic deforestation trend of 422 ha per year. The fairly high baseline deforestation rate coupled with a modest carbon density accounts for the high emission reductions potential.



### Biodiversity benefits

Mt Hoyo Natural Reserve was created in 1947 to protect its natural beauty and wildlife and in particular to protect the large caves and their associated fruit bat colonies. Originally Mt Hoyo was inhabited by charismatic species, like the okapi, but little is known about the current state of fauna, due to the insecurity of the region until recently. In 2009, the Congolese wildlife authority (ICCN) re-established a presence at the site and rangers have been conducting patrols in the region. The corridor linking this reserve to the Virunga Park is important for the conservation of species that occur at low density such as chimpanzees, okapis and elephants because the area of this forest type in Virunga National Park or Mt Hoyo Reserve is too small to contain viable populations. Maintaining the corridor between the two sites is important to maintain these populations as well as providing connectivity to the lowland forest of the Congo Basin.

### Ecosystem Service benefits

In addition to biodiversity benefits, the Mt Hoyo forest and the corridor serves as a zone of watershed protection and catchment, providing clean water to the neighboring villages. Keeping the forest also helps to mitigate climate change as the cooling effect of the forest will reduce the temperature increase predicted for the region as rains in this part of the Albertine Rift become increasingly monsoonal.

### Community Benefits

The main underlying cause of deforestation is the in-migration of people from outside Mt Hoyo region. To stop them from settling in and around Mt Hoyo discussions have been had with communities about creating a corridor that is officially gazetted as a community reserve or a similar designation. The rural

population currently around Mt Hoyo are not a major threat to the forest. These households will be the main beneficiaries of the Mt Hoyo project, both indirectly through improvements in ecosystem service provisioning and directly from improved governance structures, livelihoods interventions and benefit sharing agreement for the REDD+ funds that could become available.

### Management Approach

The Mt Hoyo Corridor Project adopts an integrated approach to reduce human threats to the region's forest, while at the same time addressing the needs of the local communities by improving household welfare, strengthening governance and land use, and engaging these communities in the management of the protected area.

Mt Hoyo Corridor Project includes the following activities to reduce deforestation:

- 1. Creation of the park and community managed areas in a participatory manner.** We will be working with the communities to describe the potential benefits of a corridor, to participatively map and agree where the boundaries would lie and to gazette some form of protected area, probably a community reserve.
- 2. Building capacity for local sustainable resource management:** WCS and ZSL will be working alongside communities to strengthen institutions and build capacity to manage their natural resources sustainably and stabilize land use, by improving their field productivity while securing formal natural use rights.
- 3. Rural development and alternative revenue creation:** The Mt Hoyo Corridor Project will include a significant number of interventions to enhance the welfare of local communities and their management of resources. We are working with ESCO-Kivu a major exporter of Cocoa and Original Beans, a company that develops and markets high value chocolate with green and fair trade labeling. The idea is to improve farmers livelihoods through a combined approach of providing them with a cash crop that requires forest cover – shade cocoa, linked to a secure market – together with REDD funding from avoided deforestation .
- 4. Creation of equitable benefit sharing mechanisms:** In the event of a REDD project and a carbon sale, WCS and ZSL will work with the Government of DRC communities to develop an agreement outlining a transparent carbon revenue sharing and management mechanism for the Mt Hoyo Corridor Project. A foundation or similar entity designated by the parties will be in charge of the management and disbursement of funds made available under the agreement.

