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## High Conservation Value Forest Analysis

Asubima Forest Reserve

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**“Forests for the Future”**



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# CONTENTS

- 1. Introduction ..... 4
  - 1.1 High Conservation Value Forests ..... 5
  - 1.2 Purpose of this study ..... 5
  - 1.3 Content of this report ..... 6
- 2. Methodology ..... 7
  - 2.1 Literature review ..... 7
  - 2.2 Field research ..... 7
  - 2.3 Stakeholder consultation ..... 8
- 3. Study area: Asubima Forest Reserve ..... 10
  - 3.1 Abiotic environment ..... 10
  - 3.2 Social aspects ..... 12
  - 3.3 Biodiversity overview ..... 13
- 4. High Conservation Values in Asubima FR ..... 19
  - 4.1 High Conservation Value 1 ..... 19
  - 4.2 High Conservation Value 2 ..... 19
  - 4.3 High Conservation Value 3 ..... 20
  - 4.4 High Conservation Value 4 ..... 20
  - 4.5 High Conservation Value 5 ..... 21
  - 4.6 High Conservation Value 6 ..... 22
- 5. Conclusion and management implications ..... 23
- 6. References ..... 24

# 1. INTRODUCTION

FORM Ghana Ltd. (FORM Ghana) is a plantation company, established in 2007 with the objective to restore parts of the degraded Asubima Forest Reserve, located in Offinso Forest District in Ashanti Region, Ghana. An innovative reforestation model is being adopted, incorporating the needs of local people and the ecological aspects while being economically viable at the same time. To underscore the adherence to this sustainability concept (people, planet, profit), in 2010 FORM Ghana was the first plantation company in West-Africa to become certified according to the Forest Stewardship Council (FSC) standard.

FSC certification is based on ten principles. One of them is concerned with High Conservation Value Forests (HCVFs): principle 9. In essence, it states that the high conservation values need to be maintained or enhanced. In view of the certification of the FORM Ghana plantation according to the principles and criteria of the Forest Stewardship Council, an analysis of the presence of High Conservation Value Forests has been executed in 2008. In 2011, as new information had become available concerning fauna and flora of the Asubima forest reserve, an update was done of the analysis. This update has been distributed to stakeholders and specialist for comments.

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## 1.1 High Conservation Value Forests

“All types of forests are unique and important and of conservation value but High Conservation Value Forests (HCVFs) are simply forests with outstanding significant values that are of critical importance, which needs to be appropriately managed or protected in order to maintain or enhance the identified values” (p.4 Rayden *et al.*, 2006).

The Forest Stewardship Council makes use of the following definition of High Conservation Value Areas. Since we are dealing with a Forest Reserve, in this case ‘Areas’ is replaced by ‘Forests’:

*High Conservation Value Areas are those areas that possess one or more of the following attributes:*

- 1) Forests containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia);*
- 2) Forests containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance;*
- 3) Forests that are in or contain rare, threatened or endangered ecosystems;*
- 4) Forests that provide basic services of nature in critical situations (e.g. watershed protection, erosion control);*
- 5) Forests fundamental to meeting basic needs of local communities (e.g. subsistence, health);*
- 6) Forests critical to local communities’ traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).*

**Source: adapted from FSC-STD-01-001 (version 4-0) EN**

The presence (or absence) of these six attributes has been analysed for the part of Asubima FR managed by FORM Ghana.

## 1.2 Purpose of this study

This report presents a revision of the original HCVF analysis revised based on additional data on flora and fauna, which have been collected during the last 2 years. The objective is to analyse the presence or absence of the six above-mentioned High Conservation Value Forests. The results of this study will be used to adjust management practices of FORM Ghana accordingly.

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### 1.3 Content of this report

The methodology for identification of HCVPs is described in chapter two. In chapter three, the report zooms in on the biodiversity and social aspects of the Asubima Forest Reserve. Chapter four captures the analysis of the six High Conservation Value Forests in the study area. Finally, the report ends with a conclusion on the HCVPs presence / absence in the Asubima Forest Reserve.

## 2. METHODOLOGY

Three types of methods are being used for the identification of HCVPs in the study area: literature study, field research and stakeholder consultation.

### 2.1 Literature review

For the correct interpretation of the six HCVPs, the national HCVP toolkit developed for Ghana was applied during the identification (Rayden *et al.*, 2006). The literature review has concentrated on 1) the collection of general information on biodiversity in Ghana and in the region of Asubima Forest Reserve; and 2) IUCN red list status for each of the encountered species.

### 2.2 Field research

#### **2.2.1 Social and Environmental Impact Assessment**

From Dec. 2007 to April 2008, a social and environmental impact assessment (SEIA) has been carried out by Abeney *et al.* (2008). Data collected on environmental aspects included:

1. Land use stratification
2. Vegetation: tree species > 10cm DBH (at 2.5% sampling intensity), scrubs and herbs sampling
3. Fauna presence: mammals, birds, and reptiles (by direct observation through sight and sound, plus by questioning local villagers)
4. Hydrological: water quality analysis (measurements of pH, turbidity, dissolved oxygen, conductivity, and nitrate content at 5 locations)

#### **2.2.2 Biodiversity monitoring by FORM Ghana**

Since 2010, FORM Ghana monitors the biodiversity status regularly. During the annual monitoring performed by FORM Ghana, the subjects for monitoring are the following:

- Plant diversity (in buffer zone);
- Bird diversity;
- Small and medium sized mammals diversity.

Plant diversity monitoring is done by creating round plots of 200 m<sup>2</sup>, the middle of which corresponds with randomly chosen GPS coordinates. In these plots, all trees with a DBH (diameter at breast height) greater than 10 cm are recorded. Five subplots of each 1m<sup>2</sup> are created to measure the diversity of shrubs, herbs, grasses and juvenile trees (De Laat, 2010).

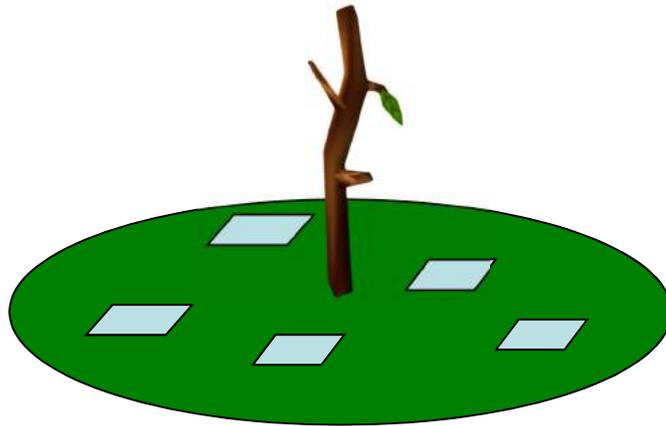


Figure 2.1. Monitoring of plant diversity. Source: De Laat, 2010.

Monitoring of fauna is done by observation of animals through sight and sound while walking existing paths, so-called permanent recce transects. The advantages of this method is that there is no noise involved from cutting a path (causing some animals to flee), also a team can work very time- and cost-efficient; disadvantage is that sampling is biased to those areas where paths are already existent as a result of which certain areas are missed (White & Edwards, 2000).

Besides the abovementioned subjects for data collection, some additional biodiversity studies were carried out for experimentation. In 2010 a survey was conducted on frog biodiversity in the plantation by de Laat. In 2011, Manu collected data on butterfly biodiversity, and Hodoli did an inventory of snake biodiversity. Finally, occasionally staff from FORM Ghana observed specific fauna during their work in the plantation area (not during monitoring studies).

### 2.2.3 Summary: reports used

To summarise, in addition to the SEIA by Abeney *et al.* (2008) the following monitoring reports are used for this HCVF analysis:

1. de Laat (2011) on flora, frog biodiversity, and birds in 2010;
2. Hodoli (2011) on snake biodiversity in 2011;
3. Manu (2011a) on small sized mammals in 2011;
4. Manu (2011b) on flora, butterflies, birds, small and medium sized mammals both in Asubima FR and neighbouring Afrensu bromuna FR in 2011;
5. Quansah (2011) on medium sized mammals in 2011.

All these reports can be downloaded from the company's website: [www.formghana.com](http://www.formghana.com) (FSC Documents).

## 2.3 Stakeholder consultation

### 2.3.1 Social and Environmental Impact Assessment

In 2008, a social and environmental impact assessment has been carried out (Abeney *et al.*, 2008). People living in the (vicinity of) Asumbima Forest Reserve were asked about:

1. Their livelihood assets (main occupation, value of personal belongings, access to school, hospital, sanitary provisions etc.)

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2. Their dependence on forest for their survival (e.g. collection Non-Timber Forest Products (NTFPs), important cultural sites)
  3. Their expectations and opinions on the project to be carried out by FORM Ghana

### **2.3.2 Stakeholder meetings**

Since 2009, three times a year stakeholder meetings are held in Akumadan, organised by FORM Ghana. Invitees to these meetings include farmers, traditional land owners, environmental NGOs, and Forestry Commission (government). Main subjects on the agenda are intercropping and FSC certification. Further, during these gatherings stakeholders will be informed about the company's developments thus far and its plans for the coming year. Stakeholders are informed about the researches of the company concerning biodiversity and High conservation Value Forests. Finally, stakeholders can bring in subjects for discussion and can comment on the company's plans.

### **2.3.3 Input HCVF analysis**

After the revision of the HCVF analysis was completed, a draft report was send by e-mail (dated 08-11-2011) to the following stakeholders: N. Ghaffar (ProForest: HCV resource network), C. Steward (ProForest: HCV resource network), S. Kofi Nyame (IUCN), M. Wit (Tropenbos International), T. Rayden (Wildlife Conservation Society – WCS) and M. Seidu (WWF Ghana).

These people were asked to distribute the draft report in their network and to provide us with comments.

### 3. STUDY AREA: ASUBIMA FOREST RESERVE

The Asumbima Forest Reserve (FR) is located in Ashanti region in the High Forest Zone of Ghana. Although this implies that it concerns a forested land, the area is highly degraded due to logging, illegal farming activities and extensive wildfires (Abeney *et al.*, 2008). Since the nineties, there is a presidential policy to actively restore the ecological, social and economic values of the degraded Forest Reserves in Ghana. In 2001, the government of Ghana developed the National Forest Plantation Development Plan a reforestation strategy where commercial reforestation was proposed as one of the solutions to reverse further degradation of the Forest Reserves.

FORM Ghana has acquired a land lease contract (validity 50 years renewable) for 1,778 hectares (ha) of land located in the southern part of the Asubima FR of Ghana, see the map below. In 2001, a pilot of 64 ha was planted. Due to the reforestation activities undertaken during the period 2008-2011, the entire area has now been replanted. The few remnant trees were conserved while new tree species planted consist predominantly of Teak (*Tectona grandis*) and a mixture of indigenous species (at least 10%). Indigenous species were planted in some of the plantation areas and in the areas near water streams that are set aside as buffer zones.

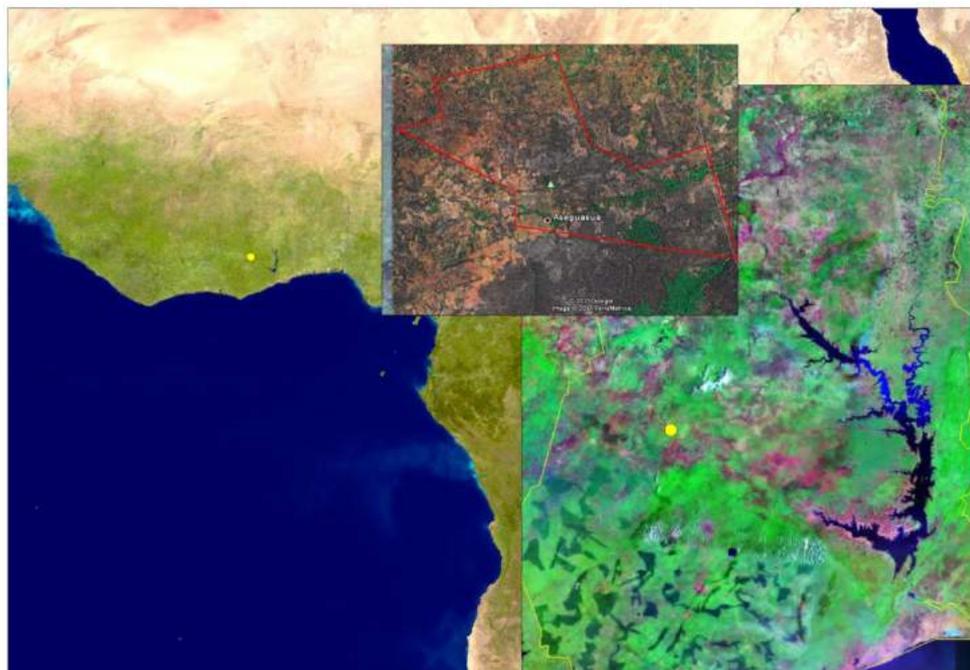


Figure 3.1. Study area: land leased by FORM Ghana for reforestation purposes. Geographical location: Latitude: W1, 53 degrees, 14 minutes; Longitude: N7, 24 degrees, 48 minutes

#### 3.1 Abiotic environment

##### 3.1.1 Relief

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The area is undulating, some rocky outcrops can be found in the FR (Sools & Wanders, 2010). Overall, the height varies from approximately 270m to about 435m.

### **3.1.2 Climate**

The Asubima Forest Reserve lies at the northern fringes of the dry semi-deciduous forest ecological zone of Ghana (Agyeman *et al.*, 2001). The zone has a tropical monsoon climate with alternating wet and dry seasons. The long wet season starts around mid-March and ends in mid-July. It is followed by a short dry season until the end of August. From September till the end of October there is a short rainy season, followed by a long dry season from November till mid-March. Total annual rainfall is 1227 mm on average.

Temperatures vary with the seasons where February to April are generally the warmest months and July and August the coolest. Mean annual temperature lies around 26° C. During dry seasons, wildfires are common to occur in the Asubima FR.

### **3.1.3 Hydrography**

Several streams drain the Asubima FR. Measurements of turbidity and chemical composition of the water (pH, dissolved oxygen, nitrogen content, conductivity) show that nearly all streams are polluted quite severely (Abeney *et al.*, 2008). This situation is a major concern to the project, and much effort is being put in the restoration of the 30 meter buffer zones along the water courses in order to remedy this problem. Vegetation will halt erosion and prevent chemicals from entering the water.



Figure 3.2. Waterfall in Asubima FR. Photo by T. Wanders.

#### **3.1.4 Infrastructure**

To the west of the Asubima FR, on a distance of approximately 7-10km, is a major road located connecting Kumasi to Techiman. Within the plantation area, FORM Ghana constructed a network of gravel roads.

## **3.2 Social aspects**

### **3.2.1 Population near Asubima FR**

At a distance of about 7 km, Akumadan is the nearest town, while Techiman (23 km further north than Akumadan) is the nearest major town (about 80,000 inhabitants). Seventeen settlements were identified in the vicinity of the Asubima FR, four of which were located within the Forest Reserve itself (Abeney *et al.*, 2008): Atrensu, Yaa Danso, Esreso, Joe Nkwanta, Beposo (plus Esunkwah and Tawiakrom – part of Beposo),

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Dompouse, Nkubem, Akomadan zongo Esuguasua, Adjeikrom, Arapata, Atabourso, Bosomponso, Ekrufi, Gyabaakrom, and Woraso.

Among the inhabitants, there were many migrants (40%) and also second generation migrants (24%), mainly from the northern part of the country. Houses found in these settlements were principally constructed from red mud, not from modern building materials. Major mode of transportation is by foot or by bicycle as there are no good roads; transportation is a major problem. As a result, people have no easy access to clinics or health posts and markets for farm produce. Two-third had good drinking water from bore holes or other source of potable water. Most communities lacked access to banking and credit facilities. The people mention absence of potable water, sanitation facilities, good roads and transportation to and from the farm as the major problems they face (Abeney *et al.*, 2008).

### **3.2.2 Land-use activities**

During the survey conducted in the framework of the SEIA, all villagers interviewed indicated that they were farmers. They typically had 2.5 ha of farmland and 1.54 ha under fallow. Almost half of them (44%) admitted to be farming in the Forest Reserve illegally, the majority of them being immigrants (who do not have easy access to farming land elsewhere). Major crops planted by the farmers include maize, cassava, yam and vegetables (tomato, pepper, beans).

People in the study appeared to derive very little economic value from forest products and none of the respondents said to depend on the collection of non-timber forest products (NTFPs) as their primary occupation. The SEIA indicated that in the past products extracted from the Forest Reserve were poles for construction, bushmeat and fruits. Today these are no longer common and most households have to rely entirely on their farm produce for sustenance. However, local people do collect fuel wood fruits, nuts and leaves for domestic consumption. Local people had no cultural or spiritual bond with the Forest Reserve (Abeney *et al.*, 2008).

Other than the terrestrial area in the Asubima Forest Reserve, fringe communities do depend on the water bodies in the area for their survival. They use them for food for domestic consumption (mainly crabs and snails), for farm irrigation and some communities also for drinking water. Food quantities are declining and particularly is fish is very scarce in the waters of Asubima Forest Reserve (Abeney *et al.*, 2008).

### **3.2.3 FORM Ghana's intercropping system**

Local farmers can participate in an intercropping system, designed by FORM Ghana. In this way, they can continue their farming activities in the area, although there are certain rules as to when crops can be planted (after the Teak seedlings have been planted), what crops can be planted (no cassava, no plantain), and for what period farmers can do intercropping in a particular plot (2-3 years). Furthermore, FORM Ghana hires local people as plantation and nursery workers, security, and fire fighting squad members. Total staff of FORM Ghana consists of 500 people of which 150 permanent employees.

## **3.3 Biodiversity overview**

Before the biodiversity in the Asubima FR is described, first the area is put in a context by describing the biodiversity and conservation status in Ghana and the direct surroundings of Asubima FR. Then, Asubima FR is divided

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into broad categories: stratification of land-uses that are present within the area. Finally an overview is given of the vegetation and fauna recorded in Asubima FR.

### 3.3.1 Context

In West-Africa, the Upper Guinea Forest Ecosystems are recognized as one of the 25 global biodiversity hotspots (MES, 2002). Originally, 36% of Ghana used to be covered by forest. This share has drastically reduced by the end of the 20<sup>th</sup> century: to 23% in 1972, 13.3% in 1990, and 10.2% in 2000 (Van Roosbroeck, 2006). The Government's Forestry Commission has designated 29 Forest Reserves as Globally Significant Biodiversity Areas (GSBAs). Further, there are 16 wildlife reserves and 6 Ramsar sites. There are no GSBAs, wildlife reserves nor Ramsar sites in the vicinity of the area managed by FORM Ghana.

Asubima FR is part of the Offinso Forest District. In those parts of Asubima FR that are not under management by FORM Ghana, other reforestation activities have started by a private investor and the government of Ghana. To the south, Asubima FR borders with Afrensu Brohuma FR. The status with regard to degradation is similar to that of Asubima FR and in part of this FR, FORM Ghana obtained a lease contract as well and started its reforestation activities in 2011. About 20 to 30 kilometres west of Asubima FR (and west of the major road) are Yaya FR and Mankrang FR located. Both Forest Reserves are also highly degraded. In parts of Yaya FR, reforestation activities started in 2002 according to the Modified Taungya System where the Government of Ghana cooperates with the local farmers to establish Teak plantations.

### 3.3.2 Stratification Asubima FR

Satellite images from 2008 demonstrate that little forest remained in Asubima FR; inventory on the ground confirmed this. The Mean Basal Area (MBA) before reforestation activities started was far below <math>5\text{m}^2\text{ per ha}</math>, the threshold for conversion from forest to plantation. More specifically, an inventory carried out in 1989 showed an MBA of  $16.7\text{m}^2\text{ per ha}$ , while a study carried out in 2005 showed that only  $1.7\text{m}^2\text{ per ha}$  was left. In fact, in those areas where no reforestation activities had been carried out by FORM Ghana, the vegetation consisted predominantly of human induced grassland containing the invasive species *Pennisetum purpureum*, *Chromolaena odorata*, *Broussonetia papyfera* and *Imperata cylindrical* (Abeney *et al.*, 2008).

Initially, five different types of land-use are identified within the area under management by FORM Ghana (Abeney *et al.*, 2008), but now that the entire area is replanted only three remain:

#### 1) *Riparian forest*

This type of forest is found bordering the various streams in the area. Around the streams, 30 meter wide buffer zones are created by FORM Ghana which allows natural vegetation to regenerate, and also functions as a fire-break. Furthermore, it improves the connectivity for wildlife to move around the area. Besides natural regeneration, indigenous tree species are planted in these buffer zones to facilitate reforestation.

#### 2) *Teak plantation*

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In the area destined for timber plantation, FORM Ghana has planted mainly Teak (*Tectona grandis*).

3) *Indigenous tree plantation*

Some parts of the plantation area are planted with indigenous tree species.

### 3.3.3 Vegetation Asubima FR

#### *Trees planted*

In the plantation areas, new tree species planted consist mainly of Teak (*Tectona grandis*), while in the riparian buffer zones and in some smaller parts of the plantation a mixture of indigenous species is planted among which Mahogany (*Khaya anthotheca*), Ofram (*Terminalia superba*), Emeri (*Terminalia ivorensis*), Onyina (*Ceiba pentandra*), Kusia (*Nauclea diderrichii*), Kokrodua (*Pericopsis elata*), Awiemfosamina (*Albizia ferruginea*), Bonsamdua (*Distemonantus benthamianus*), Mansonia (*Mansonia altissima*), Bombax (*Rhodognaphalon brevicuspe*), Potrodom (*Erythrophleum ivorensis*), Wawa (*Triplochiton scleroxylon*), Watapuo (*Cola gigantea*).

#### *Overall vegetation*

A survey executed in September 2011 recorded a total of 138 plant species belonging to 47 families (Manu, 2011b). This is an increase compared to the study executed in 2010 by de Laat where 138 plant species of 41 families were identified.

All recorded species by Manu were angiospermae to which 83 species were trees, 18, 7 and 1 species were herbs, grasses and rushes respectively. Shrubs and Lianas (climber) recorded 15 species each. The most represented plant families with between five to eight species were the Euphorbiaceae, Fabaceae, Leguminosae, Malvaceae (Sterculiaceae), Meliaceae, Moraceae and Sapindaceae. Fourteen families were represented by only a single species each. The most commonly occurring plant life-form was tree which made up 60.14% of the total recorded species. The proportional abundance estimate of trees in the sample plots showed high diversity in the plots (Manu, 2011).

Most common species in the area was York (*Broussonetia papyrifera*), a tree species. *Griffonia simplicifolia* a liana was the second most common species followed by *Chromolaena odorata*, a herb species (Manu, 2011b).

In 2009, the Kokrodua tree (*Pericopsis elata*) was observed in the field by staff of FORM Ghana. Consequently, the seed has been used to produce seedlings and more than 1000 individuals were planted within the buffer zone. The Kokrodua tree is a species listed as endangered on the IUCN Red List and also listed on Appendix II of CITES (IUCN, 2011).

### 3.3.4 Fauna Asubima FR

The fauna inventory executed within the framework of the SEIA (Abeney *et al.*, 2008) showed the presence of very few animals specifically linked to forest environments; most were common to occur in savannah habitats. Biodiversity monitoring in 2010 and 2011 revealed that several species of medium sized mammals, small mammals, birds, reptiles, amphibians and insects are present in the area. These are discussed below.

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### *Medium sized mammals*

During a survey undertaken in 2011 by Quansah, ten medium sized mammal species were recorded all of which were recorded using direct count of tracks, dung and feeding signs. Species encountered were: African brush-tailed porcupine (*Atherurus africanus*), Mona monkey (*Cercopithecus mona*), marsh mongoose (*Atilax paludinosus*), African palm civet (*Nandinia binotata*), bush buck (*Tragelaphus scriptus*), tree pangolin (*Phataginus tricuspis*), Maxwell's duiker (*Cephalophus maxwellii*), African civet (*Civettictis civetta*), Togo hare (*Lepus capensis*) and Gras cutter (*Thryonomys swinderianus*). Most species recorded are listed as least concern (species with no current identifiable risks) in the IUCN's Red data list of threatened species, while the tree pangolin is nearly threatened and the bush buck, and Togo hare are not even mentioned on the IUCN Red List (IUCN, 2011). The Mona monkey is listed on Appendix II of CITES and on Class B of the African Convention on the Conservation of Nature and Natural Resources. The tree pangolin is also listed on Appendix II of CITES.

Three of the species are amongst the wholly protected species for Ghana – schedule 1 of the Wild Life Laws. These are the Tree pangolin; African palm Civet and the African Civet.

Subsequent monitoring by Manu (2011b) later that year resulted in the identification of fourteen medium-sized mammal species. These were observed through both direct and indirect signs: visual observation and sound recording plus tracks, dung, feeding signs/ remnants. All species identified by de Laat in 2010 were recorded, except for the marsh mongoose and the African brush-tailed porcupine. In addition the following species were encountered: warthog (*Phacochoerus africanus*), bay duiker (*Cephalophus dorsalis*), common genet (*Genetta genetta*), western tree hyrax (*Dendrohyrax dorsalis*), striped squirrel (*Euxenus erythropus*) and giant pouched rat (*Cricetomys gambianus*). All are classified as 'least concern' by the IUCN Red List whereas the bay duiker is listed on CITES Appendix II (IUCN, 2011).

### *Small mammals*

During a survey conducted by Manu (2011a) three small mammal species of the family Muridae were recorded in the forest reserve: soft-furred mouse (*Praomys tullbergi*), Multimammate rat (*Mastomys natalensis*) and the Rusty-bellied rat (*Lophuromys sikapusi*).

A subsequent survey in September 2011 by Manu (2011b), showed that in total 12 species were recorded in the area consisting of 6 rodent species, 4 shrew species and 2 bat species: multimammate rat (*Mastomys natalensis*), African pygmy mouse (*Mus minutoides*), soft-furred mouse (*Praomys tullbergi*), typical striped grass mouse (*Lemniscomys striatus*), *Malacomys edwardski*, rusty-bellied rat (*Lophuromys sikapusi*), West-African long-tailed shrew (*Crocidura muricaude*), Crosse's shrew (*Crocidura crossei*), Jouvenet's shrew (*Crocidura juvenetae*), Olivier's Shrew (*Crocidura olivieri*), Franquet's epauletted fruit bat (*Epomops franqueti*) and little colored fruit bat (*Myonucteris torquata*). Conservation status of all species is 'least concern' and none are listed under CITES (IUCN, 2011).

### *Birds*

Over the last few years, there seems to be an increasing trend in the number of bird species observed in Asubima FR. The SEIA, executed in 2007, recorded 47 bird species (Abeney *et al.*, 2008). During a survey

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conducted in 2010 (de Laat, 2011) 77 bird species, belonging to 30 different families, were encountered in Asubima FR. Nearly all birds were typical for savannah vegetation or open woodlands. Five bird species were indicated as uncommon, thinly distributed or endangered: the Bearded barbet, Black face firefinch, Gambaga flycatcher, Ibadan malimbe and Togo paradise whydah.

In 2011, Manu (2011b) found 94 bird species belonging to 32 different families. These are typically savannah species. Five uncommon species were recorded: Togo paradise-whydah (*Vidua togoensis*), Tit hylia (*Pholidornis rushiae*), Western Violet-backed Sunbird (*Anthreptes longuemarei*), black coucal (*Centropus grillii*) and African baza (*Aviceda cuculoides*).

*Reptiles: crocodile and snakes*

The dwarf crocodile (*Osteolaemus tetraspis*) was spotted once in the buffer zone of Asubima FR by FORM Ghana staff. This species is IUCN red listed as vulnerable and also listed on CITES Appendix I.



Figure 3.3. Dwarf crocodile (*Osteolaemus tetraspis*) in the buffer zone. Photo by J. Eckley.

During a snake survey by Hodoli in 2011, six species were recorded: the grass snake (*Phammophis sibilans*), the green mamba (*Dendroaspis viridis*), the green snake (*Philothamnus sp.*), the blind snake (*Ramphotyphlops braminus*), the royal python (*Python regius*) and the African rock python (*Python sebae*). Out of these six species, none are red-listed (IUCN, 2011) and the royal python and the African rock python are listed in Appendix II of CITES. This means “they are not necessarily threatened with extinction, but trade must be controlled in order to avoid utilization incompatible with their survival” (CITES, 2011).

*Amphibians: frogs*

Eighteen frog and two toad species were found in Asubima FR during a study carried out in 2010 by de Laat. None of these frogs are red-listed nor CITES-listed (IUCN Red List, 2011; CITES, 2011).

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*Insects: butterflies*

Butterflies were surveyed in 2011 by Manu in the Asubima FR and the Afrensu Brohuma FR. In total, 75 butterfly species were encountered of 5 different families. In Asubima FR 61 different species were found.

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## 4. HIGH CONSERVATION VALUES IN ASUBIMA FR

Based on the information presented in the previous chapter, an analysis is done on the presence or absence of each of the six High Conservation Value Forests in the area of Asubima FR managed by FORM Ghana.

### 4.1 High Conservation Value 1

HCV 1 is defined as: *Forest areas containing globally, regionally significant concentrations of biodiversity values (e.g. endangered species, endemism, refugia).*

In the Ghanaian interpretation of HCVs this high conservation value:

1. equals the status of protected areas, i.e. national parks, resources reserves, global protection reserves, globally significant biodiversity areas (GSBAs), hill sanctuaries, provenance protection areas and wildlife sanctuaries (Rayden *et al.*, 2006).
2. refers to forest that contain outstanding concentrations of threatened or endangered species, i.e. GSBAs, concentrations of globally threatened IUCN red-listed species, or species nationally listed as protected under the National Wildlife Conservation Regulation (Rayden *et al.*, 2006).

No parts of Asubima Forest Reserve are set aside as a protected area nor are there any National Parks bordering Asubima FR.

Biodiversity monitoring executed in 2010 and 2011 showed that species have been encountered that are on the IUCN red list: the African dwarf crocodile (*Osteolaemus tetraspis*) listed as vulnerable and also included on CITES Appendix 1, the tree pangolin (*Phataginus tricuspis*) listed as nearly threatened, and the Kokrodua tree (*Pericopsis elata*), also listed as endangered on the IUCN Red List. Further, a number of species are listed on Appendix II of CITES. For the African dwarf crocodile and the tree pangolin, only one or a few individuals have been observed.

Some species that were found in Asubima Forest Reserve are protected under Ghana law, such as; Tree pangolin (*Phataginus tricuspis*); African palm Civet (*Nandinia binotata*), and the African Civet (*Civettictis civetta*). Of these also only few individuals were found.

This means that there is currently no information that outstanding concentrations of threatened or endangered species are present in the area.

To conclude, High Conservation Value 1 is not present in the area of Asubima FR managed by FORM Ghana.

### 4.2 High Conservation Value 2

HCV 2 is defined as: *Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all*

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*naturally occurring species exist in natural patterns of distribution and abundance.*

Intact Forest Landscapes are defined as “an area of at least 50,000 ha of forest that is un-fragmented by roads or other forms of man-made disturbance” (p.10 Rayden *et al.*, 2006). In Ghana no Intact Forest Landscapes exist. Therefore, “areas representing this specific HCV were not considered to be present in Ghana” (p.10 Rayden *et al.*, 2006). Abeney *et al.* (2008) confirm that no intact ecosystem can be found in the Asubima FR at the time of the SEIA (2007-2008).

Therefore, it can be concluded that High Conservation Value 2 is not present in Asubima FR.

### 4.3 High Conservation Value 3

HCV 3 is defined as: *Forest areas that are in or contain rare, threatened or endangered ecosystems.*

During the workshop organised for the development of the HCVF Toolkit for Ghana, participants agreed that ‘ecosystems’ would be defined as both ‘broad forest types’ and smaller ‘habitats types’, considering those that:

1. “are naturally rare;
2. have been dramatically reduced from their original extent due to the activities of man;
3. are so threatened by existing and planned activities that they should be considered threatened/ endangered” (p.11 Rayden *et al.*, 2006)

The Asubima FR is located in the Dry Semi-Deciduous Forest Zone. According to the Toolkit, the forest type Dry Semi-Deciduous is reduced in extent or quality and is threatened by current and future changes (Rayden *et al.*, 2006). It is indeed confirmed that in the Asubima FR the forest area has reduced in extent and quality. For that reason, according to Rayden *et al.* (2006) the area is a candidate for HCVF 3. However, the area was so severely degraded that the Mean Basal Area was less than 5m<sup>2</sup> per ha, so one could not even speak of a ‘forest area’ any longer.

Therefore, it can be concluded that HCVF 3 is not present in Asubima FR.

### 4.4 High Conservation Value 4

HCV 4 is defined as: *Forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control).*

Besides watershed protection and erosion control, forest providing barriers to destructive fire may be classified as HCVF, more specifically parts of forest reserves along road margins and when there is evidence of a fire risk from the activities of man. Finally, forests that play a critical role in local climate regulation (e.g. dramatically increased fire risk or exposure to drying winds, negatively affecting agriculture) could be designated as HCVF. Forest areas situated in the transition zone (between the High

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Forest Zone and the dry savannah) that provide protection against the North East trade winds and/ or 'Harmattan' dry winds will be considered potential HCVF (Rayden *et al.*, 2006).

There is currently no forest on steep slopes or forest protecting head waters in Asubima FR. Little forest remains protecting watercourses in the Forest. The vegetation that was present at the time of the SEIA (2007-2008) was no longer able to provide a purifying or regulating function for the water bodies. Measurements of turbidity and chemical composition of the water showed that nearly all streams were polluted quite severely. Although most communities do not depend on these waters for their survival, this water is used for irrigation purposes and the collection of food items for consumption (e.g. crabs, snails) (Abeney *et al.*, 2008). The area is not prone to flooding, and fish is not a major source of protein for the adjacent communities (Abeney *et al.*, 2008). Asubima Forest Reserve is located in the transition zone and wildfires are a frequent occurrence during the dry season. In the area managed by FORM Ghana, in the riparian buffer zones restoration takes place in order for those areas to protect water courses, conserve biodiversity and perform the function of fire-belt.

The need for forest to protect the water courses and to function as a fire-belt indicates that High Conservation Value 4 is present in potential. At the moment, however, as restoration of the buffer zone is still an on-going process, we can conclude this HCVF 4 is not present in Asubima Forest Reserve.

## 4.5 High Conservation Value 5

HCV 5 is defined as: *Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health).*

According to the Ghanaian interpretation of HCVFs, "a forest will be considered HCVF when it is the source of a basic need in a situation where the majority of the local people or the poorest population among the local people have no realistic alternative" (p.18 Rayden *et al.*, 2006). Basic needs include: food (e.g. bushmeat when this is a fundamental protein component of their diet), NTFP harvesting (for essential household income), medicines (in absence of local clinics or when this is the only affordable option), building materials, fuelwood or pestles. Immigrants and very remote settlers are more likely to suffer from extreme poverty what will make them more dependent on their direct environment for their survival (Rayden *et al.*, 2006).

The SEIA carried out by Abeney *et al.* (2008) has shown that all fringe communities depend on agriculture for their livelihoods, none depend on the forest itself for essential household income. However, collection of fuelwood is done in Asubima FR.

It is clear that the local people don not depend on the Asubima Forest for their livelihood.

It can be concluded that this High Conservation Value 5 is not present in Asubima .

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## 4.6 High Conservation Value 6

HCV 6 is defined as: *Forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).*

For forest-adjacent communities, forests often have a deep spiritual and cultural meaning. Practices expressing this cultural identity, traditional beliefs and norms are reflected in pouring libations in saying prayers to forest gods, festivals and rituals, folklores and oral history, burial of stools and skins. In Ghana, generally these HCVMs are associated with dense/intact forests, the so-called sacred groves (Rayden *et al.*, 2006).

The SEIA (Abeney *et al.*, 2008) has not resulted in the identification of areas that are of importance for the cultural identity of those living near the area under lease contract by FORM Ghana.

It can be concluded that this High Conservation Value is not found in the area managed by FORM Ghana.

# 5. CONCLUSION AND MANAGEMENT IMPLICATIONS

The buffer zones in Asubima Forest Reserve are highly degraded and cannot be classified as high conservation value forests.

Management of the buffer zones is geared towards protection and restoration using indigenous species of local provenance (cf. recommendation 6.4.4 in Rayden *et al.*, 2006). The current state of the vegetation makes it obvious that the watercourses are not sufficiently protected by a buffer zone of intact indigenous vegetation. FORM Ghana is therefore actively engaged in the restoration of the buffer zones and the monitoring of water quality to find out if the efforts are successful. Seed of the Kokrodua tree has been used to produce seedlings. In 2011, some 2000 trees of the species have been planted in the buffer zones scattered over the area to boost population and safeguard the species for the future. Finally, all animals are protected by management and hunting is strictly forbidden. This is controlled by the security team that patrols the area.

The map presented below shows the locations of these buffer zones. In total, the buffer zones cover a surface of 222 ha which is equivalent to 13 % of the total area under management by FORM Ghana.

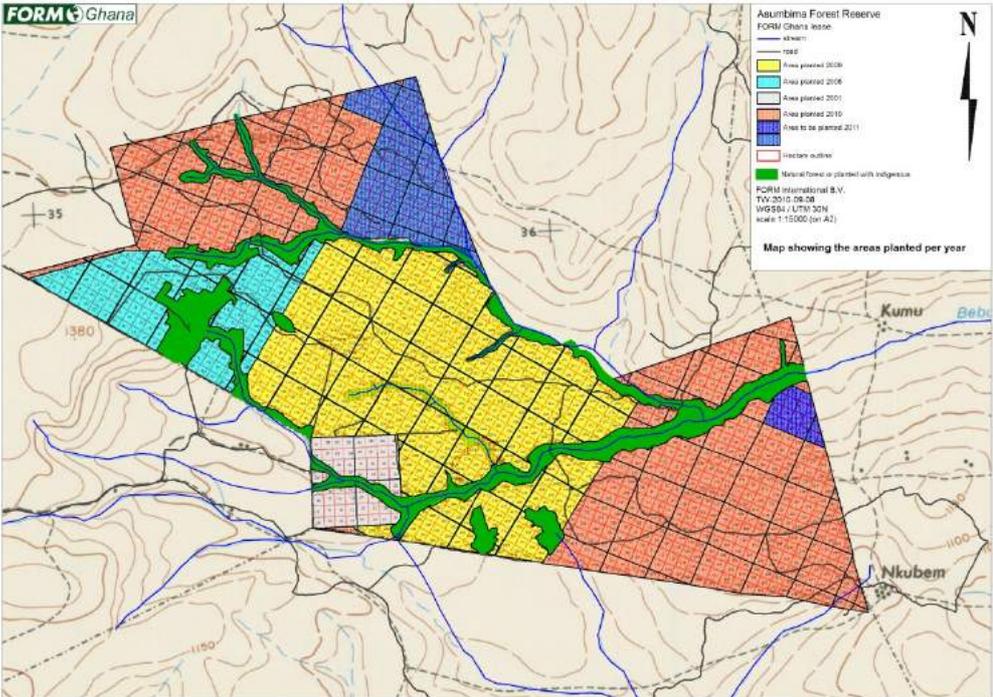


Figure 5.1. Map showing the locations of the buffer zones in Asubima FR.

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