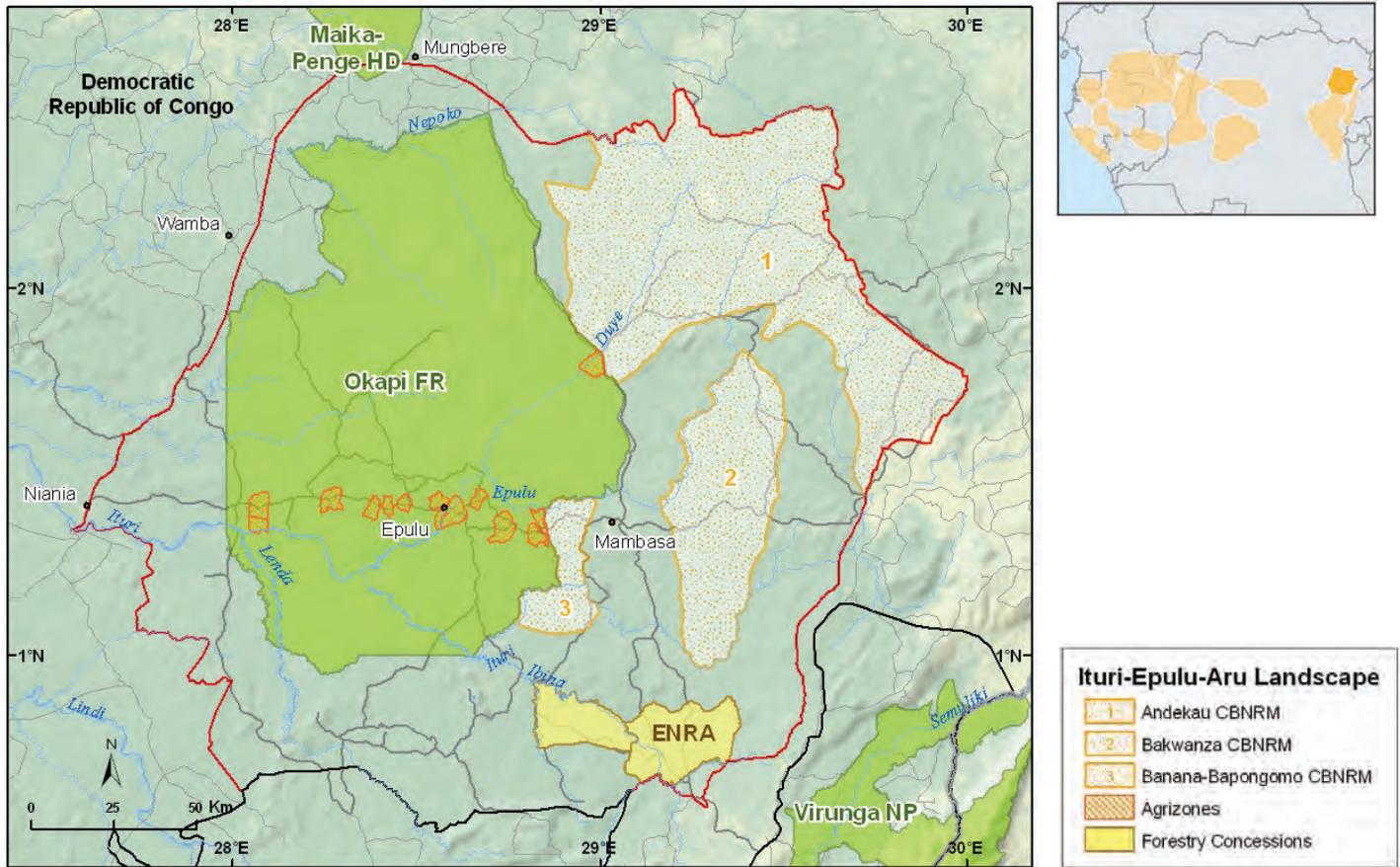


# CHAPTER 25

## ITURI-EPULU-ARU LANDSCAPE

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### Land Use Planning



Sources: WCS, UMD-CARPE, OSFAC, FORAF, IUCN, Tom Patterson, US National Park Service.

Figure 25.1: Macro-zones in the Ituri-Epulu-Aru Landscape

The Ituri-Epulu-Aru Landscape covers 40,862 km<sup>2</sup> with five designated macro-zones including:

- a protected area: Okapi Faunal Reserve (13,720 km<sup>2</sup>)
- three community-based natural resource management zones: Banana (575 km<sup>2</sup>), Andekau (6,973 km<sup>2</sup>), and Bakwanza (2,181 km<sup>2</sup>)
- an extractive resource zone: Enzyme Refiners Association (ENRA) logging concession (520 km<sup>2</sup>)

In 2006, the Democratic Republic of Congo (DRC) held its first presidential elections in over 30 years and since then institutions have slowly begun to function again and widespread national

road rehabilitation is underway. The government is amending conservation laws and drafting implementation guidelines for the national forestry code. These national level efforts to revise the forestry code and conduct land use zoning are being assisted at the local level by three NGOs supported through USAID's CARPE program. The Ituri Landscape planning team includes consortium members (WCS, Pact and GIC) and local management partners such as the DRC protected area management authority (ICCN) and the Ministry of Environment. CARPE consortium partners are working with stakeholders to develop management plans for protected areas, community-based natural resource management zones (CBNRM)



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**Photo 25.1:** Characteristic markings of the okapi, a large antelope endemic to DRC.

and extractive resource zones (ERZ). New Landscape boundaries were delineated since the last State of the Forest (CBFP, 2006) report in order to include the ENRA logging concession in the Landscape.

In 2006, the Ituri-Epulu-Aru Consortium began work on a land use planning strategy document for the Landscape. As part of this process, a stakeholder participation strategy is being developed. Consortium members raise awareness and educate stakeholders about the national forestry code and the value of zoning and land use planning. Since local government authorities lack funds and training, consortium NGOs help build local capacity by facilitating the creation of local resource management structures and by helping stakeholders to articulate a vision for resource management.

The Ituri-Epulu-Aru Landscape's unique ecological, socio-economic, and socio-cultural value will be reflected in the land use plan. The overall management vision and objectives have been drafted and will be presented to stakeholders in 2009.

Data has been collected on human populations and their livelihood activities in the Landscape. Biological and socio-economic data were collected in the logging concession. Studies on bushmeat hunting, non-timber forest products (NTFP), and artisanal timber exploitation were

conducted. Participatory sketch mapping was conducted in 42 villages in three CBNRM zones. This information will be used to guide the land use planning process, especially for community-managed forests.

Geo-referenced mapping was conducted in the Okapi Faunal Reserve (OFR), ENRA concession, three CBNRM zones and other sites such as abandoned coffee plantations in the wider landscape. In addition to macro-zone boundaries, geo-referenced data (waypoints) were recorded for roads and rivers in the Landscape.

**Protected area:** In the OFR, managers are drafting a revised management plan. Micro zoning is underway; 12 agriculture zones (34,982 ha) have been delimited with management agreements signed between ICCN and local communities and authorities. Participatory mapping has yielded geo-referenced data for hunting territories in 9 villages covering 271,599 ha, and results from biological surveys helped define the limits of a proposed core conservation zone covering 481,600 ha in the center of the Reserve.

**Community-based natural resource management zones:** As mentioned above, the three CBNRM zones in the Landscape are Banana (575 km<sup>2</sup>), Andekau (6,397 km<sup>2</sup>) and Bakwanza (2,181 km<sup>2</sup>). A land use planning strategy document was written for these zones and local committees were formed to serve as governance structures for sustainable resource use, including timber exploitation in community-managed forests, bushmeat alternatives, and agriculture.

**Extractive resource use zone:** Surveys of large mammals, plants, and signs of human activities have contributed to a management plan for ENRA's 520 km<sup>2</sup> logging concession. A strategy document was drafted and an agreement between local stakeholders and logging concession managers' has been signed and validated by local and territorial authorities. WCS will continue their assistance to ENRA in drafting its management plan when the conversion process is completed. Eventually, the management plan may contribute to ENRA's efforts to pursue forest certification status.

Studies and mapping have also been conducted to document the presence and activities of squatters in the concession. This will contribute to strategies to reduce conflicts over land and natural resources between the logging company and human communities present in the concession.



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**Photo 25.2:** Black bee eater (*Merops gularis*).

## Human Activities

The Landscape is located on a settlement frontier where during the last 60 years, and most notably in the last 30, considerable migratory movements have transformed parts of the region. Some immigrants have fled insecurity in their home region; but most were motivated by easy access to cultivable land, jobs in mining or small-scale forestry and the small businesses these activities generate. Most recent immigrants in the Landscape originate from the densely populated heights of the Albertine Rift on the border with Rwanda and Uganda.

The human population of the Landscape is estimated at 300,000. Mambasa and Niania, two major towns in the Landscape, have approximately 20,000 inhabitants each and are growing rapidly. The most recent census (2003) conducted in the OFR documented 17,000 people in the reserve and 37,000 people within 15 km of the limits.

The population of Mbuti and Efe Pygmies in the Landscape is estimated at 30,000. The main ethnic groups of Bantu and Sudanic speaking shifting cultivators are the Bila, Ndaka, Lese, Mbo and Mamvu. They depend on small-scale slash-and-burn agriculture, supplemented by fishing and hunting. Two main immigrant groups are the Nande, from the mountains to the east of the Landscape, and the Budu, from the densely populated regions to the north and west of the Landscape.

Most people practice a suite of subsistence activities throughout the year including agriculture, fishing and hunting, but they may also rely on wage labor, artisanal mining and logging. Unemployment is widespread; most who gain wages are employed through churches or international organizations, including conservation NGOs. The collapse of the road network in the 1970s has limited both access to markets and development possibilities. Repairs to the trans-African highway between Kisangani and Bunia have recently been completed which will facilitate immigration, market access and resource extraction.

*Agriculture:* Manioc, plantain, rain-fed rice, beans and groundnuts are the main crops in the Landscape. Forest dwelling subsistence farmers practice a field rotation system with two years of crops on the same land (0.5 – 1 ha) followed by ten-year fallows, which allow the soil to regain its fertility. Recent immigrants practice more intensive agriculture with larger fields, shorter fallow periods, and more extensive clearing of primary

forest. They are able to hire field labor because they have more economic power than indigenous farming groups, which in turn enables them to open larger fields and clear more forest.

*Subsistence hunting:* Hunting is an important source of protein and revenue for people in the Landscape. Mbuti and Efe (Pygmies) hunt using nets and bows and arrows, while village-based Bantu and Sudanic groups use snares. Eight species of small ungulates are the principal game species captured with net and snare hunting, while bow hunters target monkeys. Some people specialize as full time hunters, but most adult men set snare lines periodically during the year when agricultural activities are less intense. Current hunting levels are not sustainable, and if this continues unchecked, duiker populations will continue to decline.

*Commercial bushmeat hunting:* Snare hunting has intensified over the course of the last decade and has now reached remote regions of the Landscape. The trading network involves dealers and buyers in the towns of Mambasa, Niania, Beni, Butembo, Kisangani and Isiro. Recent wildlife surveys in the OFR show that populations of five duiker species declined dramatically from 26 % to 59 % depending on the species.

Very few instances of legal hunting rifles exist in the Landscape; instead guns are in ready supply from military and police who loan them out to local hunters. In some large towns in the Landscape,



**Photo 25.3:** The rehabilitation of the road between Kisangani and Beni has helped open up Kisangani.

the proliferation of guns results in sack-loads of monkeys for sale at local bushmeat markets.

*Poaching:* Elephant hunting and ivory poaching intensified in 1996 with the beginning of the civil war and again in 2002-2004 when militia and police established hunting camps in the Landscape, recruited and armed professional hunters and signed contracts with local dealers to sell meat and ivory. Elephant poaching has now been reduced considerably, thanks to a UNESCO-funded joint effort by ICCN and the Congolese Army (FARDC) to evacuate poaching camps in the OFR. Elephant populations in the OFR were reduced by an estimated 48 % since the 1995 census, which translates to an estimated loss of 3,260 elephants to poaching. Okapi were reduced by 43 %, with a loss of an estimated 2,000 animals since the outset of the conflict.

*Artisanal mining:* The Ituri region is rich in gold, coltan and diamonds. Hundreds of small permanent or semi-permanent mines have become active since the liberalization of mining in the 1980s. Mining is illegal in protected areas in DRC, but during the conflict period this law was impossible to enforce. In 2006, a joint

effort between ICCN guards and the national army conducted evacuations of all active mines in the reserve. The mines remain abandoned and vegetation and wildlife have begun to return to these former mining sites, but this requires ongoing surveillance and monitoring from ICCN. Though mining is a localized threat, it can have major repercussions when accompanied by uncontrolled population movements and increased bushmeat hunting. Mining contributes to the establishment of permanent settlements.

*Logging:* There is only one legal logging concession, Enzyme Refiners Association (ENRA), in the Landscape which covers 52,000 ha and produces 5,000-7,000 m<sup>3</sup> of sawn timber a year. As mentioned above, the CARPE consortium works in collaboration with ENRA. However, the majority of logging in the Landscape is artisanal and informal. In 2007, a container truck, over-loaded by several tons with lumber, caused a bridge to break over the Ituri River. However, even this has not prevented the steady export of timber out of the Landscape towards the east, as there is a ready supply of labor to carry timber to the river's edge, transfer it to wooden pirogues to cross the river, and then unload it on the other side.



**Photo 25.4: Gold mining in the Ituri River.**

**Table 25.1a: Important agricultural products in the Ituri-Epulu-Aru Landscape**

Site	Agricultural product	Unit	Purchase price/unit (\$)	Primary destination	Date	Data collection	Sources
Protected area: Okapi Faunal Reserve, Epulu	Rice	Sack (100 kg)	80	Inside Landscape	May-08	Market surveys	WCS
	Beans	Sack (100 kg)	80	Inside Landscape	May-08	Market surveys	WCS
	Groundnuts	Sack (100 kg)	100	Inside Landscape	May-08	Market surveys	WCS
CBNRM Andikau	Rice	Sack (100 kg)	30	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Cassava (dried tuber)	Sack (100 kg)	40	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Groundnuts	Sack (100 kg)	50	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Beans	Sack (100 kg)	100	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
CBNRM Bakwanza	Cassava (dried tuber)	Sack (100 kg)	35	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Rice	Sack (100 kg)	46	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Groundnuts	Sack (100 kg)	60	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Beans	Sack (100 kg)	100	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
CBNRM Banana	Rice	Sack (100 kg)	25	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Cassava (dried tuber)	Sack (100 kg)	49	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Maize	Sack (100 kg)	56	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Groundnuts	Sack (100 kg)	65	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
Mambasa town	Rice	Sack (100 kg)	35	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Cassava (dried tuber)	Sack (100 kg)	42	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Maize	100 kg	73	Inside Landscape	Jun-08	Market surveys	Pact/WCS
ERZ Makumo (ENRA)	Cassava (dried tuber)	100 kg	18	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Maize	Sack (100 kg)	21	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Rice	Sack (100 kg)	45	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Beans	100 kg	75	Inside Landscape	Jun-08	Market surveys	Pact/WCS
Niania town	Cassava (dried tuber)	Sack (100 kg)	30	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Rice	Sack (100 kg)	49	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Beans	Sack (100 kg)	80	Inside Landscape	Jun-08	Market surveys	Pact/WCS

**Table 25.1b: Bushmeat trade in the Ituri-Epulu-Aru Landscape**

Bushmeat species	Site	Unit	Purchase price/unit (\$)	Primary destinations	Date	Data collection	Sources
Blue duiker ( <i>Cephalophus monticola</i> )	Protected area, Epulu	Whole	4	Inside Landscape	May-08	Market surveys	WCS
	CBNRM Andikau	Whole	3	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	CBNRM Bakwanza	Whole	4.5	Outside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	CBNRM Banana	Whole	4	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Mambasa town	Whole	5.5	Outside Landscape	Jun-08	Market surveys	Pact/WCS
	Makumo town	Whole	12	Outside Landscape	Jun-08	Market surveys	Pact/WCS
Monkey spp.	CBNRM Bakwanza	Whole	4	Outside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Mambasa town	Whole	6	Outside Landscape	Jun-08	Market surveys	Pact/WCS
	Komanda town	Whole	7	Outside Landscape	Jun-08	Market surveys	Pact/WCS
	Niania town	1/6	3	Inside Landscape	Jun-08	Market surveys	Pact/WCS
Red duikers (ex. <i>Cephalophus dorsalis</i> , <i>C. callipygus</i> , <i>C. sylvicultor</i> , <i>C. leucogaster</i> , etc.)	Protected Area, Epulu	1/4	4	Inside Landscape	May-08	Market surveys	WCS
	CBNRM Andikau	1/6	3	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	CBNRM Bakwanza	1/6	4.6	Outside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	CBNRM Banana	1/8	2	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS
	Mambasa town	1/6	5.5	Inside Landscape	Jun-08	Market surveys	Pact/WCS
	Komanda town	1/6	7	Outside Landscape	Jun-08	Market surveys	Pact/WCS
	Niania town	1/6	4.5	Inside Landscape	Jun-08	Market surveys	Pact/WCS
Hog (ex. <i>Potamochoerus porcus</i> )	CBNRM Bakwanza	kg	1.5	Inside Landscape	Jun-08	Household surveys and PRA	Pact/WCS

## Forest Cover



Sources: SDSU, UMD-CARPE, NASA, SRTM, IUCN, FORAF

Figure 25.2: Composite Landsat satellite image of the Ituri-Epulu-Aru Landscape overlain with 1990 to 2000 forest loss (in red) and 2000 to 2005 forest loss (in orange)

**Table 25.2: Forest cover and forest loss in Ituri-Epulu-Aru Landscape from 1990 to 2005**

Landscape area	Forest area			Forest loss			
	1990 (km <sup>2</sup> )	2000 (km <sup>2</sup> )	2005 (km <sup>2</sup> )	1990-2000 (km <sup>2</sup> )	1990-2000 (%)	2000-2005 (km <sup>2</sup> )	2000-2005 (%)
40,862	39,663	39,449	39,310	214	0.54	139	0.35

Forest cover and forest cover loss are derived from Landsat and MODIS satellite data.

Sources: SDSU, UMD-CARPE, NASA.

The Landscape is covered with a closed canopy of dense evergreen forest consisting of areas of monodominance as well mixed forests. The north and the east of the Landscape are characterized by semi-deciduous forests whose canopies contain more light-demanding species, such as *Entandrophragma spp.*, *Khaya anthotheca*, *Albizia spp.* and

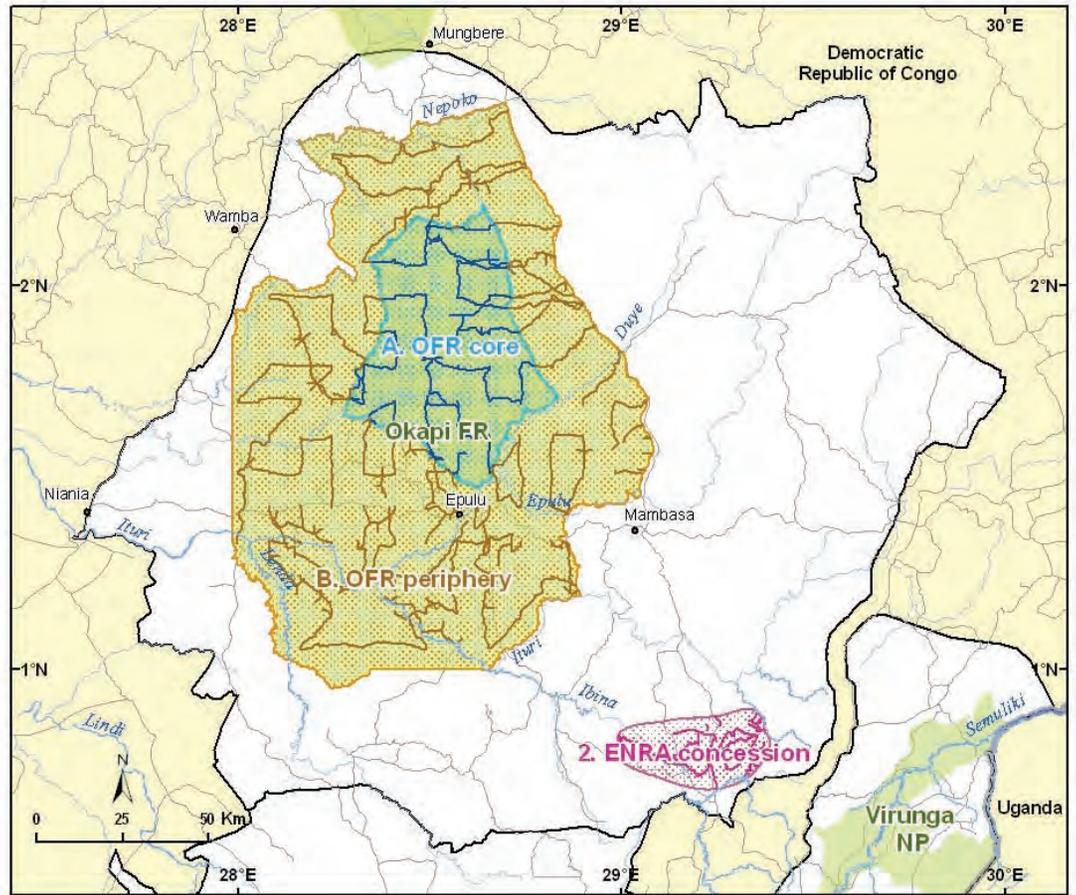
*Canarium schweinfurthii*, and a growing proportion of dendritic *Euphorbiaceae* and *Rubiaceae*. At the northern and eastern ends of the forests, the dense forests turn into a mosaic of dry forests, evergreen forest galleries and wooded savannas. The northwestern side of the Landscape is characterized by the granite inselbergs with many xer-

rophilic plant formations including many species that are of global importance for conservation. Throughout the Landscape there are clearings, called “Edo” locally, which are maintained by elephants, but used by a wide variety of fauna.

Secondary forests of varying ages cover large parts of the Landscape, partly as a result of natu-

ral causes such as the violent storms or from the result of human activities mainly shifting agriculture and, to a lesser extent, small-scale logging. In the southeast of the Landscape, degradation of forests and deforestation are increasing due to the extension of agriculture and artisanal logging causing the formation of vast areas covered with a mosaic of degraded forest and cultivated land.

## Large Mammal and Human Impact Monitoring



Sources: WCS, ICCN, UMD-CARPE, OSFAC, FORAF

Figure 25.3: Biological survey transects in Ituri-Epulu-Aru Landscape



Photo 25.5: Forest elephants are often victims of poachers involved in ivory trafficking.

**Table 25.3: Biological survey results from the Ituri-Epulu-Aru Landscape.**

Survey	Site name	Survey date	Lead	Total km of recces	Number of transects	Total km of transects	Elephant presence	Elephant dung pile encounter rate	Elephant dung pile density	Ape presence	Ape nest group encounter rate	Okapi presence	Okapi dung pile encounter rate	Okapi dung pile density (per km <sup>2</sup> )	Human sign: hunting only
A	OFR core	2005-2007	WCS, ICCN	282	35	105	Yes	1.71		Yes	0.82	Yes	0.51		2.83
B	OFR periphery	2005-2007	WCS, ICCN	872	75	175	Yes	1.18		Yes	0.41	Yes	0.18		3.86
A, B	OFR	1993-1995	WCS, ICCN	0	110	280	Yes	2.99	409 (st. err.=78.1)	Yes		Yes	0.45	106 (st. err.=19.9)	3.09
A, B	OFR	2005-2007	WCS, ICCN	0	110	280	Yes	1.29	213 (st. err.=61.4)	Yes	0.49	Yes	0.25	60 (st. err.=12.2)	3.52
2	ENRA concession	2007	WCS	106	0	0	No	0		Yes	0.06	Yes	0.007		1.93

Sources: (A and B) Hart, J. et al., 2008; (A, B) Beyers, R., 2008; (2) Madidi, J et al., 2007.

Biological surveys of key large mammal populations and human activities were conducted in the OFR in 2005-2007 and in the ENRA logging concession in 2007. The surveys were the first in the OFR since the outbreak of conflict in 1996, and the results permitted managers to evaluate changes in faunal densities over the 10-year period of conflict. Results showed that significant populations of the OFR's flagship species remain, including forest elephant, okapi and chimpanzee. Most faunal populations were significantly more abundant in the center of the Reserve in a zone proposed for conservation than in the zones designated for traditional hunting and agricultural settlement. The exceptions were elephants,

which were concentrated in areas that suffered less poaching during the period of conflict, and monkeys (12 species), which were abundant in agricultural zones and secondary forests.

Survey results from the ENRA forest concession show that two out of three forest blocks have been settled by illegal squatters who practice agriculture and artisanal logging, and only small patches of intact forest remain in the concession. Unsurprisingly, very few signs of primates and ungulates were found in these two blocks where human activities are intense. However, in the third forest block, which remains intact, abundant signs of chimpanzees and monkeys, as well as signs of ungulates were recorded.

## Special Interest

This success story is focused on the progress and potential of CBNRM zones for natural resource management and conservation. Activities conducted in the Landscape's three CBNRM zones, such as socioeconomic surveys, trainings, and formation of natural resource management committees, has attracted the attention of other towns in the region, notably Niania to the west of the OFR. Niania, a town at the western limit of the Ituri-Epulu-Aru Landscape outside the OFR has an important influence on the Landscape, especially on the OFR.

Chiefs and land owners in Niania recognize that their forest is disappearing through both agriculture and artisanal logging; but that their community is not developing as a result. They have contacted the CARPE consortium to request that a CBNRM zone be created to help them organize themselves and conduct natural resource and land use planning. Local chiefs have already taken some initiatives which include: requesting that farmers work along the roadside rather than clearing fields in primary forest and the formation of a hunting management committee with the help of a local NGO.

In the current context, artisanal logging is done in an unorganized and individual manner. However, if the CBNRM model could be applied in Niania – they could be helped to create a structure for natural resource management – that would bring together key stakeholders to elaborate a vision of conservation and development. The consortium and its partners could then help to build capacity in accounting, logistics, and project conception and feasibility studies. The two current CBNRM zones, Banana and Andikau, which are located partially in the OFR buffer zone, are proving to be pilot experience projects for protected area buffer zone management which may prove useful for other sites in DRC and the region.



*Photo 25.6: Blue Duikers (Cephalophus monticola) in a Mbuti Pygmy hunting camp.*