

Macro-Zoning in the Landscape



Photo 24.1: Tea plantations on the edge of Kabuzi-Biega National Park.

Central to land use planning is the identification of macro-zones in a participatory process with stakeholders. For this Landscape, there are currently eight macro-zones that have been identified (Figure 24.1); four are protected areas, and four are community-based natural resource management (CBNRM) areas (there are no extractive macro-zones in the MTKB Landscape). Of the four protected areas, two are National Parks (Maiko and Kahuzi-Biega), managed directly by ICCN. These two National Parks were gazetted by the government between 1970 and 1974, and as a result were readily defined as protected areas macro-zones.

Two other protected areas, however, were created from within a CBNRM macro-zone by local communities. In an innovative approach, local NGOs used participatory mapping and a sensitization program based on gorilla conservation to reach consensus among local land users to effectively “cede” large integral zones in which flora and fauna are afforded 100 % protection. The local NGOs then applied to the government to transform these integral zones into nationally recognized protected areas, and in 2006, they were gazetted as nature reserves (Tayna and Kisimba-Ikobo) by a Ministry of Environment decree. This was accompanied by a management contract

between the ICCN and each NGO, in which the latter were subcontracted to manage their corresponding nature reserve.

The MTKB Consortium’s methodological approach for macro-zoning thus includes a number of large CBNRM zones in which communities are creating protected areas. To reflect this process and plan for future zoning changes, we designate these as “macro-zones under development” (and also indicate areas that are being developed as future nature reserves, figure 24.1). For example, the UGADEC⁵ CBNRM is managed by a federation of eight local NGOs representing more than 14 Chefferies⁶ (figure 24.2). Although it is currently being managed as a CBNRM macro-zone, six of its NGO members are currently seeking to create government-authorized Nature Reserves, modeled after the Tayna NR. By identifying this as a “macro-zone under development,” the consortium and stakeholders can plan for the six additional protected area macro-zones that will exist within the UGADEC CBNRM, surrounded by the development zones of their collectivités (figure 24.2, white areas within the UGADEC area).

In a somewhat similar process, the Itombwe Nature Reserve (figures 24.1 and 24.2), which received its Ministerial Decree in 2006, is embedded in the Itombwe CBNRM. In the case of this reserve, however, its limits are still under development through a participatory planning process with local communities, and its internal integral zones have yet to be identified or zoned. Once completed, however, this will be an additional case in which a protected area macro-zone will be developed by the local population from within a CBNRM zone.

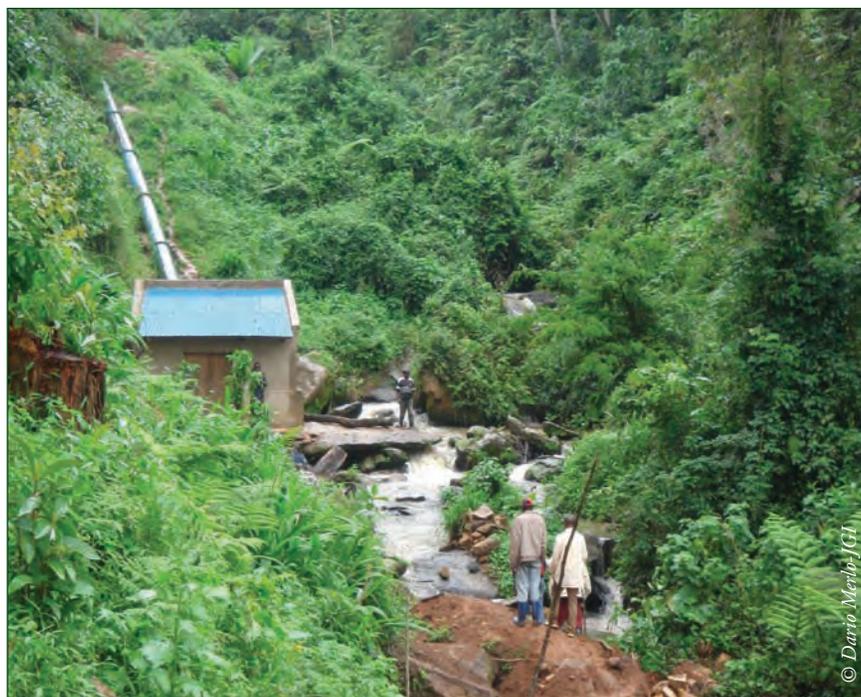
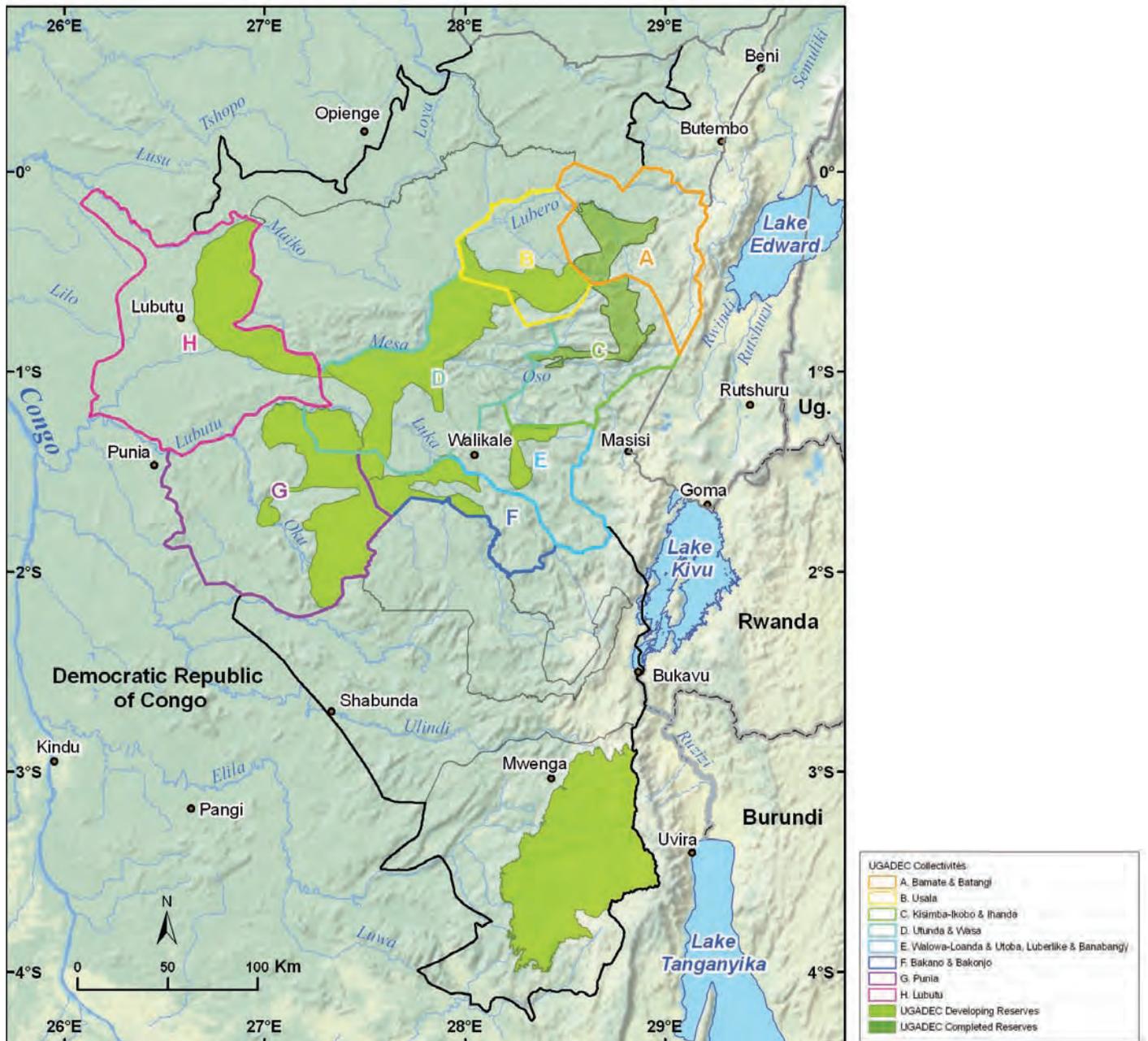


Photo 24.2: A hydro-electric station serves the Tayna Center for Conservation Biology and nearby village of Kasugha.

⁵ UGADEC is the Union des associations de conservation des gorilles pour le développement communautaire à l’est de la République démocratique du Congo.

⁶ A chefferie is a chiefdom (formerly called a “collectivité chefferie” or sector). Administrative organization in DRC is by province, then territory, then chefferie.



Sources: CI, UMD-CARPE, OSFAC, FORAF, IUCN, Tom Patterson, US National Park Service.
 Figure 24.2: UGADEC, a CBNRM macro-zone with two protected area macro-zones completed and six in development. Note that the UGADEC Nature Reserves under development will form a biological corridor between Maiko National Park and Kahuzi-Biega National Park

Human Activities

Demographic data for this Landscape are unreliable, particularly since the displacement of populations during recent conflicts. The population is unevenly distributed, with a rising density gradient moving from west to east: on the mountains of the Albertine Rift, the density is over 300 inhabitants/km²; the western lowland regions are relatively sparsely populated with approximately 80 % of the Landscape covered by forests without any permanent villages. The Landscape encompasses a mosaic of Bantu people characterized by their languages, notably Nande, Pere, Hunde, Nyanga, Rega, Kwame, Kumu and Shi. There are also small populations of Twa Pygmies, the majority of whom live near Kahuzi-Biega National Park in the south. Swahili is the most common language.

The principal economic activities in the Landscape are subsistence farming, hunting, extensive cattle farming, goat and/or sheep farming, mining, and some fishing. Most farming is carried out using slash-and-burn methods, with principal crops being manioc, cassava, rice, and beans (table 24.1). There are a few plantations near villages that grow oil palm, banana, coffee and cinchona, but most commercial plantations are no longer functional. Oil palm, extracted by simple hand methods throughout the landscape, is an important product traded in local villages, and may be transported by bicycle to larger village markets in the east.

Subsistence hunting takes place throughout the Landscape. The trade in bushmeat is not as developed as in western Central Africa, but consumption of bushmeat is high near mining camps and in some smaller towns and villages. Most lo-

cal bushmeat trade is monkey, duiker, antelope and rodents (table 24.2). Hunting for ivory also exists throughout the Landscape and is carried out by illegal armed groups. When an elephant is slaughtered, the meat also enters the bushmeat markets. River fishing is common throughout the Landscape, and some fish farming occurs near villages around Walikale.

Artisanal mining for gold, tin (tin-stone), coltan and diamonds is intensive in several areas of the Landscape, facilitated by dealers from neighboring countries who move the materials out by small plane. In some places, notably Walikale, these operations are so successful that the inhabitants have abandoned farming. Consequently, large quantities of food are brought in by plane at very high prices, completely destabilizing the local economy. There are few usable roads, but one asphalt surfaced road from Lubutu to Walikale in the center of the Landscape serves as a runway for small planes used by the mining business. In addition to the artisanal activities there are several commercial gold mining concessions in the southern segment of the Landscape.

There are no commercial logging concessions in the Landscape, but small-scale logging operations have long existed around certain villages. On the eastern fringes of the Landscape, charcoal production is also an important trade, supplying urban centers in the region.

Commercial cattle ranchers (along with goats and sheep) are extensively spreading throughout the highlands of the eastern portion of the Landscape. This is particularly damaging for the environment, since they practice clear-cutting of forest to create large expanses of pasture land.



Photo 24.3: Training of guards in mapping.

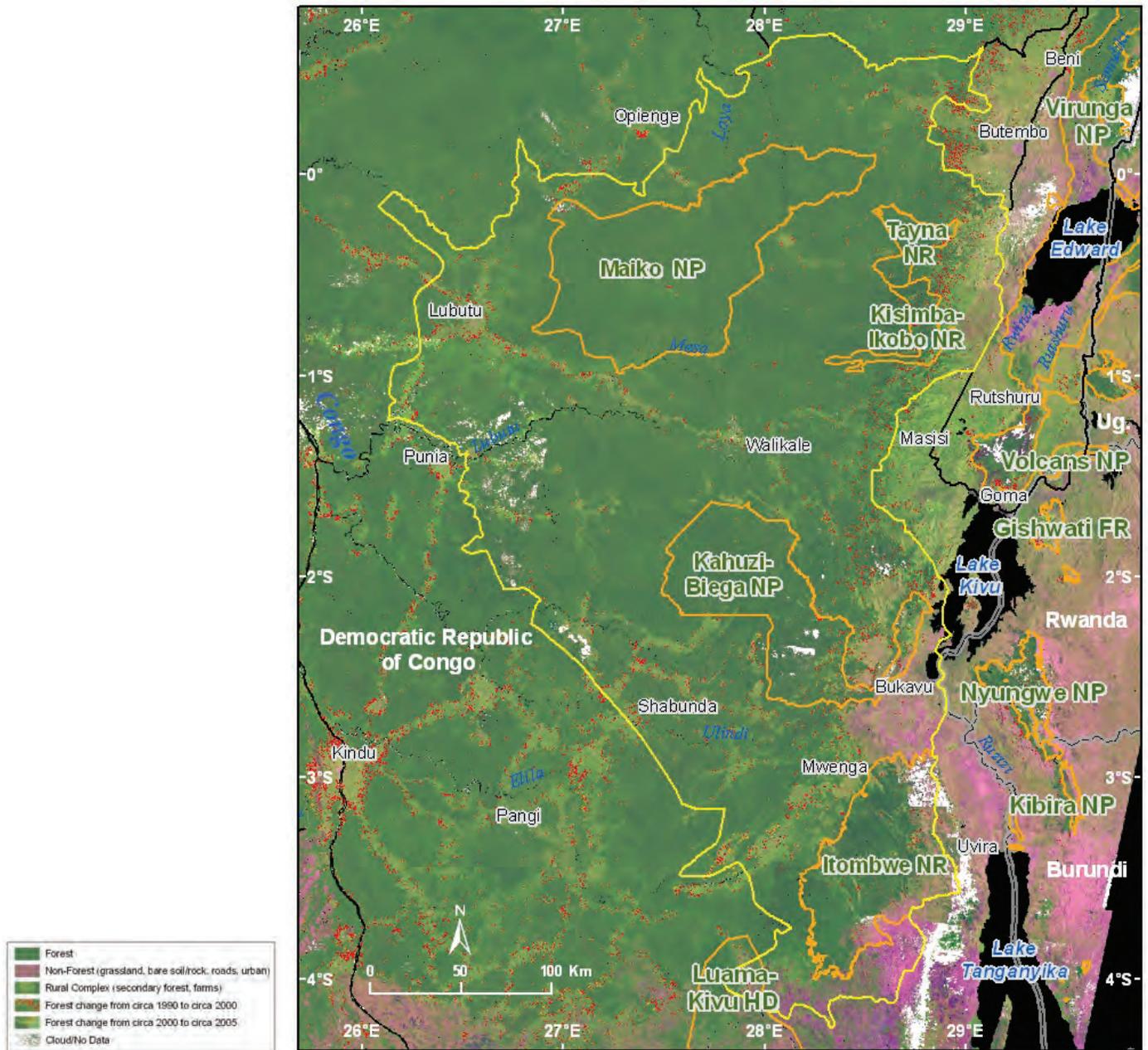
Table 24.1: Important agricultural products in the Maiko-Tanya-Kabuzi-Biega Landscape

Agricultural product	Unit	Purchase price/\$ per kg	Primary destinations	Date	Data collection	Sources
Location: UGADEC						
Cassava	Sack (100 kg)	30/0.30	Goma, Butembo, Kasugho, Miriki, Walikale, Pinga, Kasese, Lubutu	Jun-Aug 07	Data collection was made following three strategies: direct observations in mining camps, small villages and markets of bigger towns; discussions with the vendors; household surveys on main subsistence activities and small trades.	Socioeconomic surveys, field reports
Oil palm	<i>Bidon</i> (20 liters)	20/1.00 per l	Goma, Walikale, Bukavu, Pinga, Kanyabayonga, Kirumba, Mwesso, Masisi	Jun-Aug 07		
Rice	Sack (100 kg)	50/0.5	Wakikale, Goma, Kasese, Pinga, Masisi	Jun-Aug 07		
Location: Kahuzi-Biega						
Cassava	Sack (100 kg)	50/0.5	Bunyakiri	2004-2008	Market surveys	
Rice	Sack (100 kg)	50/0.5	Kamituga	2004-2009	Market surveys	
Beans	Sack (100 kg)	50/0.5	Baraka	2004-2010	Market surveys	

Table 24.2: Bushmeat trade in the Maiko-Tayna-Kabuzi-Biega Landscape

Bushmeat species	Unit	Purchase price/unit (\$)	Primary destinations	Date	Data collection	Sources
Location: UGADEC						
Monkeys (<i>Colobus</i> and <i>Cercopithecus</i>)	Half	10	<i>Carrés miniers</i> (Bisie, Irameso, Kasugho, Kibeleketa, Sakima) and villages (Oninga, Opyenge, Lubutu, Kasese, Walikale, Miriki, Rusamambu, Kibua, Mpofo, Bunyatenge)	Aug 07-Apr 08	Data collection was made following three strategies: direct observations in mining camps, small villages and markets of bigger towns; discussions with the vendors; household surveys on main subsistence activities and small trades.	Socioeconomic surveys, field reports
Antelope/duiker	Quarter	7	<i>Carrés miniers</i> (Bisie, Irameso, Kasugho, Kibeleketa, Sakima) and villages (Oninga, Opyenge, Lubutu, Kasese, Walikale, Miriki, Rusamambu, Kibua, Mpofo, Bunyatenge)	Aug 07-Apr 08		
Porcupine (<i>Atherurus</i>)	Whole	5	<i>Carrés miniers</i> (Bisie, Irameso, Kasugho, Kibeleketa, Sakima) and villages (Oninga, Opyenge, Lubutu, Kasese, Walikale, Miriki, Rusamambu, Kibua, Mpofo, Bunyatenge)	Aug 07-Apr 08		
Location: Itombwe						
Monkeys (<i>Cercopithecus</i>)	Whole	5 per kg	Kambegeti (PNKB), Lulimba (Itombwe),	2004-2008	Market surveys	
Antelope/duiker	Whole	5 per kg	Kambegeti (PNKB), Lulimba (Itombwe),	2004-2009	Market surveys	
African elephant (<i>Loxodonta africana</i>)	Whole	5 per kg	Kambegeti (PNKB), Lulimba (Itombwe),	2004-2010	Market surveys	

Forest Cover



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

Figure 24.3: Composite Landsat satellite image of the Maiko-Tayna-Kahuzi-Biega Landscape overlain with 1990 to 2000 forest loss (in red) and 2000 to 2005 forest loss (in orange)

Table 24.3: Forest cover and forest loss in the Maiko-Tayna-Kahuzi-Biega Landscape from 1990 to 2005.

Landscape area	Forest area			Forest loss			
	1990 (km ²)	2000 (km ²)	2005 (km ²)	1990-2000 (km ²)	1990-2000 (%)	2000-2005 (km ²)	2000-2005 (%)
105,736	92,376	91,404	90,600	972	1.05	804	0.88

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

Sources: SDSU, UMD-CARPE, NASA.

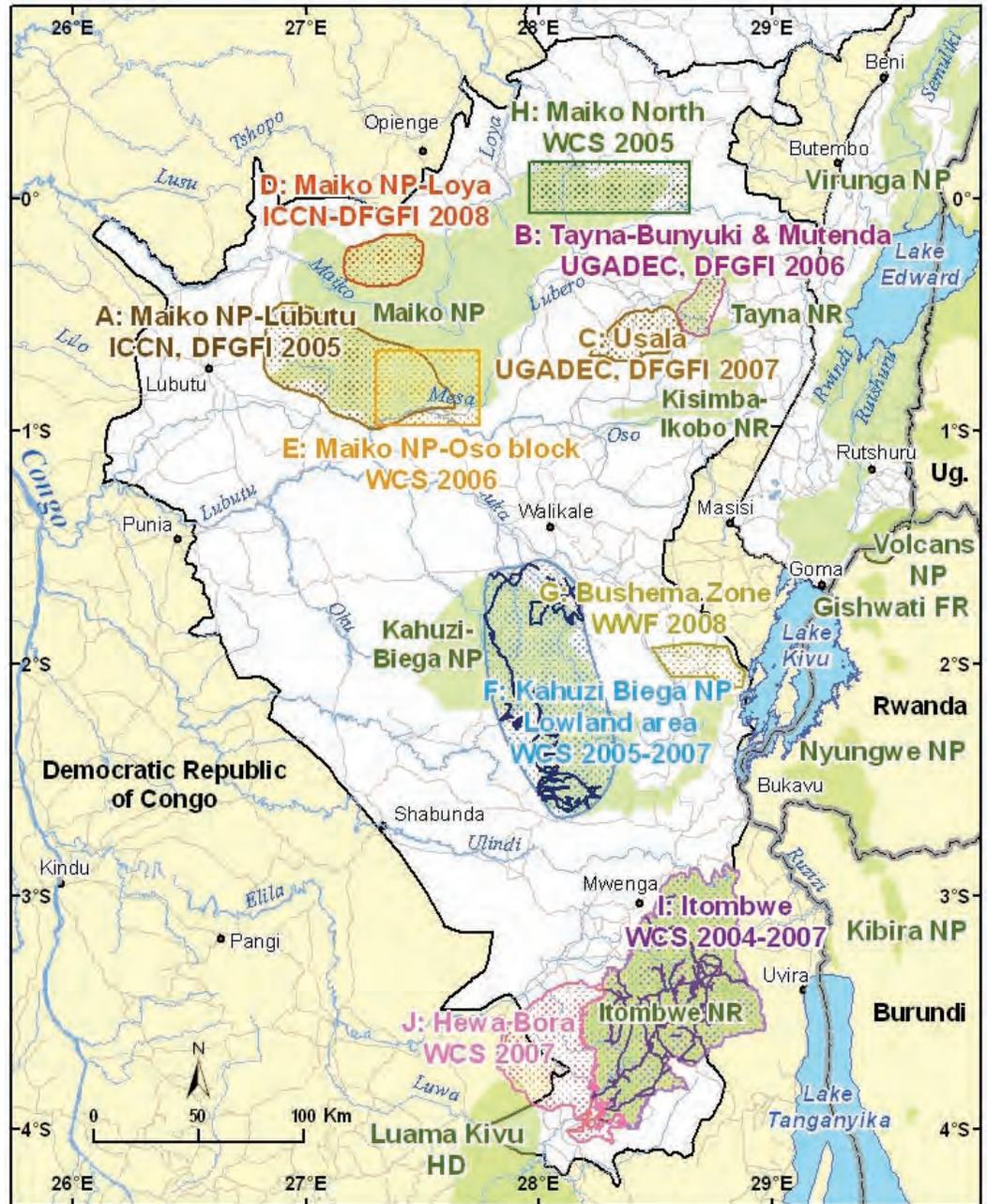
Forest loss was concentrated in three areas and can be attributed in general to expansion of agriculture and commercial pasturelands, as well as illegal mining. The largest expanse of deforestation was along the Albertine Rift region (area west of Lakes Edward, Kivu, and Tanganyika, from Butembo in the north, to Bukavu and Uvira in the south), where human population density is known to sometimes exceed 300 individuals per km². Here, there was a steady advance of forest loss from east to west, due to agricultural expansion as people sought more farmland, as well as the expansion of commercial cattle ranching (as in Latin America) to serve the beef and milk-product markets for large cities such as Butembo, Goma, and Bukavu. A second area of deforestation occurred around Lubutu and towards the southeast along the “Trans-African Highway”. This highway, clearly visible in the satellite image as a narrow corridor of pre-existing and newly degraded areas, is mostly paved between Lubutu and Walikale, and for much of the 1990s and early 2000s (as well as today) served as a series of airstrips facilitating the illegal mining of first coltan,

and then cassiterite (tin), both highly valued in the electronics industry and controlled by various illegal militias. Conversion of forest to agricultural fields in this area was related to new migrants moving into the area attracted by the illegal mining. A third area of forest loss spreads northeast from Shabundu and southeast to Mwenga and merges with the westward front of deforestation from the Bukavu area of the Albertine Rift. This area of deforestation was caused primarily by new migrants attracted to the illegal mining industry in the west, combined with farming and cattle ranching expansions coming from the Bukavu area in the east. Forest cover degradation is most severe in the Nindja ecological corridor (narrow zone between the highland and lowland sectors of Kahuzi-Biega NP) due to the illegal settlement of farmers and ranchers. It is also important to note that forest cover in the highland sector of the Kahuzi-Biega National Park is also threatened by an invasive species of vine (*Sericostachys scandens*) that covers and eventually kills many of the species of tree in this Afromontane habitat.

Large Mammal and Human Impact Monitoring



Photo 24.4: Gorilla (*Gorilla beringei graueri*) in the high altitude sector of Kabuzi Biega National Park.

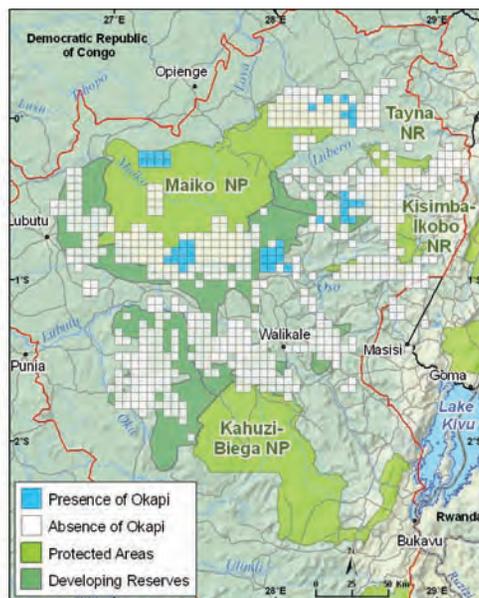
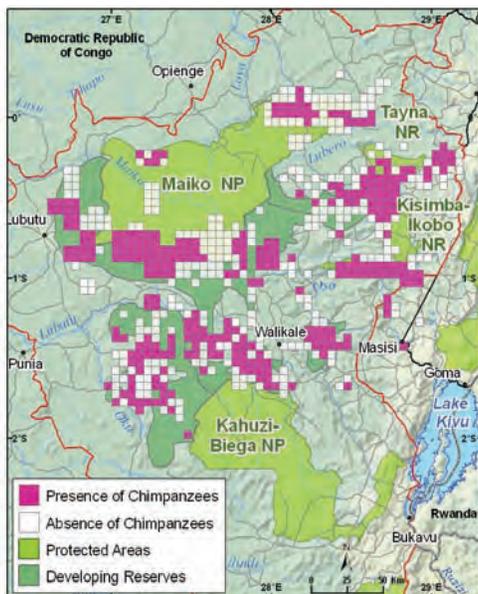
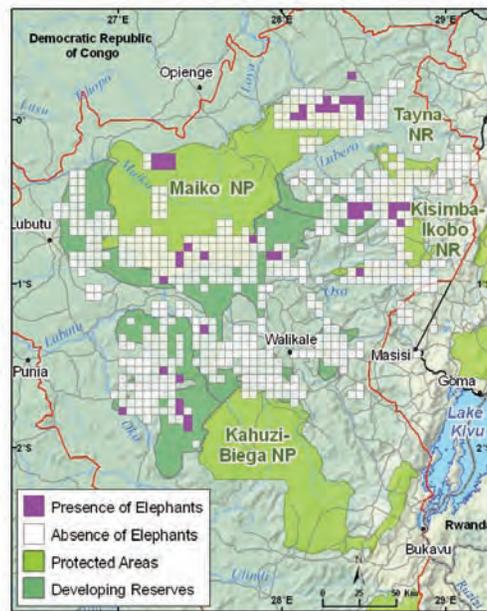
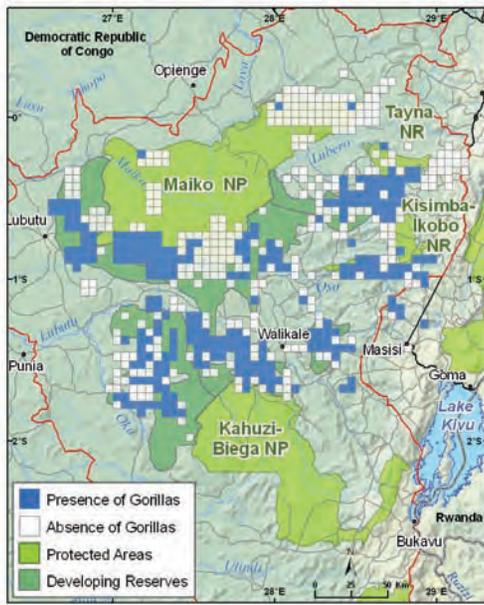


Sources: CI, DFGFI, UGADEC, ICCN, WWF, WCS, UMD-CARPE, OSFAC, FORAF

Figure 24.4: Biological surveys conducted in the Maiko-Tayna-Kahuzi-Biega Landscape

The locations of biological surveys carried out in the MTKB Landscape are shown in Figure 24.4 and the results of these surveys for the baseline biological indicators are displayed in table 24.4. For these landscape surveys, there have been a total of 1,469 km of reconnaissance and transect surveys. Elephant presence has been observed at low densities in each survey location. Great ape nest group encounter rate has been quite similar for each survey location (between 0.12 and 0.31 nest groups per km surveyed) with the exception of the Tayna area, where elephant and great ape

encounter rates are elevated compared to other sites. In the northern segment of the Landscape, a method of opportunistic data collection was employed, which included absence/presence observations in quadrants by trained teams (figure 24.5). The surveys revealed occupancy ranges for elephant, gorilla, chimpanzee and okapi. In the highland sector of Kahuzi-Biega NP, 121 gorillas in 9 social groups are regularly monitored by ICCN staff. In the Tayna NR, 14 gorillas in one social group is habituated and regularly monitored by Tayna staff.



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

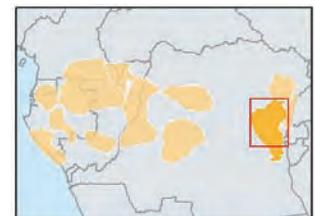


Figure 24.5: A system of quadrant (5.6 km by 5.6 km) monitoring by trained UGADEC field teams indicates those quadrants in which opportunistic surveys have been conducted (purple) against those quadrants in which evidence of gorilla, chimpanzee, elephant, and okapi have been recorded. This system is building a basic model of occupancy ranges for these species.

Table 24.4: Biological survey results from the Maiko-Tayna-Kabuzi-Biega Landscape

Survey	Site name	Survey date	Source	Lead	Total km of recces	Number of transects	Total km of transects	Other
A	Maiko NP-Lubutu	Feb-Apr 2005	DFGFI report	ICCN, DFGFI	170			
B	Tayna - Bunyuki and Mutenda	Mar-06	DFGFI report	UGADEC, DFGFI	61		28	
C	Usala	Mar-Apr 2007	DFGFI report	UGADEC, DFGFI	204			
D	Maiko NP-Loya (preliminary results)	May 2008	DFGFI report	ICCN, DFGFI	45			
E	Maiko Oso	Mar-May 2006	WCS-IMU tech. report 6	WCS	A) compass line: 301	0	No data	Compass line recces, linking 5 x 5 km grid centroids in a 600 km ² survey zone
F	Kahuzi lowland	2004 - 2007	WCS-IMU tech. report 8	WCS	A) Compass line: 511 B) trail 293	0	No data	A) Compass line recces oriented to selected waypoints in site, B) Recces along established paths
G	Bushema zone	2008	WWF report	WWF		7	14	Methods used: *Transect-observation done on both sides of the transect by using GPS and compass. Hunters were associated. *Recces
H	Maiko North	Jul-Aug 2005	WCS-IMU tech. report 4	WCS	A) compass line: 378	0	No data	Compass line recces, linking 5 x 5 km grid centroids in a 1,250 km ² survey zone
I	Itombwe	2004-2007	WCS-IMU Itombwe interim figures	WCS	Compass line and trail total: 1038	0	No data	Compass line and path recces, not separated in analysis.
J	Hewa Bora	2007	WCS-IMU Itombwe interim figures	WCS	Compass line and trail total: 71	0	No data	Compass line and path recces, not separated in analysis.

	Elephant presence	Elephant dung pile encounter rate (N/km)	Elephant dung pile density (N/km ²)	Ape presence	Ape nest group encounter rate (N/km)	Ape nest group density (N/km ²)	Human sign (N/km)
	Yes	0.02	0.005	Yes	0.14	0.03	
	Yes	0.56	0.36	Yes	1.16	0.75	0.84
	Yes	0.005	0.001	Yes	0.31	0.07	0.49
	Yes	0.29	0.05	Yes	0.15	0.03	0.38
	Yes	0.26	No data	Chimpanzee: yes gorilla: yes	Chimpanzee: 0.11 gorilla: 0.01	No data	Hunting: 0.76 Total: not calculated
	No	0	0	Chimpanzee: yes gorilla: yes	Chimpanzee: 0.14 gorilla: 0.05	No data	Hunting: 0.83 Mining: 0.15
	No	No data	No data	Yes			
	Yes	0.99	No data	Chimpanzee: yes gorilla: yes	Chimpanzee: 0.05 gorilla: 0.00	No data	Hunting: 0.74 Total: 1.90
	Yes	< 0.01	No data	Chimpanzee: yes gorilla: yes	Chimpanzee: 0.02 gorilla: 0.03	No data	Hunting: 0.41 Mining: 0.15
	Yes	0.06	No data	Chimpanzee: yes gorilla: yes	Chimpanzee: 0.76 gorilla: 0.15	No data	Hunting: 0.89 Mining: 0.04

Special Interest

Developing a Conservation Village

One of the first development incentives UGADEC communities asked of Dian Fossey Gorilla Fund International and Conservation International in exchange for their commitment to conservation was education. The Tayna Center for Conservation Biology (TCCB, registered with the state as the Kasugo University for Conservation and Rural Development) is the product of that partnership. By any measure, establishing the TCCB is an extraordinary achievement for an association of rural communities in a developing country. Under the prevalent conditions in eastern DRC, it defies belief. In addition to its academic facilities, the University supports a student-run AM radio station, a 28-bed clinic, complete with a laboratory and operating theater, a primary school and orphanage. And this entire complex was hand-built by the villagers of Kasugho – the widow’s association pressed and fired the bricks; local craftsmen built all the furniture, doors, and windows. With the support of Jane Goodall Institute, in November 2007, the TCCB and the neighboring village of Kasugho began operating a 37kW hydro-electric dam that

provides constant and emissions-free electricity to the university, the hospital, and public lighting to the village. A village committee oversees its operation, and is making available electrical power to small development projects.

By October of 2008, more than 200 students had received their diplomas in conservation biology (a three-year degree). As the sons and daughters of the stewards whose land easements form the reserves of UGADEC, these graduates will one day inherit their parents’ responsibility to adjudicate land-use rights in their communities. Without the leadership and vision of their elders, these students would likely have been limited to a life tilling the land, mining under harsh conditions, or poaching protected wildlife. Yet as new graduates, they have returned to their communities, qualified to work as field researchers, rangers, wardens, protected area managers, teachers, conservation journalists, and out-reach workers. Once the traditional rights of their elders are passed on to them, these graduates will have both the knowledge and the skills needed to make the critical decisions necessary to protect their land.

The impact of the university is remarkable and far-reaching. In addition to construction jobs, the local population now has access to doctors, nurses, and the health center’s services. Agricultural extension programs support local farmers, and children have access to primary and high school education. The radio station broadcasts messages to the local communities concerning conservation, politics, music, culture, and women’s and family issues. However, the University’s true value for conservation rests with the students: they are the new generation of conservation stewards of the land that lies within the Maiko-Tayna Kahuzi-Biega corridor.



Photo 24.5: The Tayna Center for Conservation Biology is a community-managed university, specializing in conservation biology, and serving the needs of local people involved in community conservation.