CHAPTER 19
## SANGHA TRI-NATIONAL (TNS) LANDSCAPE

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Land Use Planning
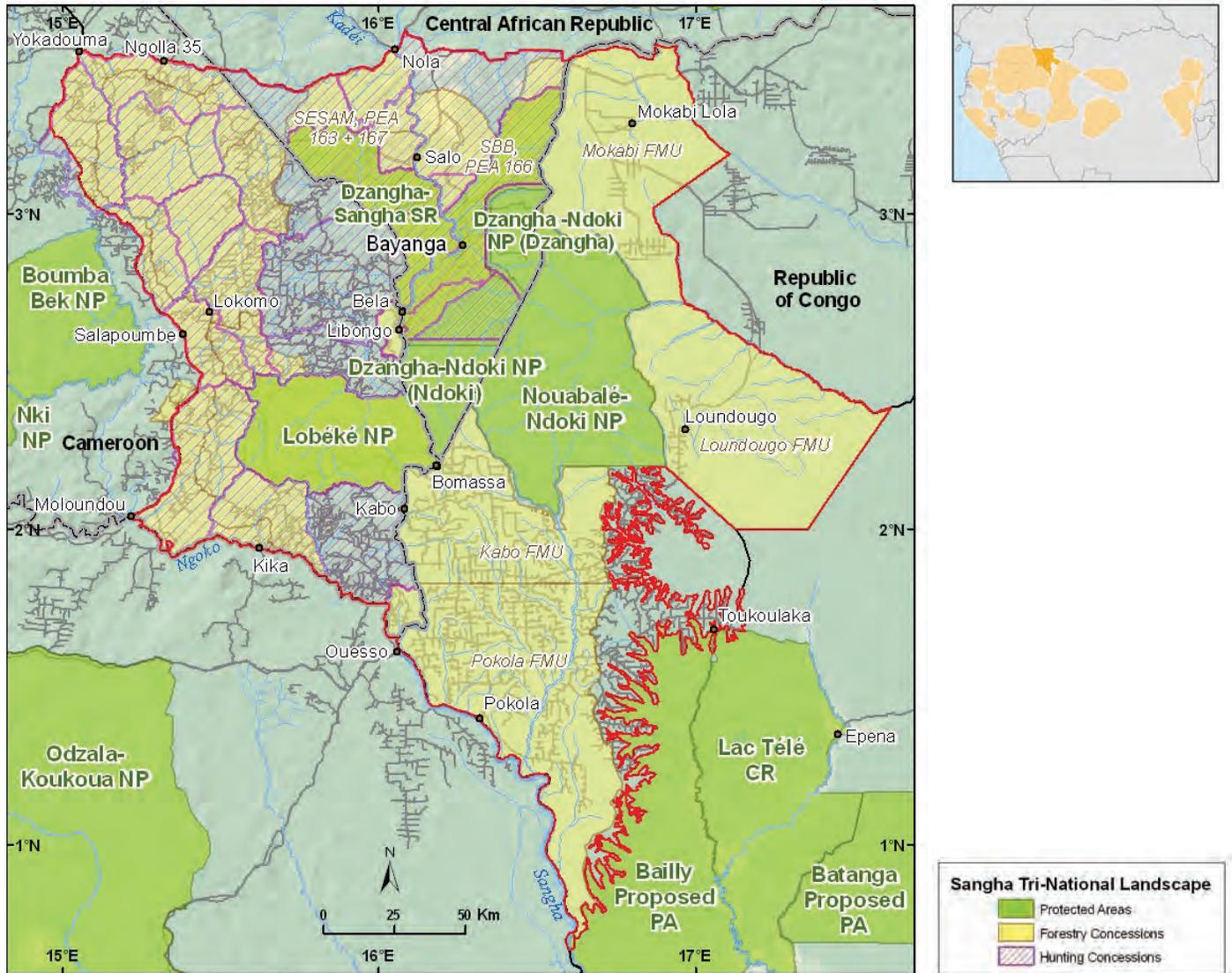
Sources: WWF, UMD-CARPE, OSFAC, FORAF, IUCN, Tom Patterson, US National Park Service.
Figure 19.1: Macro-zones in the Sangha Tri-National (TNS) Landscape

The Sangha Tri-National (TNS) Landscape consists of three national parks: Lobéké (Cameroon), Nouabalé-Ndoki (ROC) and Dzanga-Ndoki (CAR), covering in total 4,520,000 ha. The surrounding multiple use zones with logging concessions, community use zones and professional hunting areas make up 3,751,800 ha.

The TNS land use plan is a state of the art document that describes the TNS Landscape's forest vegetation types and presents land uses and the management strategies employed by the diverse actors in the different segments of the TNS Landscape. It brings together existing knowledge

Photo 19.1: Children also take advantage of forest products.

concerning: vegetation types, animal populations and movements, road infrastructure and human settlements, land use zoning maps and overlays and conservation management (law-enforcement) infrastructure. It is a technical document defining the broad axis of landscape management and identifying the weak spots in the management.

The TNS land use plan is also:

- A strong visionary statement that describes perspectives on land use planning, and implementation strategies with direct participation of all stakeholders within context of trans-boundary collaboration. The document defines, from a local perspective, policy issues related to forest and wildlife legislation and issues related to land-use (access) rights of local/indigenous peoples. It identifies problems of implementing national legislation and proposes appropriate solutions.

- A showcase that clearly demonstrates to the governments and donors, the management of complex landscapes. This document will provide technical, institutional and political leverage for the TNS Landscape to COMIFAC and may serve as a tool for facilitating the implementation of the TNS Trust Fund process and other long term funding initiatives for the region.

The land use plan proposes a vision for the TNS Landscape and, in broad terms, a ten-year strategy of how to get there. The master plan provides guidelines for managing natural resources in the Landscape based on a major axis of cross boundary interventions and coordination. Some

of the sensitive issues described in the land use plan document include:

- differences in forest legislation (e.g., the ban on exporting logs) or forest management influencing land use planning in the different units of the TNS Landscape;
- differences in subsistence and sport hunting legislation;
- access and land rights of Pygmies (bearing in mind that the TNS Landscape may have the highest concentration/number of Pygmies in Central Africa) as well as those of other local peoples;
- locations of human settlements in the TNS Landscape.

Significant progress has been made in management planning for individual land use units within the TNS Landscape. A number of national parks have management plans approved, as do a number of forestry concessions and wildlife zones. Although the management plan for Dzanga Ndoki National Park in CAR is yet to be developed, most information and baseline data exist for the Park. Furthermore, management plans have been approved for a number of forest concessions and some forestry companies have made progress towards certification. A total of 1,051,600 ha out of 3,388,803 ha of forest concessions are FSC certified (table 19.1). Even though these activities are executed within the specific contexts of each country and are, therefore, not supported under the umbrella of the TNS Landscape, it is these management planning processes of individual land units that define by-and-large the TNS land use plan.

Photo 19.2: Logging trucks being controlled by State agents.

Table 19.1: Management effectiveness for forest management units (FMU) inside TNS

Country	Logging company	Area (km²)	Year attributed to present holder	Forest under exploitation since (year)	FMU management planning process	Certification process stage	Level of transfor-mation	Other land-use	Co-management agreement for wildlife
Cameroon									
FMU 10-008, 10-009, 10-010, 10-012	SEFAC/ SEBAC	2,910		1970	Plan adopted	FSC-certified except UFA 10-009) (09/2007)	2 + 3	ZIC 29, 30, 36	Nsok Safaris, Faro West Sa-faris, Africam Safaris
FMU 10-001, 10-002, 10-003, 10-004	Vicwood-Thanry	1,931	1996	1997	Plan adopted	Chain of custody approved by SGS	1	ZIC 35, 36 + ZICGC 5, 4	Bosacam, Af-ricam Safaris, COVAREF Bangue and Bidjouki
FMU 10-007, 10-011	Vicwood-Thanry	1,709	1997	1990	Plan adopted	Chain of custody approved by SGS	1	ZIC 28 + ZICGC 01	Ngong Safaris, COVAREF Salokomo
FMU 10-005	STBK	893	2001	2002	Plan adopted	Not engaged	1	ZIC 37 + ZICGC 06	Patrick Teresi, COVAREF Bouloba
FMU 10-013	ALPI-CAM	508	2002	1975	Planning convened	Not engaged	1	ZICGC 02	COVAREF Boumba-Ndjombi
FMU 10-063	SIBAF (1973)/ ALPI-CAM (2004)	689	2000	1973	Plan adopted	Engaged	1	ZICGC 03	COVAREF Ndjombi Bolo
FMU 10-064	Filière Bois	1,144	2001	1975	Plan adopted	FSC-certified (09/2007)	2 + 3	ZIC 31	Polo Safari
Congo									
FMU Kabo	CIB	2,870	1997	1968	Plan adopted	FSC-certified (06/2006)	1	Village + semi-nomad	WCS
FMU Pokola	CIB	4,500	1968	1975	Draft plan available	FSC-certified (07/2008)	2	Village + semi-nomad	WCS
FMU Loundougou	CIB	4,230	2002	2003	Planning convened	In process		Village + semi-nomad	WCS
FMU Toukoulaka FMU Mokabi	CIB	2,080	1968 (as Pokola)	1993	Planning convened	In process		Village + semi-nomad	WCS
	Rougier	3,600	1999	1999	Planning convened	-------	0		

Country	Logging company	Area (km²)	Year attributed to present holder	Forest under exploitation since (year)	FMU management planning process	Certification process stage	Level of transformation	Other land-use	Co-management agreement for wildlife
CAR									
PEA 166	Ex-SBB	2,876	Currently not attributed	1975	No plan		1 + 2	Safari hunting zone	
PEA 163	SESAM 1	3,693	Currently not attributed	1985	No plan		1 + 2	Safari hunting zone	
PEA 167	SESAM 2	943	Currently not attributed	1968	No plan		1 + 2	Safari hunting zone	
PEA 185	SCAF	2,706	2005	1972	Planning convened		1 + 2		PDS (WWF, GTZ)
PEA 164	Vicwood-Thanry	2,249	1995	1995	Plan adopted		1 + 2	Safari hunting zone	

Human Activities

The TNS Landscape spans four districts (*"Préfectures"* or *"Départements"*) located in three countries:

- Cameroon: The Boumba and Ngoko District with the administrative center of Yokadouma;
- CAR: The Sangha Mbaéré District with the administrative center of Nola;
- ROC: The Likouala Department with the administrative centers of Ouesso and Impfondo, respectively.

Yokadouma, Nola and Ouesso are at the periphery of the Landscape. Impfondo falls outside the currently defined limits of the TNS Landscape.

The TNS economy is entirely based on extractive exploitation of the forest resources, in the formal sector for timber and in the informal sector for diamonds, bushmeat, palm wine, fish and other NTFPs. Locally, agricultural production has some importance in Cameroon. The impacts of this extractive economy on the socio-economic conditions and activities in the administrative centers or the local villages are not easy to quantify as they are diffuse and fluctuate considerably over time. However, what is evident is that poverty is rife. Social services, such as schooling and health, benefit little from the revenue generated from forest exploitation. Although some local people find employment in this industry, most of the jobs go to better trained workers who are brought in from elsewhere.

The industrial logging towns are self-reliant islands where the concession holder (owner) is expected to provide, which he does in most cases, social services and infrastructure for the concession's own workers and families. The extent to which this benefits local villages and the local administrative towns is, as mentioned above, very small.

With a surface area of about 45,200 km² and a total population of around 200,000, the population density of the TNS Landscape can be estimated at 5 individuals/km². Approximately two thirds of the populations in the industrialized towns are immigrants from outside the TNS Landscape. Table 19.2 summarizes human population densities and distribution in major towns and villages within the TNS Landscape. In the context of the table, the general term "Pygmies" is used as a common designation for different "semi-nomadic" ethnic groups. Inside the limits of the TNS Landscape, there are distinct Pygmy populations, known as "Baka" in South-East Cameroon, "BaAka" in Southern CAR, and "Mbenzélé" in northern Congo.

The principal threats to biodiversity conservation within the TNS Landscape remain hunting and the commercial bushmeat trade, unsustainable commercial logging, uncontrolled mining, ivory trade and the capture and trade in African grey parrots. These threats are addressed by the land use plan and tackled directly by field project activities.

Table 19.2: Population distribution inside the limits of the Sangha Tri-National Landscape

Country	Administrative centers		Industrial towns		Rural villages (all)		Pygmies
	Name	Population	Name	Population	Name	Population	Population
Cameroon	Yokadouma	10,000	Lokomo	2,700	*Sous-préfecture* Yokadouma	24,300	3,400
	Moloundou	3,200	Libongo/Bela	4,300	*Sous-préfecture* Moloundou	16,100	7,100
			Kika	1,400			
			Ngolla 35	1,150			
CAR	Nola	37,000	Bayanga	4,000	Dzangha-Sangha Special Reserve	2,250	1,150
			Salo	2,000	Outside the Reserve	8,000	3,000
Congo	Ouesso	22,000	Kabo	3,000	FMU Kabo	650	
			Pokola	14,500	FMU Pokola	2,500	1,700 (50 % in Pokola)
					FMU Toukoulaka	2,300	900
					FMU Loundougou	6,000	2,700
					FMU Mokabi	4,000	
Total		**72,200**		**33,050**		**66,100**	**19,950**

Total population TNS: approx. 191,000

Source: Defo, 2007; APDS, 2006; PROGEPP, 2005; Kamis, 2006.

Table 19.3a: Important agricultural products trade in the markets of Sangha Tri-National Landscape

Agricultural product	Unit	Purchase price/unit ($)	Primary destinations	Date	Data collection	Sources
Dzanga Ndoki, CAR						
Coco (*Gnetum africanum* and *Gnetum bucholzianum*)	1 cup	0.11	Bayanga	2006-2008	Market surveys	APDS unpublished data
Chili /piment (*Capsicum spp.*)	1 cup	0.11				
Manioc leaves ((*Manihot esculenta*)	1 cup	0.11				
Amarante (*Amaranthus hybridus*)	1 cup	0.11				
Spinach (*Spinacia oleracea*)	1 cup	0.11				
Lobéké segment, Cameroon						
Plantain (*Musa paradisiaca*)	Bunch (average size)	2.22	Mboy II-Mang	Feb 2007	Stratified sampling	Fogue and Defo, 2007
Macabo (*Xanthosoma sagittifolium*)	Bowl	3.33				
Manioc (couscous) (*Manihot esculenta*)	Bowl	4.44				

Table 19.3b: Bushmeat species trade in the markets of Sangha Tri-National Landscape

Bushmeat species	Unit	Purchase price/unit ($)	Primary destinations	Date	Data collection	Sources
Dzanga Ndoki, CAR						
Blue duiker (*Cephalophus monticola*)	Kg	3.57	Bayanga	2006-2008	Market surveys	APDS unpublished data
Bongo (*Tragelaphus euryceros*)	Kg	3.57				
Yellow-backed duiker (*Cephalophus sylvicultor*)	Kg	3.57				
Water chevrotain (*Hyemoschus aquaticus*)	Kg	3.1				
Moustached monkey (*Cercopithecus cephus*)	Kg	2.38				
Greater white-nosed monkey (*Cercopithecus nictitans*)	Kg	2.38				
Black and white colobus (*Colobus guereza*)	Kg	3.1				
Crested mangabey (*Cercocebus agilis*)	Kg	3.8				
Red river hog (*Potamochoerus porcus*)	Kg	3.8				
Major settlements and Loundoungou Forestry Management Unit, Congo						
Blue duiker (*Cephalophus monticola*)	Kg	0.75	Loundoungou FMU	Sep 07-Feb 08	Market surveys	PROGEPP unpublished data
Peter's duiker (*Cephalophus callipygus*)	Kg	0.74				
Red river hog (*Potamochoerus porcus*)	Kg	0.69				
Lobéké segment, Cameroon						
Brush-tailed porcupine (*Atherurus africanus*)	Whole (fresh)	4.44	Mboy II-Mang	Feb 2007	Stratified sampling	Fogue and Defo, 2007
Blue duiker (*Cephalophus monticola*)	Whole (fresh)	3.33				
Red duiker: Bay duiker, Peter's duiker, White-bellied duiker, Black-fronted duiker (*Cephalophus dorsalis, C. callipygus, C. leucogaster, C. nigrifrons*)	Whole (fresh)	22.22				

Forest Cover
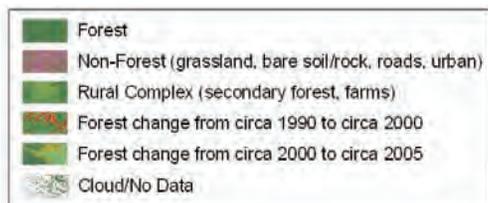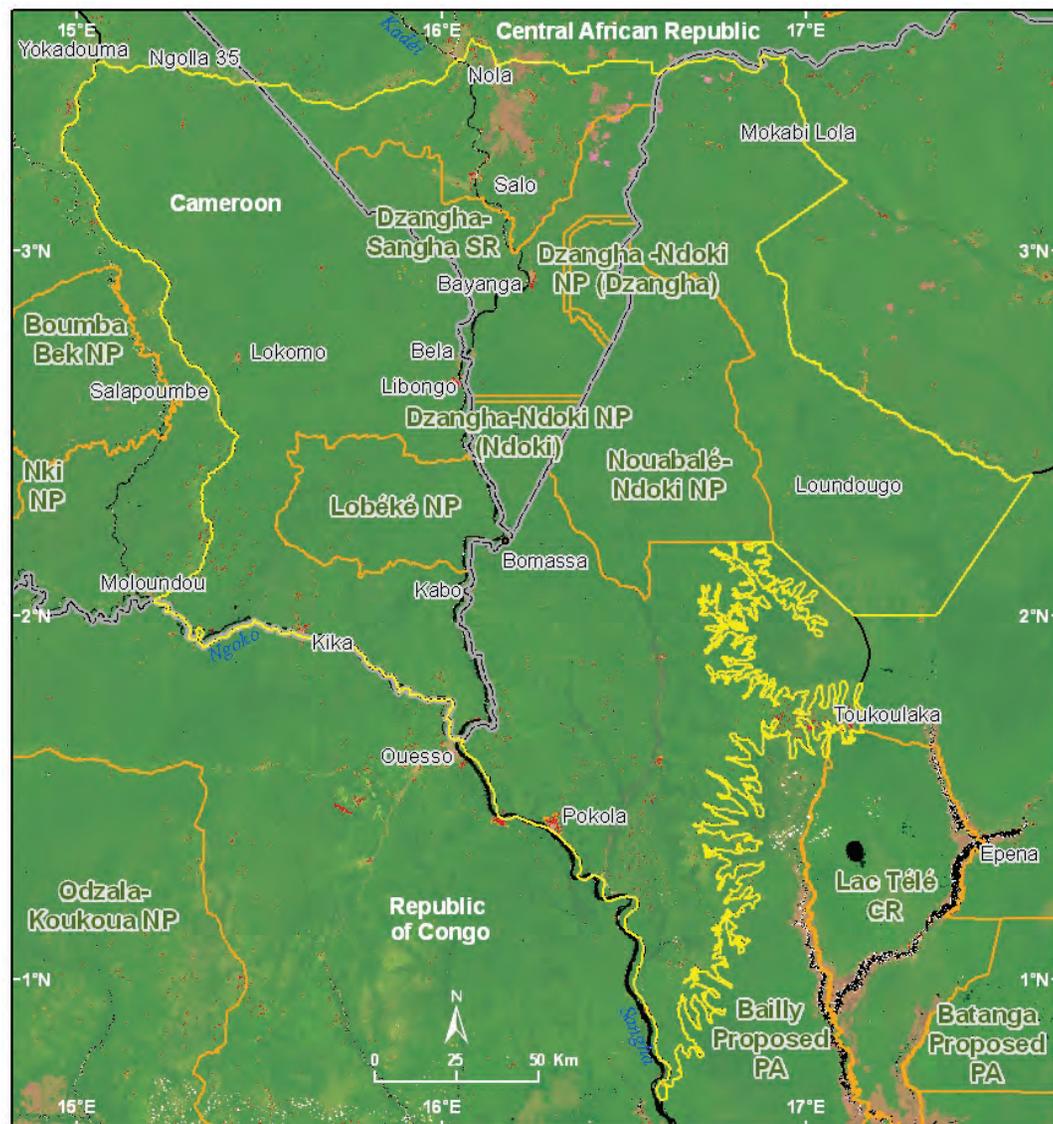
Sources: SDSU, UMD-CARPE, NASA, SRTM, IUCN, FORAF.

Figure 19.2: Composite Landsat satellite image of the Sangha Tri-National Landscape overlain with 1990 to 2000 forest loss (in red)and 2000 to 2005 forest loss (in orange)

Table 19.4: Forest cover and loss in the Sangha Tri-National Landscape from 1990 to 2005

Landscape area	Forest area			Forest loss			
	1990 (km²)	2000 (km²)	2005 (km²)	1990–2000 (km²)	1990-2000 (%)	2000-2005 (km²)	2000-2005 (%)
43,936	42,820	42,743	42,608	77	0.18	135	0.32

Forest cover and forest cover loss are derived from Landsat and MODIS satellite data.
Sources: SDSU, UMD-CARPE, NASA.

Photo 19.3: Overview of a bai in Dzanga-Ndoki National Park.

The most striking feature of vegetative change in the TNS Landscape is the extent to which forests have been heavily exploited by commercial logging with significantly lower cover of primary forest in many areas. The only exceptions are unlogged forests of Dzanga-Ndoki zone and part of northern Congo. Estimated proportion of forest loss from circa 1990 - 2000 is about 0.2 % which is relatively low when compared to other areas in the Congo Basin. However, several factors such as increased allocation of forest concessions and expanding slash-and-burn agricultural practices account for the significant percentage (0.32 %) of forest loss in the region between 2000 and 2005.

It is well recognized that forest exploitation generates a dynamic in vegetation that is not per se negative. Elephants and gorillas are known to prefer to forage on vegetation types found in secondary forest regrowth areas. On the whole, the biodiversity of the entire landscape will be enhanced if there is a balance between undisturbed primary forest and well managed forest concession areas.

Large Mammal and Human Impact Monitoring

Biological surveys have been carried out in about 60 % of the TNS Landscape with results indicating relatively healthy populations of flagship species notably elephants and great apes. Results of dung counts of elephants in national parks gave counts of 550.96 ± 169.1 dung/km² in Nouabalé Ndoki (NN) and 2,555.2 ± 222.2 dung/km² in Lobéké. Similar surveys in logging concessions surrounding the national parks, indicated figures ranging from 22.19 ± 30.7 dung/km² in the Mokabi UFA (north Nouabalé Ndoki National Park) to 2,125.3 ± 423.47 dung/km² in UFA 10-012 (north Lobéké National Park). Results of dung counts indicate high and relatively stable populations of elephants within the TNS Landscape. Hunting of elephants for ivory trade remains a significant threat to elephant populations in the area. For example in July 2008, in Lobéké, Cameroon, 22 elephant tusks were confiscated from arrested poachers.

With regards great ape populations, results from nest counts in national parks, indicated 70.28 ± 30.74 nest group/km² in Nouabalé Ndoki National Park as compared to 162.12 ± 26.01 nest group/km² in Lobéké. The TNS Landscape harbors some of the healthiest populations of great apes in Central Africa as confirmed by results of nest counts.

Human activities, especially hunting and bushmeat trade, are relatively intense in surrounding extractive use zones such as logging concessions. Areas with the high hunting intensities within the TNS Landscape include Mokabi FMU in Congo and UFA 10-008 in Cameroon which are densely populated with workers of logging companies.

Photo 19.4: Path in Dzanga-Ndoki National Park used to see habituated gorillas.
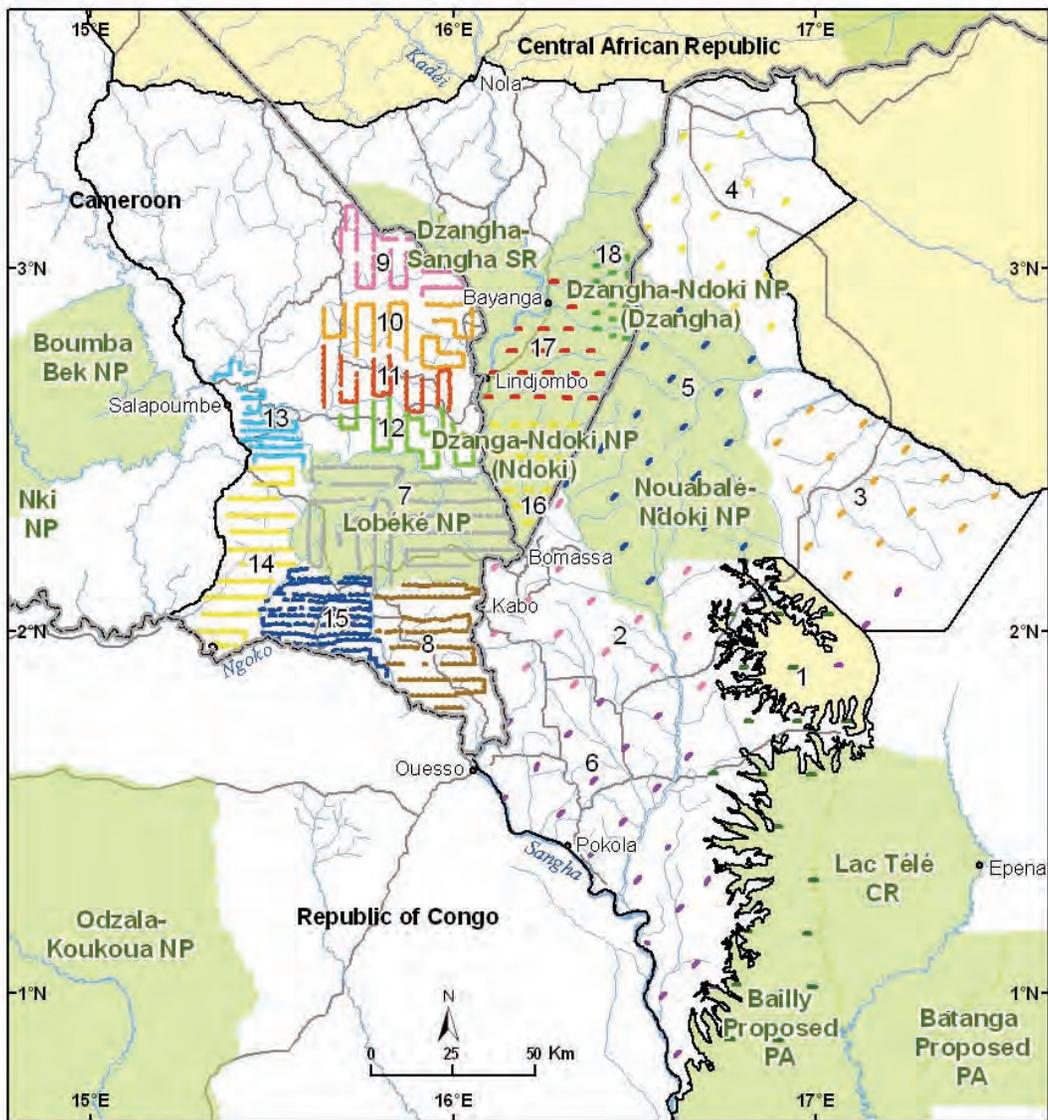
Sources: WWF, WCS, SEFAC, GTZ, MIKE, UMD-CARPE, OSFAC, FORAF.

Figure 19.3: Biological transects and recces conducted in Sangha Tri-National Landscape

Table 19.5: Biological survey results from the Sangha Tri-National Landscape

Survey	Site name	Survey date	Lead organization(s)	Number of transects	Total km of transects	Elephant presence	Elephant dung pile encounter rate (N/km ± 95 % confidence interval)	
1	Bailly/Bodingo / Toukoulaka	Jan-May 2006	WCS	24	48	Yes	2.68 ± 2.57	
2	Kabo FMU	Jan-May 2006	WCS	15	30	Yes	3.83 ± 1.62	
3	Loundougou FMU	Jan-May 2006	WCS	20	40	Yes	2.07 ± 1.62	
4	Mokabi FMU	Jan-May 2006	WCS	15	30	Yes	0.14 ± 0.19	
5	Nouabalé-Ndoki National Park	Jan-May 2006	WCS	20	40	Yes	3.42 ± 1.00	
6	Pokola FMU	Jan-May 2006	WCS	21	42	Yes	4.34 ± 2.39	

(*) For accuracy purpose, ape nest group density estimates are based on fresh/recent nests (not old ones).
Source: Stokes, 2007.

Survey	Site name	Survey date	Lead organization(s)	Total km of recces	Number of transects	Total km of transects	Elephant presence	Elephant dung pile encounter rate (N/km ± 95 % confidence interval)	
7	Lobéké National Park	Nov 05-Feb 06	WWF	198	194	190	Yes	8.01 ± 0.641	
8	UFA 10-064	Jul-Oct 2004	WWF and SEFAC	129	123	123	Yes	4.42 ± 0.5	
9	UFA 10-008	Feb-Jul 2005	WWF and SEFAC	77	77	77	Yes	0.234 ± 0.201	
10	UFA 10-009	Feb-Jul 2005	WWF and SEFAC	91	91	91	Yes	1.429 ± 0.462	
11	UFA 10-010	Feb-Jul 2005	WWF and SEFAC	70	70	70	Yes	2.186 ± 0.70	
12	UFA 10-012	Feb-Jul 2005	WWF and SEFAC	76	76	76	Yes	3.684 ± 1.258	
13	ZICGC 1	May-Aug 2007	WWF and GTZ	92	88	88	Yes	2.367 ± 0.472	
14	ZICGC 2	Apr-Jun 2007	WWF and GTZ	112	111	110	Yes	0.341 ± 0.127	
15	ZCGC 3	May-Aug 2007		155	154	154	Yes	0.521 ± 0.121	
16	Dzanga-Ndoki National Park (Ndoki)	Aug 2003-Apr 2004	WCS (MIKE)	383	75	26	Yes	8.5	
17	Dzangha-Sangha SR	Aug 2003-Apr 2004	WCS (MIKE)			24	Yes	1.4	
18	Dzangha-Ndoki National Park (Dzangha)	Aug 2003-Apr 2004	WCS (MIKE)			7.5	Yes	9.9	

7) Nzooh Dongmo et al., 2006; 8) Nzooh Dongmo et al., 2004; 9, 10, 11 and 12) Nzooh Dongmo et al., 2005; 13) Mendomo Biang and Nzooh Dongmo, 2007; 14) Ghogue and Nzooh Dongmo, 2007; 15) Mengamenya Goue and Nzooh Dongmo, 2007; 16-18) Blake, 2005

Elephant dung pile density (N/km² ± 95 % confidence interval)	Ape presence	Ape nest group encounter rate (N/km ± 95 % confidence interval)	Ape nest group density* (N/km² ± 95 % confidence interval)	Human sign (N/km ± 95 % confidence interval)
432.44 ± 416.4	Yes	0.65 ± 0.33	26.6 ± 13.58	0.75 ± 0.09
616.81 ± 266.6	Yes	1.31 ± 0.75	52.89 ± 30.48	1.60 ± 0.92
333.81 ± 263.4	Yes	1.59 ± 0.82	64.21 ± 33.51	1.26 ± 0.53
22.19 ± 30.7	Yes	0.45 ± 0.50	18.26 ± 20.26	3.93 ± 0.41
550.96 ± 169.1	Yes	1.74 ± 0.75	70.28 ± 30.74	0.28 ± 0.21
697.94 ± 390.6	Yes	3.07 ± 1.65	123.65 ± 67.23	2.21 ± 0.38

Elephant dung pile density (N/km² ± 95 % confidence interval)	Ape presence	Ape nest group encounter rate (N/km ± 95 % confidence interval)	Ape nest group density* (N/km² ± 95 % confidence interval)	Human sign (N/km ± 95 % confidence interval)	Apes nest density
2,555.2 ± 222.2	Yes	0.474 ± 0.057	162.12 ± 26.01	0.681 ± 0.149	252.7 ± 42.24
1,832.63 ± 3,223.83	Yes	0.623 ± 0.102	138.6 ± 29.131	0.933 ± 0.138	375.45 ± 85.534
	Yes	0.39 ± 0.182	0.97 ± 0.26	2.019 ± 0.343	148.68 ± 43.048
499.54 ± 96.275	Yes	0.604 ± 0.183	206.54 ± 41.63	1.286 ± 0.327	295.83 ± 62.959
1,179.5 ± 292.55	Yes	0.429 ± 0.81	144.2 ± 45.38	0.645 ± 0.146	205.69 ± 67.693
2,125.3 ± 423.47	Yes	0.184 ± 0.120	92.42 ± 41	0.821 ± 0.215	158.27 ± 74
1,950.3 ± 403.7	Yes	1.111 ± 0.16	2.243 ± 0.41	4.374 ± 0.49	3.993 ± 0.759
1.60 ± 0.62	Yes	0.70 ± 0.108	185.71 ± 34.98	3.229 ± 0.333	287.87 ± 59.073
137.51 ± 34.853	Yes	1.285 ± 0.133	161.76 ± 20.592	2.200 ± 0.256	326.74 ± 45.043
960.4	Yes	1.04	1.49	2.92 transects 1.72 recces	
162.7	Yes	0.58	0.84	6.89 transects 4.84 recces	
1,114.2	Yes	0.66	0.96	4.28 transects 1.42 recces	

Photo 19.5: Wildlife mirador over a rainforest bai.

Photo 19.6: A female sitatunga (Tragelaphus spekei), a species with an affinity for wetlands.

Photo 19.7: School built using revenues generated by sport hunting.

[2] CFA 1 = 655.957 Euro

Special Interest

How Conservation is Contributing to Livelihood of Local Communities of TNS

In the heart of the Congo Basin rainforest, a people-centered conservation approach is yielding benefits to local people and contributing to wildlife protection. This has been made possible due to the rich wildlife and fascinating magical traditions of indigenous forest people, the Baka and BaAka pygmies and Bantu communities. Thanks to efforts of key conservation partners in the region, namely WWF, WCS and GTZ, the local communities have been organized and are involved in ecotourism and other income generating activities aimed at improving their living conditions.

In Bayanga, Central African Republic, a gorilla habituation project presages a new era for local people. Each year, tourists visit the area where they are offered extraordinary opportunities to accompany the BaAka pygmies on guided tours to observe western lowland gorillas and see the elusive forest elephants and other wildlife. Traditional hunting by BaAka pygmies, using bows and arrows, nets etc. and collection of medicinal and edible plants are a source of attraction and an income earner too. These activities have contributed significantly to the local economy with accompanying improvement in the living condition of local people. Proceeds from this project have been spent on provision of health services and education, training in agricultural techniques, and helped legalize village traditional hunting by BaAka pygmies in the area. The economic position as well as their political standing of BaAka pygmies has been strengthened by assisting them to maintain their habits and exploit the forest according to their traditions.

In Nouabalé Ndoki National Park, local communities are directly involved in guided tours to the Mbeli Bai, a swampy clearing measuring some 15 ha visited by 130 gorillas. Locals also guide adventurous tourists to track groups of habituated gorillas through the forest in another Congo site outside the park, known as Mondika. These activities have had significant impact on the local economy. Every visitor pays CFA 5,000[2] daily. The proceeds are managed by a village development fund. In 2007, the funds, totaling CFA 3,325,000 (approximately $ 6,500), were spent on basic amenities such as schools, dispensaries and electricity supply in Bomassa and Makao, villages located at the periphery of the park. This has created a propitious environment for other fledgling tourist activities, amongst them traditional dances and making of artistic objects, hitherto less developed in the area.

Around Lobéké National Park, trophy hunting in a community hunting area is generating some $ 50,000 each year. This money is managed by local wildlife management committees. It is invested in education, through the construction of schools (Figure 19.4) and the provision of potable water through improvement of water sources and well construction. The result is greater involvement of local communities in wildlife protection.

The people-centered conservation approach has enabled local communities to recognize the links between conservation and development to improve their living conditions given accrued benefits from ecotourism, trophy hunting and other income generating activities. Another important aspect is granting access to forest resources to indigenous forest peoples and surrounding Bantu communities. The co-management initiatives have stimulated greater local community participation in and support for conservation work in the region. WWF and other conservation partners will continue to support this people oriented approach within the TNS Landscape.