Chapter 12

Côte d'Ivoire

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12.1 Introduction

The chimpanzee population of Côte d'Ivoire has suffered enormously because of deforestation and poaching pressure in the past 40 years, dwindling from probably over 100,000 to around 8,000–12,000 chimpanzees at present. Most populations are isolated from each other, and for many there is not much hope of their long-term survival. Only about half of the total chimpanzee population, 7,225 (53%), live in protected areas, and 6,511 (47%) live in poorly or non-protected areas. There are ten protected areas in the country with chimpanzees, and a total area of 20,506km^2. Efforts to find out more about the present distribution and status of chimpanzees in classified and other forests and a better protection of these chimpanzee habitats must be of high priority to guarantee their survival.

Most information on the numbers and distribution of chimpanzees in Côte d'Ivoire comes from a census by Hoppe-Dominik in 1988 (Hoppe-Dominik 1991) and a nationwide census carried out by P. and N. Marchesi, B. Fruth, C. Boesch and D. Lia in 1989 to 1990 (Marchesi *et al.* 1995) and from censuses carried out by one of the authors (Herbinger) with the assistance of Lia and local guides (Herbinger and Lia unpublished report 2001a, b).

Economic crisis in the 1980s had far reaching consequences for the protected area management system. Government funding diminished below critical levels, leaving protected areas unattended and allowing poaching to increase to alarming levels. The chimpanzee population has suffered enormously because of deforestation and poaching pressure. Information is limited about the current status of Côte d'Ivoire's chimpanzee population, but a more active conservation policy would allow the protection of one of the most viable population of chimpanzees in West Africa.

12.2 Country profile

12.2.1 Geography

Côte d'Ivoire covers 322,460km^2 is situated between latitudes: 4°15′N–10°40′N and longitudes: 8°30′W–2°30′W, and is bordered by Mali and Burkina Faso to the north, by Ghana to the east, by Liberia and Guinea to the west and by the Gulf of Guinea to the south. The topography is mostly flat to undulating plains with mountains in the north-west. The highest point is Mont Nimba at 1,752m.

12.2.2 Climate

Average annual rainfall varies from 1,905mm in the coastal region to about 1,143mm in the savanna. In the south the average annual temperature remains roughly the same throughout the year (27°C). In the north the temperature can vary from 14–39°C (Données encyclopédiques 2001). In forested areas like Taï National Park, daily mean temperature ranges from 25–35°C. Mean annual rainfall varies from 1,700mm in the northern part of the park to 2,200mm in the southern part. The rainy season is characterized by peaks in June and September (Gartshore *et al.* 1995).

12.2.3 Habitat

The land is divided into two geographical areas consisting of equatorial rain forests to the south and a drier savanna belt to the north. In 1987 the Ministére de l'Environment et de la Forêt reported a total forest area of 51,700km^2, but this is clearly an overestimation.

12.2.4 People

The human population of Côte d'Ivoire is estimated at 16,804,784 with a growth rate of about 2.5% annually (CIA World Factbook 2002). Population density is about 52 persons per km^2. About 44% of the population is urban with 2,877,948 people living in the economical capital Abidjan (Institut National de la Statistic in Côte d'Ivoire 1998).

The area around Abidjan and the south of the country are the most populated areas (Abidjan 1,475 people per km^2, Bouaké 154 people per km^2, Haute Sassandra 73 people per km^2, Odienne 11 people per km^2) with about 78% of the total population. The western part of the country is the least populated. In 1971 the population density in the vicinity of Taï National Park, which is probably the most important protected area for chimpanzees in Côte d'Ivoire, was reported at 1.3 people per km^2, but by 1979 it had grown to 7.7 people per km^2 and continues to grow today. In the 1990s, population density west of Taï National Park had peaked at 135

people per km^2 due to refugee influx from Liberia. For 1998 the National Institute for Statistique reports of 67 people per km^2 in the vicinity of Marahoué National Park as well as in the vicinity of Comoé National Park, both considered to hold important populations of chimpanzees.

The population of Côte d'Ivoire is culturally very diverse with over 60 different ethnic groups. The main groups are the Akan (42.1%), the Voltaiques/Gur (17.6%), the Northern Mandes (16.5%), the Krous (11%), the Southern Mandes (10%) and other ethnic groups that make up about 2.8% of the population (CIA World Factbook 2000). Many different ethnic groups live in the vicinity of chimpanzee habitats, since chimpanzee populations are distributed throughout the country. Some families from different ethnic groups consider chimpanzees as their totem, and they neither kill nor eat chimpanzees.

12.2.5 Political context

Despite a long history of political stability, Côte d'Ivoire has been subject to political ''unrests'' since 1990 due to repression of a multi-party democracy. In December 1999, the first military coup in the country's history overthrew the government led by President Henri Konan Bédié. Presidential and legislative elections held in October and December 2000 provoked violence due to the exclusion of opposition leader Alassane Ouattara. In October 2000, Laurent Gbagbo replaced Robert Guei as president, ending ten months of military rule. Political instability in the last two years led to negative economic growth in the year 2000 because of difficulties meeting the conditions of international donors. Since September 2002, a civil war has divided the country in three sectors, and the progressive worsening of the situation has made the work of the Eaux et Forêt agents and researchers very difficult in all regions of the country. It is hoped that the situation will improve rapidly since both the human and some wildlife populations suffer directly from this.

12.2.6 Economy

Côte d'Ivoire is among the world's largest producers and exporters of coffee, cocoa beans and palm oil. As a result, the economy of Côte d'Ivoire is very sensitive to fluctuations in international prices for these products. The government has tried to diversify the country, but about 68% of the population still remains mostly dependent on agriculture and related activities. GDP is $637 US per capita.

12.3 Legislation and conservation policies

Authorities that enforce conservation policies in Côte d'Ivoire are currently divided into two Ministries. The Ministère de l'Environnement et Cadre de Vie, including the Direction de la Protection de la Nature, is in charge of managing protected areas. The Ministère de l'Environnement et Forêt includes the Direction de la Protection de la Faune et Peche en Eaux Continentales and Societé de Developpement des Forêts, which manages the classified forests (Forêt Classées). There are administrators of these ministries situated in the main regional cities across Côte d'Ivoire. Forest agents are often based near national parks and are directly responsible for law enforcement. However, the number of forest agents per park are usually insufficient, as are their means of transportation and equipment.

Until recently, protected area management was carried out by a centralized administration without significant involvement of the local communities. In 1995 the Government realized the need for broad reform and adopted a National Strategy for the Parks and Reserves. In 1996 a National Environmental Action Plan (Plan National d'Action Environnemental) was created which is supposed to be implemented through a National Protected Area Management Program called the Projet Cadre de Gestion des Aires Protegées. The objective of the Projet Cadre de Gestion des Aires Protegées is to set up a sustainable and efficient system for the management of all protected areas in the country. The 12-year project is to be implemented in three four-year phases, and it is currently still in its initial phase.

In 1974 hunting was made illegal throughout Côte d'Ivoire. Unfortunately, hunting activities have continued and even increased to uncontrollable levels. Currently there is an unresolved debate about whether hunting will be legalized again, and studies are now being carried out that aim to determine what restrictions and conditions should be imposed if hunting is to be made legal again.

Under the present law the chimpanzee is listed as a species that is completely protected (''integralement protegé''). Côte d'Ivoire also signed the Convention on Biological Diversity in November 1994, as well as the Convention on International Trade of Endangered Species, where chimpanzees are listed under Appendix I and therefore are protected from any international commercial usage. Côte d'Ivoire is also an active participant in the UNESCO Biosphere Reserves Program. The Taï and Comoé National Parks and the Nature Reserve Mount Nimba were declared Natural World Heritage Sites under the International Convention concerning the Protection of the World Cultural and Natural Heritage. Côte d'Ivoire also signed the Tropical Timber 83

and 94 Convention, the Ramsar Convention on Wetlands, the Desertification and the Climate Change Convention. The Convention on Biological Diversity as well as the Climate Change Convention are currently enforced under the Ministère de l'Environnement et Forêt, whereas Convention on International Trade of Endangered Species and the Ramsar Convention are enforced under the Direction de la Protection de la Nature.

In Côte d'Ivoire there are eight national parks totaling 17,321km^2, six natural reserves totaling 3,396km^2, 16 botanical reserves totaling 1,984km^2, and 147 classified forests totaling 29,000km^2. So called ''sacred'' or ''village forests'' (''forêt sacré'' or ''forêt villagoise'') – small, isolated forests next to villages – might account for approximately 40km^2 of forest in Côte d'Ivoire (Croix Verte reports of over 6,500 of these forests [1998]). Including only national parks and natural reserves, (20,717km^2), 6.4% of the country's land area is under protection. Within protected areas such as national parks and reserves any human activity is strictly forbidden, like hunting, capturing, fishing and habitat destruction. Classified forests, on the contrary, have been created with the purpose of exploiting wood in a sustainable way. Only about 5% of each classified forest is declared as a biological reserve (reserves biologiques) and therefore protected from exploitation. Classified forests are not as well controlled as national parks and therefore are often exposed to heavy poaching, agricultural use and human settlements.

12.4 Past research and conservation efforts

The main field research project on the West African chimpanzee (*Pan troglodytes verus*) in Côte d'Ivoire is carried out in Taï National Park, under the supervision of Christophe Boesch. Taï chimpanzees have been the subjects of observation and behavioral research here for over twenty years. Study of this population has led in particular to insights concerning cooperative hunting behavior and tool use by chimpanzees. More recently, comparison of behavior patterns seen at Taï with those exhibited by chimpanzees at other study sites has led to the more widespread recognition that culture, an attribute often restricted to humans, is also present in chimpanzee societies.

At Taï, three habituated communities totaling some 100 individuals are under observation, with habituation of a fourth community in progress. Observation of nine neighboring groups, including collection of samples for genetic analysis, is also being conducted. Some of the topics currently being investigated by researchers on Taï chimpanzee behavior include food, social grouping and reproduction (Anderson 2001; Anderson *et al.* 2002), vocalizations and communication (Crockford and Boesch 2003; Crockford *et al.* submitted), hormonal cycle and sexual behavior (Deschner *et al.* 2003), food distribution and abundance (Goné Bi 1999; Goné Bi *et al.* in prep.), intergroup dynamics (Herbinger *et al.* 2001; Herbinger and Boesch submitted a, b; Herbinger and Boesch in prep), long-term Taï chimpanzee behavior database (Lehmann and Boesch 2003; Lehmann and Boesch submitted a, b), diseases and disease transmission (Leendertz *et al.* 2003; Ehlers *et al.* 2003), social learning (Y. Möbius), sexual behavior of female chimpanzees (Stumpf and Boesch in prep. a, b, c), genetics (Bradley *et al.* 2000; Morin *et al.* 2001; Vigilant *et al.* 2001) and conflict management (Wittig and Boesch 2003a, b, in press, submitted). Published papers by Boesch include information on social structure (Boesch 1996a; Boesch and Boesch-Achermann 2000a), social learning and communication (Boesch 1991a, c, 1995; Boesch and Boesch-Achermann 2000b), mother-infant relation (Boesch 1997), nut cracking (Boesch 1991d, Boesch and Boesch 1981, 1983, 1984a, b, 1993b), tool use (Boesch 1993b; Boesch and Boesch 1990, 1993a), hunting behavior (Boesch 1994a, b, c, 2001b; Boesch and Boesch 1989), predation (Boesch 1991b), sicknesses and mortality (Hill *et al.* 2001, Santiago *et al.* 2002), theory of mind (Boesch 1992), evolution (Boesch-Achermann and Boesch 1994; Gagneux *et al.* 1999) and culture (Boesch 1993a, 1996b, c, d, 2001a; Boesch *et al.* 1994; Boesch and Tomasello 1998; Whiten *et al.* 1999; Whiten and Boesch 2001).

Collaborative projects between the researchers at Taï and other chimpanzee research sites (e.g., Uganda, Tanzania) have also been established. A collaborative project with the World Health Organization, under the supervision of Dr. Pierre Formenty, aiming to find the reservoir of the Ebola virus, was also undertaken in this area, although this project has recently come to an end (Formenty *et al.* 1999a, b; Le Guenno *et al.* 1995, 1998; Wyers *et al.* 1999). The Taï Monkey Project, under the supervision of Prof. Dr. Ronald Noë, Dr. Klaus Zuberbühler, and others, concentrates mostly on the behavior of all the monkey species in Taï, but also relates to chimpanzee behavior since chimpanzees are an important predator to some of the monkeys (Zuberbühler 2000, 2001).

Some other short-term chimpanzee research has been conducted in Comoé National Park, Banco National Park and in the Nimba mountains (Matsuzawa and Yamakoshi 1996).

Present chimpanzee related conservation projects include the Ecotourism Project of the Projet Autonome pour la conservation du Parc National de Taï. This project offers among other activities a guided visit to a habituated chimpanzee community. The World Wildlife Fund for Nature, a partner organization of the Projet Autonome pour la conservation du Parc National de Taï responsible for education and awareness-creation around the Taï National Park, initiated some chimpanzee-related seminars in schools. To help children and teachers understand more of the life of wild chimpanzees, Grégoire Nohon, the main field assistant of the Taï

Chimpanzee Project, visits schools to discuss with the students his own experiences and knowledge of chimpanzees.

The Wild Chimpanzee Foundation, founded by Christophe and Hedwige Boesch, was created in 2000 and is directly concerned with the protection of chimpanzees. The Wild Chimpanzee Foundation is a multi-national foundation, where individuals combine efforts to preserve as many of the remaining wild chimpanzee populations as possible, as well as their natural habitat throughout their range in Africa. The main objectives of the Wild Chimpanzee Foundation are to establish a ''Pan-African Forest network of scientists working for the conservation of chimpanzees,'' with the aim of assuring protection of 20,000–25,000 chimpanzees, and to create a ''Pan-African monitoring program'' to guarantee the preservation of the forest network by involving local people and by increasing our knowledge of the chimpanzee populations being protected. The Wild Chimpanzee Foundation aims to achieve these goals through education, conservation and research, and it aims to involve the local human populations around the protected key sites, school children from developed and sub-Saharan countries and scientists. Environmental education projects around Taï National Park have already been initiated, such as an interactive theater play, a newsletter and film presentations.

12.5 Chimpanzee distribution and numbers

12.5.1 Chimpanzee distribution

Most information on the distribution and numbers of chimpanzees in Côte d'Ivoire comes from a census by Hoppe-Dominik from November to December 1988 (Hoppe-Dominik 1991) and a nationwide census carried out by P. and N. Marchesi, B. Fruth, C. Boesch and D. Lia from September 1989 to December 1990 (Marchesi *et al.* 1995). More recent information on chimpanzee distribution comes from censuses carried out by one of the authors (Herbinger) with the assistance of D. Lia and local guides.

Chimpanzees are found throughout Côte d'Ivoire, but their range is generally limited to areas that receive some sort of protection. Table 12.1 provides a list of all the national parks and classified forests where chimpanzee presence has been confirmed in Côte d'Ivoire. Figure 12.1 provides a map of the known distribution of chimpanzees throughout Côte d'Ivoire. The authors considered the total population as highly endangered since only the chimpanzee populations in three national parks – Comoé, Marahoué and Taï – revealed large enough numbers to be viable in the long term.

12.5.2 Chimpanzee numbers

Hoppe-Dominik (1991), Marchesi *et al.* (1995) and Herbinger and Lia (unpublished report 2001a, b) all used the classical line transect method to estimate chimpanzee numbers (Anderson *et al.* 1983; Tutin and Fernandez 1983, 1984). Hoppe-Dominik (1991) walked 17 transects varying from 1.4–15km in six areas, totaling 83.6km of transects. A total of 82 nests were observed and 39 nest groups. Hoppe-Dominik also questioned local communities about the occurrence of chimpanzees. Persons in a total of 166 villages and settlements in the rain forest zone were questioned. In addition, a total of 40 individuals in government-owned enterprises and forestry and hunting departments, as well as scientists and hunters were interviewed.

Hoppe-Dominik (1991) estimated the total chimpanzee population in Côte d'Ivoire to be 11,867 individuals. He found the majority of the chimpanzees (10,692 or 90.1%) to be living in the rain forest zone, 560 (4.7%) in the Guinea zone and 615 (5.2%) in the Sudan zone. He estimated the overall chimpanzee population density to be 0.09 chimpanzees per km^2 in rain forest near villages, 0.36 chimpanzees per km^2 in forest plantations and 0.03 chimpanzees per km^2 in the Sudan area.

Marchesi *et al.* (1995) walked transects varying from 9–15km and a 10m strip on each side of the transect line was always recorded, whatever the density of the habitat. During their study 154.4km of transects were walked in 14 sites. They also surveyed, without transects, 21 other sites. In total, 611 nests were observed on transects.

Marchesi *et al.* (1995) estimated the total number of chimpanzees in Côte d'Ivoire to be 11,676 $\pm$ 1.168, very similar to Hoppe-Dominik's (1991) estimate of 11,867. The densities for different habitat types were estimated as follows; intact primary forest – 1.64 chimpanzees per km^2, degraded forest – 0.4 chimpanzees per km^2, human encroached forests and mosaic habitats – 0.09 chimpanzees per km^2. Marchesi *et al.* (1995) estimated the chimpanzee population in the national parks and reserves in Côte d'Ivoire to be about 7,225 individuals and estimated the chimpanzee population in the classified and other unprotected forests in Côte d'Ivoire to be 6,511 individuals.

Hoppe-Dominik (1991) gave a much higher estimate for the number of chimpanzees outside national parks and reserves (8,896 chimpanzees). Since Marchesi *et al.* (1995) did not undertake transects in these areas, it is possible that they underestimated the chimpanzee population in unprotected areas. On the other hand, it is possible that Hoppe-Dominik's study might be an overestimate due to the inaccuracies of information from questionnaires. He did however manage to confirm the presence of chimpanzees in the majority of sites where interviews indicated that they

Table 12.1. Confirmed presence of chimpanzees *Pan troglodytes verus* in Côte d'Ivoire.

	Name	Latitude Longitude
1	Taï National Park	5°09′-6°09′N/6°48′-7°26′W
2	Comoé National Park	8°5′N-9°06′N/3°01-4°04′W
3	Marahoué National Park	6°53′-7°14′N/5°46′-6°10′W
4	Mount Sangbé National Park	8°02′N/7°24′W
5	Mount Péko National Park	7°01′N/7°16′W
6	D'Azagny National Park	5°13′N/4°53′W
7	Banco National Park	5°21′-5°25′N/4°01′-4°05′W
8	Mount Nimba Nature Reserve	7°34′N/8°25′W
9	Haut Bandama Fauna Reserve	8°27′N/5°29′W
10	Duékoué Classified Forest	6°38′N/7°07′W
11	Mount Kopé	4°59′N/7°27′W
12	Monogaga Classified Forest	4°48′N/6°26′W
13	Nizoro Classified Forest	5°51′N/5°56′W
14	Dagbégo (Dassiékro Classified Forest)	5°05′N/5°31′W
15	Go Classified Forest	5°50′N/5°31′W
16	Bossématié Classified Forest	6°20′-6°35′N/3°20′-3°35′W
17	Gbapleu (Tiapleu Classified Forest)	7°27′N/8°14′W
18	Blépleu (Sangouiné Classified Forest)	7°23′N/7°49′W
19	Mount Tonkouri Classified Forest	7°25′N/7°38′W
20	Mount Bétro Classified Forest	6°39′N/7°54′W
21	Mount Zoa (Scio Classified Forest)	6°47′N/7°49′W
22	Guiniadou (Niegré Classified Forest)	5°30′N/6°03′W
24	Mopri Classified Forest	5°48′N/4°58′W
25	Irobo Classified Forest	5°29′N/4°44′W
26	Songan Classified Forest	5°46′-6°12′N/3°12′-3°26′W
27	Haute Dodo Classified Forest	4°54′N/7°18′W
28	Sangoue Classified Forest	6°12′N/5°28′W
29	Sanaimbo Classified Forest	6°36′N/4°30′W
30	Port Gauthier Classified Forest	5°09′N/5°25′W
31	Tioko (west bank of Boubou river)	5°13′N/5°14′W
32	Assahara-Soungassou northwards (north-east Dimbokro)	6°40′N/4°35′W
33	Fresco	5°04′N/5°34′W
34	Forest at Bandama (Tene Sodefor plantations)	6°32′N/5°28′W
35	Fetekro (District Gagnoa)	7°48′N/4°49′W
36	Vatoua (Cantonnement Danane)	7°04′N/8°06′W
37	Rapide Grah	5°04′N/6°53′W
38	Fresco Kotrohou Village II westwards	5°06′N/5°45′W
39	Bacanou II south-east (near Sikensi)	5°36′N/4°38′W
40	Sebso (Kouakoukro)	7°30′N/4°01′W

were present (Appendix II and III). Whether the Marchesi *et al.* (1995) or the Hoppe-Dominik (1991) estimate is more accurate, both studies suggest that about half of the chimpanzees in Côte d'Ivoire live in poorly or unprotected forests, and this stresses the need to identify and improve the status of these populations.

12.5.2.1 Mont Péko National Park

A recent census carried out by Herbinger and Lia (unpublished reports 2001a) found a significant population of chimpanzees in the Mont Péko National Park. The census in Mont Péko was carried out in April 2001 using four different straight transect lines between 2–4km long, and totaling 12.5km in length. The census suggested a density of 1.6 chimpanzees per km^2 and estimated a total population of around 320 weaned chimpanzees for Mont Péko. This is much higher than the density estimate given by Marchesi *et al.* (1995) for this park of 0.4 chimpanzees per km^2, and a total population of 78 chimpanzees. The classified forest of Haut Sassandra, which is connected through corridors to Mont Péko, might still hold up to 400 chimpanzees (Hoppe-Dominik 1991).

12.5.2.2 Mont Sangbé National Park

Herbinger and Lia (unpublished reports 2001b) also carried out a chimpanzee survey in Mont Sangbé National Park in

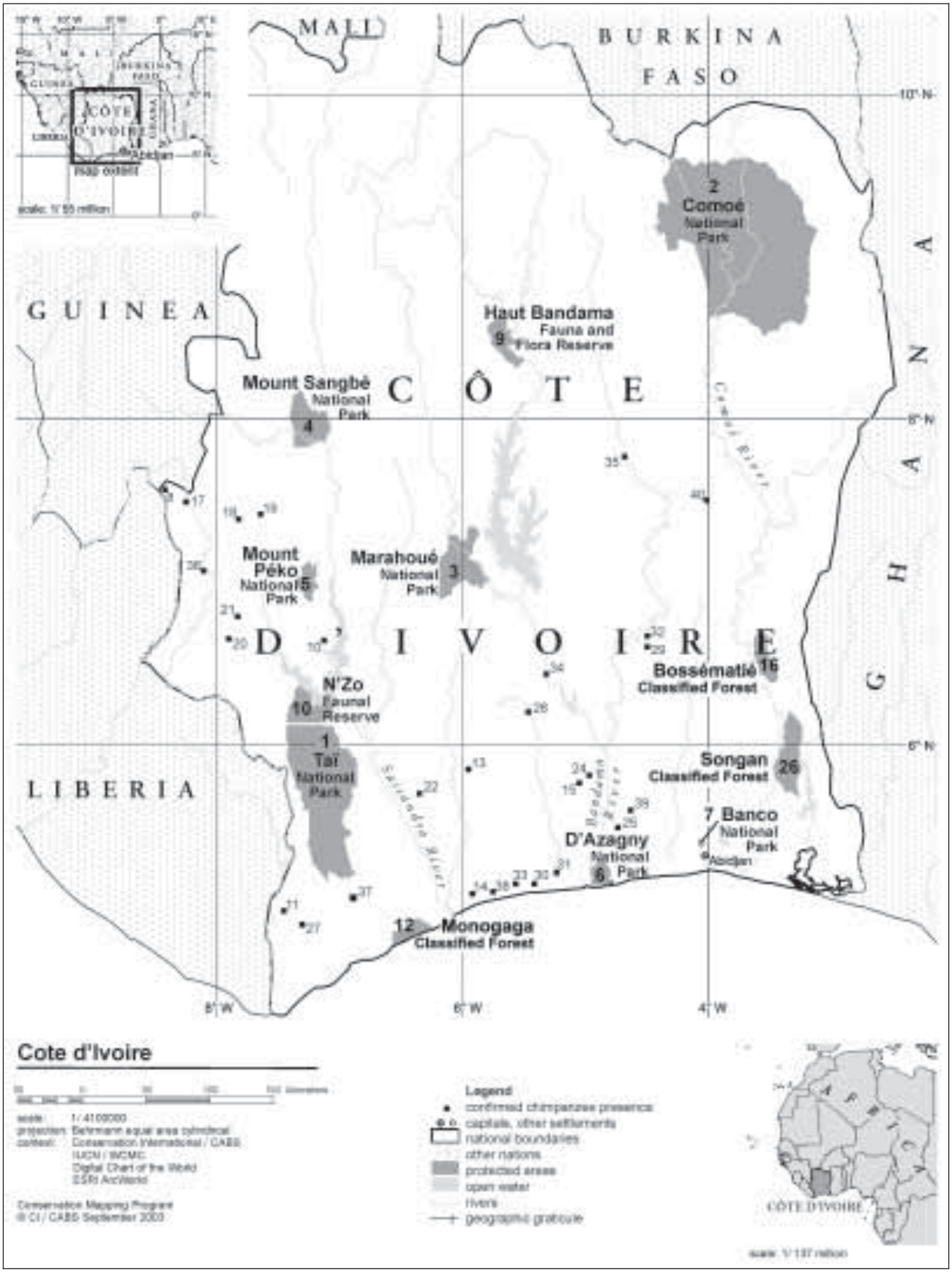

Figure 12.1. Confirmed presence of chimpanzees *Pan troglodytes verus* in Côte d'Ivoire, including only direct sightings, audition of vocalizations, observations of nests or shot animals.

May 2001. Five different transect lines between two and 5km were walked, totaling 19.75km in length. Herbinger and Lia (unpublished reports 2001b) found a much higher density estimate for Mont Sangbé of 5.7 chimpanzees per km^2 compared to the 1.64 chimpanzees per km^2 found by Marchesi *et al.* (1995) and a higher overall population of 235–260 chimpanzees in the park than the estimated 55 chimpanzees by Marchesi *et al.* (1995). The very high-density number of 5.7 chimpanzees per km^2 for Mont Sangbé National Park could be due to a concentration of the chimpanzees in the forested parts of the park, that only account for less than 5% of the total area. Also, ageing of nests has not been studied in that zone, and mean nest duration used for calculations might have been underestimated. Nevertheless, during the census Herbinger and Lia (unpublished reports 2001b) heard chimpanzees several times and recorded 31 fresh nests out of 578 from 48 groups of nests.

12.5.2.3 Taï National Park with Reserve N'Zo

Marchesi *et al.* (1995) estimated the total number of chimpanzees in Taï to be 4,507 and 292 individuals in the N'Zo reserve. For the reserve, as well as for the classified forests surrounding Taï National Park (Haute Dodo, Cavally Goin), the status of protection needs to be improved to guarantee the survival of the assumed 1,500 chimpanzees living in these forests. Together with the estimated 4,500 chimpanzees in the Park, this population holds about 6,000 chimpanzees.

12.5.3 Marahoué National Park

Marchesi *et al.* (1995) found the highest density of chimpanzees in Côte d'Ivoire to be in the Marahoué National Park (6.39 chimpanzees per km^2 and 1,407 individuals). During a rapid assessment survey in 1998, however, the evidence confirming the presence of chimpanzees included one nest, no sightings and four auditions, which suggests that the population has declined greatly (Schulenberg *et al.* 1999).

12.5.4 Comoé National Park

Marchesi *et al.* (1995) estimated the total number of chimpanzees in this park to be 470 individuals, which is the highest number of chimpanzees in the Soudanian Belt in Côte d'Ivoire. New censuses are planned in the near future. Fischer and Gross (1999) have most recently confirmed the presence of chimpanzees in Côte d'Ivoire.

12.5.5 Banco National Park

Marchesi *et al.* (1995) presumed that chimpanzees have disappeared from Banco National Park but recent observations by Joulian Fréderic and personal communications with park rangers confirmed their presence in this park.

12.5.6 D'Azagny National Park

Marchesi *et al.* (1995) estimated the total number of chimpanzees in this park to be 57. The presence of chimpanzees in D'Azagny National Park today is questionable, and a survey is needed to confirm whether this park still holds a population (Boesch sighted chimpanzees in 1988).

12.5.7 Nature Reserve Mount Nimba

Marchesi *et al.* (1995) estimated the total number of chimpanzees in this reserve on the Côte d'Ivoire side to be 59 individuals. The Mont Nimba reserve straddles three countries (Côte d'Ivoire, Liberia, Guinea), and together with the connected classified forest of Tiapleu in Côte d'Ivoire, it is estimated to contain over 300 chimpanzees.

12.5.8 Haut Bandama

Marchesi *et al.* (1995) estimated the total number of chimpanzees in this reserve to be 300 individuals.

12.5.9 The classified forest of Monogaga

The classified forest of Monogaga might still hold a chimpanzee population of over 100 individuals (Hoppe-Dominik 1991, Marchesi *et al.* 1995).

12.5.10 Classified forests of Bossématié and the nearby Songan-Tamin-Mabi-Yaya Complex

Chimpanzees in the Songan Complex have been estimated to number around 500 individuals (Hoppe-Dominik 1991), but currently they are highly threatened by hunting. The isolated but nearby classified forest of Bossématié presumably still holds around 100 individuals (Marchesi *et al.* 1995).

12.5.11 Haute Dodo classified forest

The Haute Dodo classified forest probably still holds a significant population of chimpanzees (around 500 individuals, Hoppe-Dominik 1991), but at present we lack information of its status.

12.5.12 Mount Kopé

Marchesi *et al.* (1995) found a density of 1.67 chimpanzees per km^2 in this forest.

12.5.13 Other areas

Other classified forests that presumably still hold significant populations of chimpanzees are Rapide Grah classified forest in connection with Haute Dodo and the Cavally-Goin classified forest north-west of Taï National Park, and the Niegré and the Scio classified forests.

12.6 Threats to chimpanzees

12.6.1 Habitat destruction

The southern half of Côte d'Ivoire was once covered by equatorial rain forest (160,000km^2, Lanly 1969). However, strong economic growth based mostly on agriculture, combined with a government policy of active immigration from the northern countries, led to one of the highest deforestation rates worldwide. Between the years 1956 and 1966, 28,000km^2 of dense forest, or 30% of the area covered by forest in 1956 (98,000km^2), were cleared by cultivation. Forest was disappearing at an annual rate of 10km^2 in 1956. By 1966, the annual deforestation rate was 5,000km^2 per year (Lanly 1969). Deforestation continued at this high annual rate until the 1980s. Today, 90% of the dense forest in Côte d'Ivoire has vanished (FAO/Banque Mondiale 1988).

12.6.2 Hunting

Although it is forbidden to kill, consume or trade wild animals in Côte d'Ivoire, a study by Caspary *et al.* (2001) showed that 35.5 million wild animals, weighing 120,000 tons and worth 76.8 billion FCFA, were killed in 1996 by hunters. Their study estimated that each inhabitant of Côte d'Ivoire consumes daily about 22g of meat. Over half of the hunted species were those listed under Appendix I of the Convention on International Trade of Endangered Species. They found that chimpanzees made up about 3% of the species sold in urban markets and served in village restaurants (Caspary *et al.* 2001). Chimpanzees are also hunted because they raid crops and to a lesser extent for medicine and the trade of orphans. During his study, Hoppe Dominick (1991) found that villagers reported damage to their farms in 26.6% of all interviews. Damage was reported primarily to cocoa plantations (35.5% of all cases) and banana plantations (25% of all cases).

12.6.3 Disease

Chimpanzees in Côte d'Ivoire are threatened by diseases of zoonotic or natural origin (e.g., Ebola, Monkeypox), as well as by diseases introduced to the wild population through interactions between chimpanzees and humans, e.g., while crop raiding and through hunters, researchers or tourists. In 1994 chimpanzees in Taï National Park suffered from an infection of a new subtype of Ebola virus, whereby 25% of a community under study died (Formenty *et al.* 1999a, b; Boesch and Boesch-Achermann 2000b). In 1999, an epidemic of acute respiratory disease reduced the community further by 25% (see Formenty *et al.* 2003, Chapter 23 for details). Currently, a veterinarian is carrying out a Ph.D. thesis in Taï National Park to find out more about the ways and sources of infections and how to prevent them in the future.

12.7 Priority sites for chimpanzee conservation

12.7.1 Mont Péko and the classified forest of Haut Sassandra

Mont Péko National Park and the nearby classified forest of Haute Sassandra hold together an important number of chimpanzees (around 700). Both forests are connected by two corridors (G. Rondeau, pers. comm.). Protection and enlargement of these corridors should be of high priority for conservation actions. Moreover, a survey for the population still living in Haute Sassandra classified forest is urgently needed.

12.7.2 Mont Sangbé National Park

Mont Sangbé National Park has high biodiversity as a result of being situated between the Guinean and Soudanian Belt. To protect the chimpanzee population of Mont Sangbé, improved efforts of surveillance, especially in the southern region of the park, must be undertaken. The northern part already shows a much lower density of chimpanzees, which in part can be attributed to the nature of the forest but also to the presence of some villages and camps within the national park. Habituation of a chimpanzee community for ecotourism is also a possibility in this area. Visibility in the forest can reach up to 50m (in comparison to 20m in Taï), and this could facilitate first the habituation process and later the observation of chimpanzees by tourists. A feasibility study to develop ecotourism in this park should be of high priority, as well as a survey of the chimpanzee population covering areas that have not yet been surveyed.

12.7.3 Taï National Park and Reserve N'Zo together with adjacent classified forests of Haute Dodo, Cavally Goin and Rapide Grah

Taï National Park and Reserve N'Zo hold nearly half of the total population of chimpanzees in Côte d'Ivoire. Taï chimpanzees are recognized internationally due to the published results of over 20 years of research on this population and the new insights into the behavior of the species that they have provided. Moreover, the habitat in Taï National Park and Reserve N'Zo is intact and well preserved and represents, together with the classified forests of Haute Dodo, Cavally Goin and Rapide Grah and the adjacent forest in Liberia, the largest forest bloc in the Guinean belt. The forests of Haute Dodo and Cavally Goin seem relatively intact, whereas the forest of Rapide Grah is much more disturbed.

A survey of the current population and an inventory of the habitat is of high priority to be able to monitor changes in chimpanzee populations over time. Another high conservation priority is to increase the protected area status of the N'Zo Fauna Reserve and the classified forests Cavally-Goin and Haute Dodo and create corridors linking chimpanzee populations in Côte d'Ivoire to populations in Liberia. It will also be important to better understand the threat of bushmeat, and therefore a bushmeat survey should be conducted which will give information on wildlife offtake in this area. In order to increase value of chimpanzees to local people and provide alternative income, chimpanzee-related tourism in Taï National Park should be promoted, as well as education and awareness campaigns.

12.7.4 Marahoué National Park

Marahoué National Park is currently threatened by agricultural activities as well as a high hunting pressure carried out by the adjacent local population. An improvement in law enforcement is necessary to save the habitat as well as the fauna. A survey to estimate the current population of chimpanzees should be of high priority in order to determine the decline. Park guards and national researchers should be trained in survey techniques and in the establishment of a system for long-term monitoring of primates within the park.

12.7.5 Comoé National Park and the biodiversity zone of GEPRENAF (West African Pilot Community-based Natural Resources and Wildlife Management Program)

Chimpanzees in Comoé are currently threatened by a high hunting pressure. Conservation actions should aim at increasing the status of the biodiversity zone GEPRENAF, conducting a survey of the population and developing anti-poaching mechanisms.

12.7.6 Banco National Park

Banco National Park presumably holds a very small number of chimpanzees but because of its uniqueness of being situated in the center of a city of 3,000,000 people, the presence of chimpanzees offers an enormous potential for awareness and education programs. Furthermore, a survey is urgently needed to estimate the number of chimpanzees that are currently present. New surveys are planned here in the near future.

12.7.7 D'Azagny National Park

The presence of chimpanzees in D'Azagny National Park is currently questionable. A survey to determine whether the park still holds a population should be of high priority.

12.7.8 Mont Nimba Reserve and the classified forest of Tiapleu

Mont Nimba Reserve has a high biodiversity in flora and fauna, an intact forest and is connected to the well studied chimpanzee population of Bossou in Guinea. Efforts are underway to improve the forest corridor between the chimpanzees in Bossou and the population in Mont Nimba. A survey of the total population in Mont Nimba Reserve as well as an improved protection status of the classified forest of Tiapleu should be considered as high priority actions.

12.7.9 The classified forest of Monogaga

Because of its already well established infrastructure as one of the nicest beach resorts in Côte d'Ivoire and its closeness to San Pedro, a feasibility study to develop ecotourism including a visit to habituated chimpanzees should be undertaken in the classified forest of Monogaga.

12.7.10 The classified forests of Bossématié and the nearby Songan-Tamin-Mabi-Yaya complex

The Songan complex represents the largest and best preserved forests in the east of Côte d'Ivoire. Actions of high priority should be aimed at improving the protection of wildlife in this forest, specifically chimpanzees. A survey should be conducted of the chimpanzee populations here and studies undertaken to find out if it would be feasible to create a corridor that connects Bossématié and the nearby Songan-Tamin-Mabi-Yaya complex.

12.8 Priority actions for chimpanzee conservation

12.8.1 Nationwide census

A nationwide census should be conducted again in order to update the information from Marchesi *et al.* (1995) and determine the rate of decline of chimpanzees in Côte d'Ivoire. This survey should focus on priority sites and larger classified forests and assess the status of potentially important chimpanzee habitats (e.g., the classified forest of Niegré). During the survey, an impact study should also be conducted in order to identify threats and appropriate conservation actions.

12.8.2 New legislation

The status of complete protection for chimpanzees should be assured in the National Protected Area Management Program, which will be implemented in the next twelve years.

12.8.3 Improved protected areas network in Côte d'Ivoire

The protected areas network in Côte d'Ivoire should be improved by both reinforcing the infrastructure and effectiveness of national parks and improving the protection status of reserves and classified forests (e.g., N'Zo, Haute Dodo, Cavally Goin, Haut Sassandra, Songan Complex, Monogaga). Training of park personnel (management, researchers, forest agents) on conservation issues would also help to reinforce the strength of protected areas.

12.8.4 Education and awareness-raising campaigns

Education and awareness-raising campaigns in rural and urban areas are needed to relate to the conservation of chimpanzees (interactive theater, discussion rounds, films, newsletters, seminars, campaign inclusion in school curriculae). Local taboos to kill or consume chimpanzees exist throughout the country. They mostly consider the similarity between humans and chimpanzees and could be used to promote the conservation of this species. Regular visits of school classes to protected areas could serve to raise awareness about nature early on. In Abidjan, Banco National Park should play a crucial role in education programs.

12.8.5 Corridor creation, maintenance, and improvement between fragmented habitats that hold isolated populations of chimpanzees

Corridors should be created and improved between isolated small populations in order to provide chimpanzees with the possibility of genetic exchange, which they need for long term survival. Smaller chimpanzee populations like, for example, those in the Haut Sassandra or Bossématié classified forests might only be viable when connected to a larger population living nearby.

12.8.6 Ecotourism development

Rich cultural diversity combined with high biological diversity could potentially attract a sufficient number of tourists to Côte d'Ivoire. The habituation of chimpanzees in sites like Taï National Park, (where one project is already ongoing), Mont Sangbé National Park or the classified forest of Monogaga, offers a good potential for ecotourism. Local as well as foreign tourists could experience chimpanzees in their natural habitat, thereby raising awareness of the uniqueness of this species. Moreover, ecotourism allows for employment, income and involvement of the local community through nature conservation. Therefore it may be more readily accepted than a solely ''protectionist'' approach. However, a habituation program needs to be accompanied by a health-monitoring program for the chimpanzees to prevent disease transmission between humans and chimpanzees.

12.9 Conclusions

Besides Guinea, Côte d'Ivoire appears to be the only country within West Africa that might support a chimpanzee population greater than 10,000 individuals. However, most populations exist in isolation, and half of the total population lives in unprotected areas. Improving the protected areas network, connecting fragmented habitats and raising awareness for the plight of chimpanzees will be necessary to ensure the long-term survival of this viable population. Immense habitat destruction and high hunting pressure have already reduced the chimpanzee population enormously in the recent past, and immediate conservation actions are needed to stop further decline. Since September 2002 Côte d'Ivoire has suffered from civil war, leaving hundreds of people dead and hundreds of thousands displaced. Together with the humanitarian crises, nature conservation has suffered likewise. National parks and classified forests are left uncontrolled, and illegal hunting in protected and unprotected areas is increasing to alarming levels. The chimpanzee population is very likely suffering from a strong increase in threats that contribute to their decline, and efforts to protect fauna and flora are needed in parallel with efforts to help the human population to rebuild peace.

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