



Charcoal in the Mist

*an overview of environmental
security issues and initiatives
in the Central Albertine Rift*



May 2008

Charcoal in the Mist

An overview of environmental security issues and initiatives
in the Central Albertine Rift

May 2008

Eric van de Giessen

Institute for Environmental Security

Anna Paulownastraat 103

2518 BC The Hague, The Netherlands

Tel. +31 70 365 2299 • Fax: +31 70 365 1948

www.envirosecurity.org

Charcoal in the Mist

an overview of environmental security issues and initiatives in the Central Albertine Rift.

May 2008

Prepared by: Eric van de Giessen

Copyright © 2008 Institute for Environmental Security (IES), The Hague, The Netherlands



The Hague | Brussels
London | California
New York | Washington DC

Institute for Environmental Security
Anna Paulownastraat 103
2518 BC The Hague
The Netherlands
Tel. +31 70 365 2299
Fax: +31 70 365 1948
www.envirosecurity.org
info@envirosecurity.org

“Charcoal in the Mist: an overview of environmental security issues and initiatives in the Central Albertine Rift” has been published by the Institute for Environmental Security (IES) within the framework of the Environmental Security for Poverty Alleviation programme, financially supported by the Netherlands Ministry of Foreign Affairs.

The IES has in all cases tried to identify and make reference to the original sources of the information presented in this report. The IES takes no legal responsibility for the accuracy of the information presented in this report.

All rights reserved. Reproduction and dissemination of material in this information product for education and other non-commercial purposes are authorised without any prior written permission from the copyright holder provided the editor and publisher are fully acknowledged. Reproduction for resale or other commercial purposes is prohibited without written permission of the copyright holder. For further information contact the Institute for Environmental Security.

Table of Contents

	Summary	5
1	Introduction	6
	1.1 Environmental Security	6
	1.2 Great Lakes region	7
	1.3 Objective	7
2	Background	9
	2.1 Location	9
	2.2 Volcanoes	9
	2.3 Water tower	9
	2.4 Biodiversity	11
	2.5 Protected areas	11
	2.6 Land and Population	12
	2.7 Security situation	15
3	Environmental Security Threats	18
	3.1 Insecurity, military presence and displaced persons	18
	3.2 Encroachment of forest	21
	3.3 Charcoal industry	22
	3.4 Hydrological issues	22
	3.5 Methane gas in Lake Kivu	24
	3.6 Volcanic eruptions	24
4	Analysis	25
5	Initiatives	27
	5.1 Mapping and Monitoring	28
	5.2 Diplomacy and Law	32
	5.3 Nature Conservation	38
	5.4 Finance and Economics	40
	5.5 Empowerment and Training	42
	5.6 Eco-tourism opportunities	44
6	More ideas & Recommendations	47
7	Abbreviations & Acronyms	50
8	Sources	52

Summary

This report "Charcoal in the Mist" describes the environmental security situation and the role of resources in one of the world's most important ecosystems, the Central Albertine Rift. This transboundary eco-region is important not only in terms of its great biodiversity, with many endemic species of birds and mammals, but also in terms of politics and security. As the source of the Nile River, the region is of great interest to other riparian states. Moreover, violent conflicts in the region, to a significant extent related to valuable mineral and natural resources, have (had) a major destabilising effect on states and communities in the wider Great Lakes region.

Analysis

Apart from the geological threats, such as volcanic eruptions and earthquakes, there are a significant number of environmental security threats to the Central Albertine Rift. These mainly derive from the combination of the presence of armed rebels, an ill-disciplined national Congolese army, artisanal mining, high and rising population densities and increasing food and energy needs. These needs have resulted in a continuously growing demand for land and firewood, as well as an increasingly attractive charcoal industry in the Democratic Republic of Congo. Although park authorities work hard trying to tackle charcoal production and trade, insecurity in the region prevents them from effectively monitoring and protecting the forests of Virunga National Park.

The environmental effects, such as forest degradation, wildlife poaching, soil erosion, overfishing and water pollution, pose great dangers to the survival of man and nature in this region and can contribute to social unrest and instability.

Initiatives

The work of the American scientist Dian Fossey, including her book "Gorillas in the Mist", that was later made into a film, incited worldwide attention for the Central Albertine Rift and the mountain gorillas that inhabit this part of Africa. Pleading for the protection of the mountain gorillas and the suppression of the poachers' black market, Dian Fossey inspired many people and organisations to help protect these animals and their habitats.

Now, twenty five years after her book was published, even more people and (inter)national organisations are actively striving for environmental conservation and sustainable economic development in the Central Albertine Rift. After analysing the environmental security threats, this report tries to give an overview of current activities by many of these organisations, in the field of mapping and monitoring, diplomacy and law, nature conservation, finance and economics, empowerment and training and eco-tourism. By making such an overview, although never complete and up-to-date, the Institute for Environmental Security wants to contribute to the distribution of knowledge and ideas.

The way forward

Further, by making specific recommendations on the way forward, this report aims to inspire people and organisations, in order to strengthen environmental protection, enhance security and promote sustainable development in the Central Albertine Rift.

1. Introduction

1.1 ENVIRONMENTAL SECURITY

“Charcoal in the Mist” is about the very complex issue of environmental security in the Central Albertine Rift, and about the role of resources in conflict. Although the precise roles of the environment in peace, conflict, destabilisation and human insecurity are still being debated in relation to other security and conflict variables, it seems that environmental factors are increasingly an underlying cause of instability, conflict and unrest. Although the idea that resource constraints can lead to insecurity is not new, this notion has not adequately been internalised in (inter)national security policies.

The term environmental security can be defined as “the availability of environmental services for man and nature” or, according to Gleditsch (2001), as “the freedom from environmental destruction and resource scarcity”. When environmental destruction takes place, the availability of environmental services is reduced. Environmental security, therefore, is broader than the classical definition of security, which usually centres around military security aspects. Improving environmental security aims at preventing erosion of the world’s carrying capacity, and at preventing war and armed conflict resulting from resource scarcity and environmental degradation. In other words, environmental security has a strong human security component, and vice versa.¹

Resource scarcity is a main element in the relationship between resources and conflict. Thomas Homer-Dixon has distinguished three forms of resource scarcity: *supply-induced scarcity*, resulting from the depletion or degradation of a resource; *demand-induced scarcity*, stressing that environmental problems and scarcity should be seen as the result of increasing population pressure; and *structural scarcity*, referring to the unequal distribution of resources.¹

Many academics, non-governmental organisations and, increasingly, politicians begin to recognise the intertwined relationship between environment, development and security. Population pressure results in resource scarcity, while environmental scarcity is one of the main causes of undernourishment, slowing rates of economic development, population movements, struggles over resources and violent conflicts.

The British government has directly mentioned environmental security as one of the main future risk factors for stability.² In April 2007 the United Nations Security Council also held its first-ever debate on the impact of climate change on security. Here UN Secretary-General Ban Ki-moon acknowledged that projected climate changes could not only have serious environmental, social and economic implications, but implications for peace and security, as well. Two months later, in June 2007 the UN Security Council debated on the relationship between natural resources and conflict, a very relevant issue especially in the African Great Lakes region.

1.2 GREAT LAKES REGION

In the African Great Lakes region, the linkage between resources, development and conflict are particularly relevant, as livelihoods of people are intimately linked to the entitlement to natural resources, such as land and water. Water and land scarcity are certainly among the main explaining factors of the human development figures in this part of the world. Also, when resources are scarce, opposing interests are easily brought to the forefront. Far too often do we hear stories from Africa about (violent) conflicts related to resource scarcity, for instance when cattle keepers and peasants fight over access or use of land.

An important demographic characteristic of the Great Lakes region is the large concentration of people. Due to its fertile soils, the region has been inhabited by numerous groups of people for centuries. Population density in both Rwanda and Burundi, and to a lesser extent Uganda, is extremely high; Rwanda is the most densely populated country in Africa, with an average of more than 350 people living per km². Annual population growth rates of the countries of the Great Lakes region seem to be consistent with the high growth rates in other regions in Sub-Saharan Africa. This increases the human pressure on land, water and other valuable resources every day.

Although it might not have been the main explanation in all cases, the unequal distribution of land has certainly played an important role in almost violent conflicts in the Great Lakes region in the past two centuries, in Burundi, Rwanda as well as in the DR Congo. Furthermore, the strive for highly valuable mineral and natural resources in - especially - the DR Congo, such as gold, coltan, tin, copper, diamonds and timber, has been a strong driving force for civil wars in the whole Great Lakes region. The abundance of these resources has thus proven to be a "curse", not only for the Congolese people but for people in the whole, destabilised, Great Lakes region.

In short, the African Great Lakes region clearly shows the interconnectedness between natural resources, development and security.

1.3 OBJECTIVE

The Institute for Environmental Security (IES) is an international knowledge network, with the mission to advance global environmental security by promoting the maintenance of the regenerative capacity of life-supporting ecosystems. In 2006 the IES launched its work programme "Environmental Security for Poverty Alleviation". With this programme the IES aims for the development and implementation of EnviroSecurity Action Plans with special focus on: Kalimantan – Indonesia; the Central Albertine Rift and the Congo Basin – Africa; and the Matavén region - Colombia.

Analysis

Building on the envirosecurity assessment carried out by the IES in 2005, this report gives an update of the environmental security situation in the Central Albertine Rift case study region. Threats to the environment are identified. Despite of what the title "Charcoal in the Mist" might suggest, this report is not about charcoal only; the variety of issues at stake in this region is enormous. Charcoal production and trade is, however, one of the main drivers of change, which

helps to explain the current dynamics in the region in the field of human and environmental security. Further in this report, potential means to tackle these problems are suggested.

Accelerating learning

Furthermore, this report makes an effort to demonstrate some of the progress made and initiatives carried out by various (inter)national organisations, the IES and its partners, in the promotion of environmental security and poverty alleviation in the Central Albertine Rift. Although realizing that this can never be comprehensive and up-to-date, the IES recognizes the added value of such an inventory. In the online version of this report, reference is made to other organisations and initiatives, sometimes via hyperlinks to records in the EnviroSecurity Action Guide. This online relational database contains information on key organisations, initiatives, publications and web resources related to environment, security and sustainable development.

The underlying philosophy is that, especially when many organisations are actively involved in a certain region or thematic field, it is important to be aware of each others' objectives and activities. This approach could help organisations in functioning more efficiently, by preventing them from carrying out overlapping activities. Further, sharing knowledge and information enables all stakeholders to learn from each other and be inspired by one another. As a knowledge network, the Institute for Environmental Security wants to contribute to the distribution of knowledge and ideas. Therefore, the IES would be extremely grateful if readers would share any suggestions on organisations, initiatives, publications and web resources for the EnviroSecurity Action Guide, to accelerate learning about environment, security and sustainable development in the Central Albertine Rift or our other case study regions.



[EnviroSecurity Action Guide](#)

2. Background

To understand the importance of the Albertine Rift ecoregion, its biophysical and social aspects are briefly described here.

2.1 LOCATION

The Albertine Rift, a part of the Great Rift Valley, stretches from the northern end of Lake Albert to the southern end of Lake Tanganyika. The region extends through five countries, spanning the eastern portion of the Democratic Republic of Congo (DR Congo), parts of Western Uganda, Rwanda, Burundi and western Tanzania. This study primarily focuses on the central part of the Albertine Rift.

Figure 2.1 River Basins



2.2 VOLCANOES

A characteristic feature of this mountainous region is the high volcanic activity. According to Blom and Bowie (2001), the Albertine Rift was formed from uplifted Pre-Cambrian basement rocks and recent volcanic activity. Associated volcanic activity resulted in the overflow of volcanic materials, giving rise to the characteristically rich fertile soils.³

The highest peak in the region, 5110m, is in the Ruwenzori Mountains. In January 2002, the eruption of Nyiragongo Volcano killed about 150 people and, by damaging the town of Goma and several nearby villages, it left approximately 120,000 people homeless.

2.3 WATER TOWER

The Albertine rift lakes, Lake Albert, Lake Edward, Lake Kivu, and Lake Tanganyika, were formed from continental movement which created cracks in the earth's crust.^{3, 4} Together with the other lakes in the East African Rift Valley, namely Lake Turkana, Lake Victoria and Lake Malawi, they are known as the Great Lakes of Africa.⁴ Interesting to note is that all these lakes in the Albertine Rift cross international boundaries.

The lakes play a vital role in the maintenance of life and biodiversity in the region. Lake Edward, for instance, is one of the world's most

productive lakes, and along with the other lakes their fisheries provide one of the main sources of revenue for the surrounding communities.⁵ These lakes contribute water to the atmosphere through evaporation. This water eventually is precipitated from the atmosphere not only over the lakes, but also in other areas that may not have nearby water sources, thus continuing the hydrological cycle.

Due to the altitude of the region, the climate is rather temperate. There are two rainy seasons - around October-November and April-May and two dry seasons around January and July. Generally, rainfall is abundant, although rainfall - and temperatures - vary enormously according to altitude and relief. The mountainous Albertine Rift region has an altitudinal range of between 1,100 m and 4,511 meter. Gradients are very steep in places. The plains to the south of Lake Edward are hot and receive less than 1,000 mm of precipitation a year on average, while the saddle between the Karisimbi, Mikeno and Bisoke volcanoes receives over 2,000 mm at an altitude of 3,000 m. The flanks of the Ruwenzori Mountain are also very rainy, while the highest peaks, over 4,000 m, are dry.⁶

These mountains that function as headwater catchment systems play a remarkable role in the hydrological situation in the region. Due to the high permeability of the volcanic soil and rocks in the Albertine Rift, the abundant rain quickly infiltrates into the ground, leaving only a small amount of water to the seasonal river flows. The large amount of rainwater that infiltrates within the soil cannot provide water supply to the people living on the volcanoes' slopes. In fact, the water either flows underground or re-surfaces in a few springs inside the park and its surroundings.⁷

The Albertine Rift is very important in the role its hills play as upstream locations. Its south-western slopes drain down through Lake Kivu and Lake Tanganyika into the Congo River system. A part of the water on the northern and eastern slopes flows through Lake Edward and down the Semliki River into the Nile River. Another part of the water on the eastern slopes streams through the Kagera River into Lake Victoria, Africa's largest lake and the second largest fresh water lake in the world. Lake Victoria in turn also provides water to the Nile. Given the fact that 160 million people in ten different African countries depend on the water of the wider Nile Basin, and dozens of millions of people depend on the Congo Basin, the Albertine Rift is a vitally important water tower.⁸

Wetlands

In the Albertine Rift, as elsewhere in the world, wetlands are critically important ecosystems, crucial for water storage, erosion control, groundwater recharge and discharge; water purification through retention of nutrients, sediments, and pollutants; and stabilization of local climate conditions, particularly rainfall and temperature.⁹ Also in the Albertine Rift, several wetlands function as productive environments and cradles of biological diversity. Moreover, for the local population the wetlands provide important sources of fishing, hunting as well as means of transport.



[More on Wetlands](#)

2.4 BIODIVERSITY

The region is of global importance for the protection of biodiversity. As a result of the wide range of habitats that can be found here - glaciers, alpine vegetation, montane forest, lowland forest, savannah grasslands and woodlands, papyrus swamps, high altitude swamps, lava rock, hot springs and lakes - the area is very rich in the number of species it contains. The area contains 52% of all bird species and 39% of all mammal species on the African continent.⁵

Because of the high biodiversity importance, the Albertine Rift has also been recognized as part of the Eastern Afrotropical biodiversity hotspot in the reanalysis of global biodiversity Hotspots by Conservation International.



[More on this Biodiversity Hotspot](#)

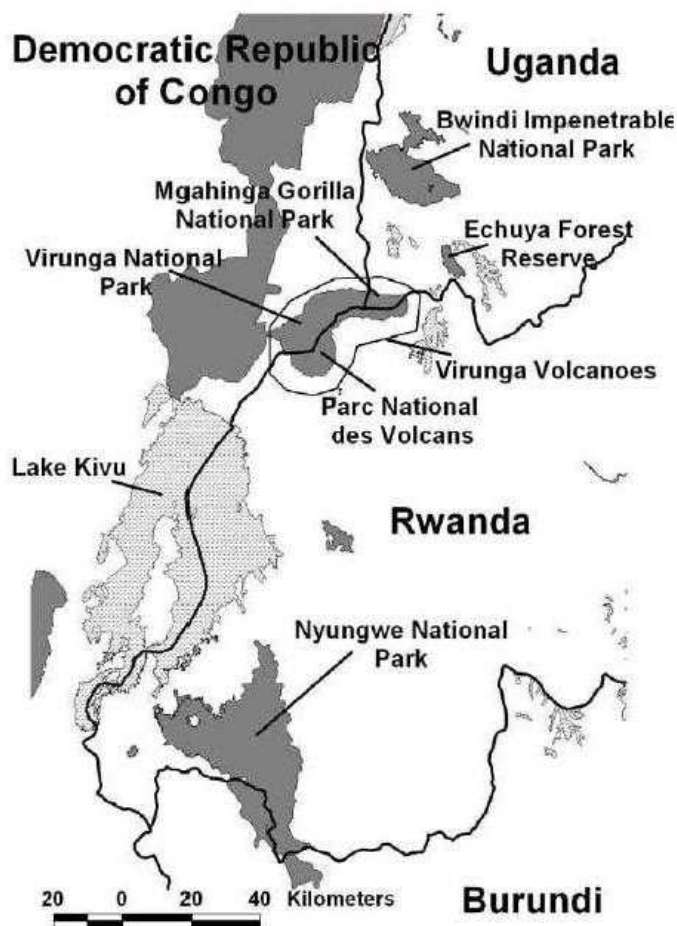
The Albertine Rift has more endemic vertebrate species than any other region in mainland Africa.¹⁰ These endemic species include, among many others, various chameleons, bird species, more than a hundred butterfly species. Moreover, the lakes of the Albertine Rift are some of the richest in the world for freshwater fish species, of which many are endemic. Of special interest in this respect is Lake Tanganyika, which contains hundreds of species of fish that can be found nowhere else in the world.

Among the 34 endemic mammals are various squirrel, rat, shrew and mouse species as well as the endangered Golden monkey, the Rwenzori duiker, the Red Colobus monkey and the last population of mountain gorillas (*Gorilla beringei beringei*).¹⁰ With approximately 700 individuals living only in the Virunga-Bwindi region, mountain gorillas are classified as an endangered species. They were particularly brought into the international spotlight by the work of Dian Fossey ("Gorillas in the Mist") and by the gorilla tourism that followed. This has spurred the efforts made to protect their habitat.

2.5 PROTECTED AREAS

The region defined as the Central Albertine Rift in this report is presented in figure 2.2, based on a study published in 2004 by IGCP, WCS, and CARE. One of the most famous

Figure 2.2 Protected areas in the Central Albertine Rift



Source: Plumptre et al. 2004.¹⁴

areas of high conservation value is the Virunga Volcanoes region, named after the volcanic mountain area where Rwanda, Uganda and the DR Congo share their borders. This border region of Uganda, Rwanda and the DR Congo is the habitat of an estimated 380 mountain gorillas, which is more than half of the total global population of mountain gorillas. Each of the three countries protects its own portion of the Virunga Volcanoes region (see box 2.1). The other mountain gorilla habitat is located in Bwindi Impenetrable Forest National Park in Uganda, about 40 kilometres to the north; it is estimated that about 320 mountain gorillas live in this protected area.¹¹ These two areas with mountain gorilla habitats can together also be referred to as the Virunga-Bwindi region (indicated with red lines on figure 2.1).

Box 2.1 Virunga Volcanoes

- The volcanic Mikeno sector of [Virunga National Park in the DR Congo](#) – which is the oldest African National Park, established in 1925, inscribed on UNESCO's World Heritage List in 1979.
- [Volcanoes National Park in Rwanda](#); and
- [Mgahinga National Park in Uganda](#).

Other protected areas within the Central Albertine Rift, as defined in this report, are Nyungwe National Park in Rwanda and Echuya Forest Reserve in Uganda.

Until 1994, Gishwati Forest in Rwanda also was a protected area. After the civil war, many refugees resettled in that forest, some with their cattle. As a result, 95% of Gishwati Forest was deforested, resulting in soil erosion, flooding, landslides and reduced water quality – as well as the isolation of a small population of chimpanzees. Only 10 km² of forest is now left. This demonstrates the important effect of population pressure on protected areas.

2.6 LAND AND POPULATION

The fertile soils of the Central Albertine Rift are among the most crucial resources for the survival of the region's inhabitants. Unfortunately, due to the combination of huge demographic pressure, poverty and strong dependence on these natural resources, the struggle for land is extraordinary intense.

As table 2.1 shows, the income levels (GDP per capita) in the countries are very low, while population pressure is high and increasing. With an average of 94.6 people per square kilometre, the population density in the Albertine Rift region is significantly higher than the population density of other parts of Sub-Saharan Africa.¹⁶ The population density in the areas surrounding the protected areas is even higher. According to population censuses and estimates, densities in the districts adjacent to the protected areas were higher than 300 inhabitants per km² in Uganda, and even over 600 inhabitants per km² in certain Rwandan districts. In the DR Congo, population densities around Virunga National Park are slightly lower, but still much higher than the average of the rest of the country.

Deprived of family, property, education and employment opportunities, many people in these rural areas region see no alternatives other than to survive on the natural resources they can

access. Subsistence agriculture is the main activity of over 90 percent of the population in the Central Albertine Rift.¹⁴

Table 2.1 Population statistics

	DR Congo	Burundi	Rwanda	Uganda
Population (2006) ¹²	60,640,000	8,170,000	9,200,000	29,900,000
Land area (km ²) ¹²	2,345,000	27,800	26,300	241,000
Population density (people per km ²) ¹²	26	294	350	124
Population annual growth rate (2005-2015) ¹³	3.2 %	3.6 %	2.7 %	3.2 %
Gross Domestic Product (GDP) per capita, US\$ (2007/2008) ^{13 · a}	714	699	1,206	1,454
Population with sustainable access to an improved water source (2004) ^{13 · b}	46 %	79 %	74 %	60 %
Ranking on UNDP's 2007-2008 Human Development Index ¹³ (total 177 countries)	168	167	161	154

¹² Source: World Bank, data and statistics. Data: 2006:

¹³ Source: UNDP, Human Development Indicators

^a Methodology: Purchasing Power Parity, estimates are based on regression.

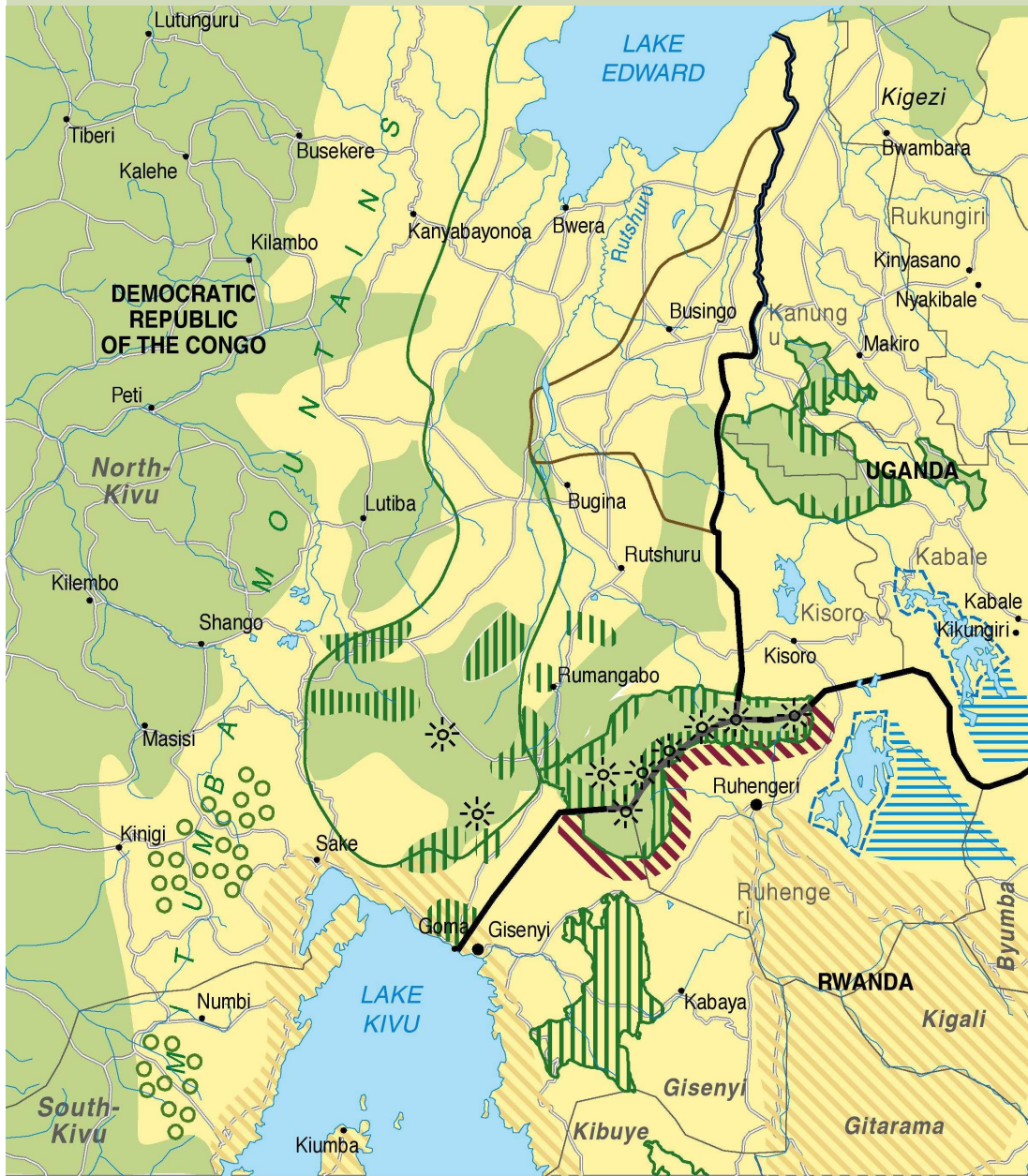
^b Definition: the availability of at least 20 litres a person per day from a source (such as household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collection) within 1 km of the user's dwelling.

Main food crops are maize, sorghum, Irish potatoes, cassava, beans, banana, sugar cane, cabbages, onions, leeks, carrots, spinach, peas and sweet potatoes. Cash crops produced in this area are mainly pyrethrum and tea, and to a lesser extent also coffee.¹⁴ This strategy makes households largely depend on land, water, wood, as well as non-timber forest products like honey, mushrooms and meat.

The combination of a high and rising population density, the strong reliance on resources and the enormous need for energy in the form of firewood and charcoal, all lead to a very high pressure on the natural resources in this region. This has accumulated to a situation in which almost every piece of land is in use, including steep hill slopes and swamps, which are drained and transformed into farmland.¹⁷ These households generally do not have the opportunity to invest in anything other than their basic daily needs. With such a livelihood strategy, focused on survival, most people have to give low priority to activities such as planting trees and applying measures to prevent erosion and to improve soil fertility. Furthermore, a situation develops in which fallow periods are shortened and eventually disappear.

The strong dependence on natural resources is also an important underlying factor for the intrusion and degradation of forest. Although the majority of the population of the Central Albertine Rift still lives outside the protected areas, locally they can also be found inside the protected areas, particularly in the fishing villages around Lake Edward.¹⁶

Figure 2.3 Land use and land cover



- International border
- ☀ Volcanoes
- Forest
- ▨ Deforested area or intense human activities
- Recent operations of reforestation
- ▤ Agriculture area for coffee and tea
- Subsistence agriculture, potatoes, beans, sugar cane, bananas, cereals
- ▨ Agriculture area for Pyrethrum
- ▤ Marshlands
- ▤ Wet zone threatened by localized climate change and excess water extraction for agriculture. Pressures compete with electricity production.



0 10 20 30 40 km

MAP BY PHILIPPE REKACEWICZ AND DIANA RIZZOLIO
 COPYRIGHT © 2006 - INSTITUTE FOR ENVIRONMENTAL SECURITY
 (THE NETHERLANDS) AND UNEP/GRID-ARENDAL (NORWAY)

Sources: Institute for Environmental Security (IES) field survey;
 Spatial data produced by FAO-Africover.

Land security

Land has always been a very important and highly contested resource in the region. As noted in many earlier studies, land has been closely related to politics and conflict for at least four decades.¹⁵ Although the conflicts in Rwanda of 1959, 1963, 1973, 1980, 1990, and the genocide of 1994 were all politically motivated by politicians, evidence has shown that fertile land was a large factor behind social tensions before these erupted into violent conflicts. The same holds true for the conflicts in Ituri region and, to a lesser extent, the Kivu provinces in DR Congo. As mentioned, the struggle for land is very intense and land scarcity is increasing. Therefore, in order to prevent further social and violent conflicts, improving land security is one of the most urgent agenda points for the Rwandan and Congolese governments.

After very long deliberations, the Rwandan Parliament in 2003 approved a "Land Reform Decree that provides for individualized rights to property. This policy was followed, in 2005, by passage of the Land Law. The Land Law abolishes all customary forms of tenure. In their place, the government issues titles for 99-year leases of land".²¹ The government claimed that this new tenure system would contribute to enhancing food production, social equity and cohesion and the prevention of conflict.²² See also chapters 5.2 and 6.

2.7 SECURITY SITUATION

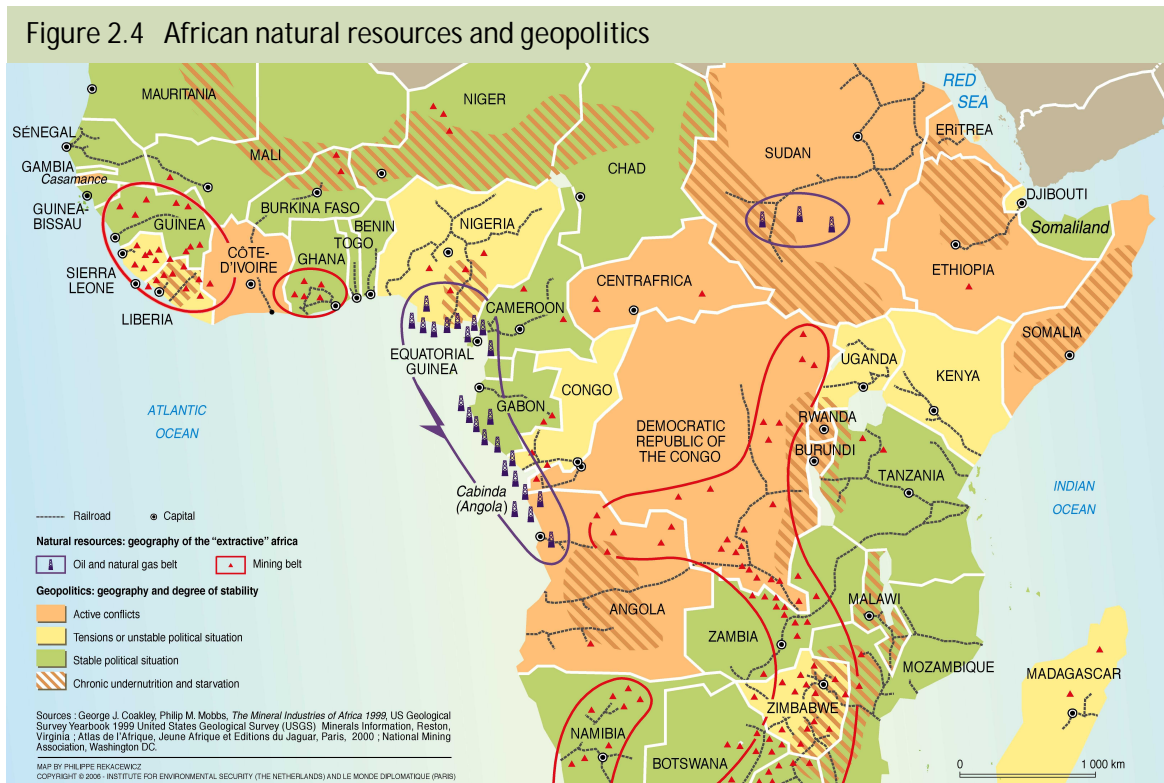
In the past two decades the Albertine Rift has been characterised by many extreme violent conflicts. After an ethnic guerrilla war in the north of Rwanda, ending in the monstrous genocide of 1994, in which some 800,000 people were killed, a massive refugee flow into neighbouring countries, particularly Zaire, Tanzania, Burundi and Uganda took place. The combination of millions of refugees, including the "genocidaires", the heavy struggle for resources in the host countries, the wide accessibility of small arms, post-traumatic stress disorder, and the already existing ethnic tensions in Zaire, led to a great destabilisation of the region that still determines everyday life anno 2008. The social, economic and political life in the Great Lakes region is still influenced by this huge destabilisation and, as with an earthquake, by the aftershocks that followed.

Short history

In May 1997, an alliance of forces, backed by Uganda and Rwanda, entered the country to capture Kinshasa and overthrew president Mobutu. The leader of the alliance, Laurent Kabila, changed the name of the country into the Democratic Republic of the Congo (DR Congo) and installed himself as president. When in August 1998 an insurgency backed by Rwandan and Ugandan governments invaded the Kivu provinces in the east of the DR Congo, a second large civil war broke out. While one of the reasons for these foreign-backed forces was to fight the Interahamwe, the perpetrators of the genocide, and protect their borders, another important reason was to gain control over DR Congolese valuable mineral resources. As a result of this civil war, which lasted until 2003, an estimated 4 million people have died.

A peace agreement has been signed by the fighting parties in 2002, practically all foreign troops left the DR Congo later that year and a very large UN mission (MONUC) has been put in place to assist the national Congolese army (Forces Armées de la République Démocratique du Congo, or

FARDC) in disarming and demobilising rebels. Despite all this, and even though the elections that were held in the summer of 2006 were rather successful, the security situation in the Congolese part of the Central Albertine Rift is still very worrying. Despite a number of successful disarmament operations, thousands of troops of Mai-Mai and FDLR (Interahamwe) still roam in the east of the country, especially in the province of North Kivu, where access to gold, coltan and cassiterite have continued to play an important role.



For the past four years, insecurity in North Kivu province has been expanded as a result of the presence of General Laurent Nkunda and his rebel army. General Nkunda used to be a commander in the Rally for Congolese Democracy (RCD), a main rebel group which controlled most of eastern Congo during the country's five-year civil war. In 2004, after the civil war had officially ended and Nkunda was incorporated in the FARDC, Nkunda led an uprising to defend the rights of his Tutsi minority group.

The presence of these rebel armies in various parts of the region continues to pose a threat to the local population and restricts the work of the national army and (non-) governmental organisations. A group of (est. 8000) highly trained and armed dissidents loyal to General Nkunda, calling themselves the National Congress for People's Defense (CNDP), continues to fight with government forces, FDLR and local non-armed people in and around Virunga National Park.⁶ In the summer of 2007 the UN Security Council therefore expressed its deep concern at the deteriorating security situation in the east of the Democratic Republic of the Congo, particularly in North and South Kivu. Nkunda's forces were seen as "the single most serious threat to the stabilization of the DR Congo."¹⁸

The humanitarian consequences of this situation are very serious. Following attacks by Nkunda's forces on FARDC troops, tens of thousands of people were forced to flee, partly across the border into Uganda and partly into spontaneously set-up camps on the Congolese side of the border. The UNHCR estimates that since December 2006, the number of newly displaced in North Kivu has surpassed 300,000 and continues to grow. UNHCR estimates that inside North Kivu province there are now more than 800,000 people internally displaced. This situation causes grave threats to natural resources in the region, and consequently, to the Congolese people and their sources of livelihood.

Although the UN mission (MONUC) has on the one hand contributed to stability in the region, by assisting the national Congolese army (FARDC) in disarming and demobilising rebels, there have also been disturbing reports of misbehaviour by these UN peace keepers. In the early years of the UN mission, reports of sexual abuse of Congolese girls and women by the peace keepers have cast a shadow over the UN's credibility in DR Congo. Very recently, a BBC research team reported how Indian and Pakistani blue helmets have been trading gold with militia in Ituri district and North Kivu, who received weapons in return. Moreover, according to this report, the Indian peace keepers flew a UN helicopter into Virunga National Park, where they exchanged ammunition for ivory. These acts of misbehaviour by a small group of UN soldiers are of course extremely counterproductive.⁴⁰

A peace pact signed on the 23rd of January 2008 by Nkunda's CNDP movement, FDLR and other militias in the Kivu provinces, is a positive sign. The peace negotiations and the resulting "Act of Engagement" could lead to more security in this region. Whether this agreement implies that many displaced people can return home safely, remains unclear at this stage. This will be elaborated upon in the next chapter.

3. Environmental Security Threats

Environmental security, or in other words the availability of environmental services for man and nature, in the Central Albertine Rift is severely under threat. This is the result of a combination of -greatly interrelated - factors that will be described in this chapter.

3.1 INSECURITY, MILITARY PRESENCE AND DISPLACED PERSONS

The relation between the violence in the region and environmental protection is twofold. On the one hand, although the national parks in the Central Albertine Rift have become battlefields, this was not always disastrous for the vegetation and fauna of the area. For example, despite the civil wars in Rwanda and the DR Congo the number of mountain gorillas living in the heart of the conflict zone, the Virunga-Bwindi region, has increased from 624 in 1989 to almost 700 individuals in 2004. Moreover, the insecure situation in eastern DR Congo has led to a general disinterest from private companies to invest in forest logging, preventing large scale deforestation in this part of the country.

On the other hand, violence in the region has (had) vicious effects on the local people including the park rangers. Furthermore, the insecurity terribly impacts the state of the farmlands, as well as the state of protected areas, due to large concentrations of refugees and lack of monitoring.



Refugee crises

Mass movements of human populations during the refugee crisis from 1994-1996 have had catastrophic effects on vegetation, fauna and all renewable resources. Between 1994 and 1996, several hundreds of thousands of Rwandan refugees lived in the south of Virunga National Park.

As a result of refugees cutting forest for fuel wood, the amount of deforestation in Virunga National Park was enormous. According to Kalpers (2001) the most irreversible damage occurred in the Mikeno sector of Virunga National Park, within the zone of influence of Kibumba refugee camp, where extensive areas of primary forest were cut.¹⁹

Humanitarian aid organisations have not always been very considerate for the environmental impacts of their activities. For example, the refugee camps of UNHCR were located on the boundaries of Virunga National Park, and initially insufficient action had been taken to prevent the wide scale deforestation in the protected area. Also, disarmament and demobilisation camps and security sector reform programmes, such as the Nyaleke CBR (Centre de Brassage), have been set up within the boundaries of Virunga National Park.

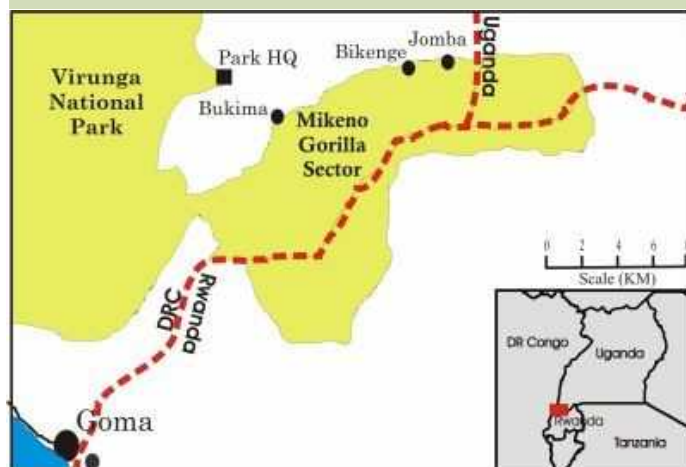
However, having learned from mistakes from the past, UNHCR's current policies and activities in the region demonstrate its growing awareness for environmental concerns in relation to large concentrations of refugees. In autumn 2007 for instance, when the refugee crisis in the Kivu provinces reached a new climax, conservation agencies and UNHCR combined forces to distribute fuel wood (and sometimes charcoal) in the camps surrounding Virunga National Park. These efforts were meant to dampen down the need of the displaced people to encroach the protected areas for cutting and collecting fuel wood and preparing charcoal.

Lack of monitoring

The instability in the Kivu provinces has a great impact on park management: the violence in and around Virunga National Park has made monitoring of the area almost impossible. When the Congolese civil war began in 1997, large areas of the National Parks became off-limits to rangers from the Congolese Institute for the Conservation of Nature (ICCN). More than 100 rangers were killed in rebel attacks since that time, ranger accommodations have been destroyed and a lot of transport and communication equipment has been stolen. As described in the previous chapter, especially the security situation around Virunga National Park in the North Kivu province of the DR Congo, remains very volatile, and deteriorated again recently. Late 2006, insurgent forces led by the dissident General Laurent Nkunda have invaded Virunga National Park's southern sectors.

In January, May, August and September 2007 hostilities took place again, forcing ICCN's park staff and their families to flee several of the park's patrol posts, leaving the park's resources including the mountain gorilla populations totally unprotected. In May 2007, one ranger was killed in such an attack, while several others were shot and heavily injured. Due to the continuing presence of the armed forces led by Nkunda rangers still have no access to, and control of, the Mikeno sector of Virunga National

Figure 3.2 Virunga Volcanoes region



Source: Wildlife Direct^{20a}

Park, where the mountain gorillas are situated. The Nyamulagira sector of Virunga National Park is also barely accessible to rangers. Reportedly, Nkunda's troops have introduced cattle into various areas within the national park, indicating they intend to settle.^{20b}

Although rangers continue to show remarkable commitment for the work, the risk of being assaulted or robbed by armed forces in the forest, and the lack of communication equipment make the lives and work of Congolese park rangers enormously difficult. Moreover, there have been reports that anti-personnel land-mines have been set on the road to Bukima.^{20a} It is therefore practically impossible to enforce protection of the national park.

Mountain gorilla tourism

Since the CNDP rebels have taken over power in the Virunga National Park, they have reportedly also taken over the "authority" to guide tourists around in the Mikeno Sector. They sometimes pretend to be the official Congolese conservation authority, inviting ignorant tourists from across the border to visit the mountain gorilla families. The fee they charge for this is high, though much lower than the official fee in Rwanda and Uganda. These tourism activities finance the CNDP rebels, making it all the more appealing for them to stay in the Mikeno Sector. Furthermore, these illegal mountain gorilla tours take place without respecting the official standards, such as keeping a proper distance to the animals, in order to prevent the spreading of human diseases to the animals, among other reasons.^{20a}

Impact on wildlife

The presence of various armies in the region has a rather large impact on wildlife and their habitat. According to the State of the Forest 2006 report, "these poorly paid troops poach, their families grow crops and the camps attract much human activity and trading."⁶ The presence of military in Virunga National Park has led to a decline in the number of wildlife. Almost all large mammal populations in Virunga National Park have collapsed over the past three decades. An exception is the Uganda kob, that is small and difficult to shoot, and the mountain gorillas, that have been well-protected by the ICCN. The numbers of monkeys and other mammals, such as buffalo, elephant, waterbuck, topi living in Virunga National Park have strongly dropped since the 1960's. The thriving market for bushmeat is one of the factors underlying the threats to biodiversity in the region at this moment. There have been some positive signs that, now that the war has finished, the larger animals, including larger predators, are returning back to the Virunga National Park. However, poaching still occurs, according to excellent reports by Wildlife Direct.^{20a}

An exceptionally dramatic decline is faced in the number of hippopotamus in Lake Edward. In the sixties and early seventies there were about 30,000 hippos in and around Lake Edward, the world's most important hippo population. When the presence of soldiers and displaced persons in the region increased, the hippo population rapidly decreased. The militia, as well as other poachers and the ill-paid national Congolese army (FARDC) have been targeting hippos for the meat and for the ivory in their canine teeth; this is "collected regularly from the militia camps and is thought to leave Congo through Uganda and Sudan to be traded illegally on the international black market."²⁴

A census carried out by the Frankfurt Zoological Society in October 2006 revealed that now only 629 hippos remained in the Virunga National Park.²⁴ This decline of the Virunga hippo population has serious environmental security impacts, and has adversely affected the situation of local people. Especially the thousands of fishermen living around Lake Edward, within the park, are affected, according to Marc Languy of WWF's Eastern Africa Regional Programme.²⁵ The lake is one of the most productive in the world, as hippo dung provides vital nutrients for fish. The dramatic fall of the hippo population has also resulted in a rapid decline of the lake's fish stocks.

Since December 2006, 9 mountain gorillas were killed. It was generally assumed that Nkunda's rebel forces were responsible for killing two silverback mountain gorillas in January, although the rebels have denied involvement in an official press statement. The executions of five mountain gorillas in July 2007, which sparked a lot of international media attention, were brutal but also rather mysterious acts of violence; despite the arrest of a corrupt park warden in March 2008, it is still officially unknown why these animals were massacred and who was responsible for it. It is feared that economic motives related to the production of charcoal might have played an important role.

3.2 ENCROACHMENT OF FOREST

Increasing pressure on land for agriculture is one of the main driving forces behind forest clearance in the region. The need for fertile agricultural land and lack of alternative sources of livelihoods forces farmers to encroach forests, despite their status as protected areas. As a result of this pressure, the forest area in Uganda, Rwanda as well as the DR Congo has been significantly reduced in the past fifty years.⁵ For example, since the creation of Volcanoes National Park in 1925, its area has been officially reduced by nearly 50%, shifting from 328 km² to 165 km², mainly for agricultural purposes particularly to grow pyrethrum.⁵ The high need and speed of agricultural encroachment became visible in 2004, when thousands of Rwandan settlers converted 15 km² of the mountain gorilla habitat in the Mikeno sector in Virunga National Park, DR Congo, within a few weeks time.⁴ These kinds of actions were possibly even stimulated by highly placed individuals, who encouraged the people to occupy the protected areas.

According to the Congo Basin Forest Partnership (CBFP), over 168,000 people have invaded Virunga National Park over the last seven years, thereby degrading 90,000 ha. Although a number have been relocated elsewhere, 50,000 people still live in the Kilolirwa area and 30,000 on the western shore of Lake Edward inside Virunga National Park.⁶ Although this situation is highly understandable from the viewpoint of the, often landless, internally displaced people in the region, it has an exceptionally negative effect on the possibilities of local, national and international efforts to protect the biodiversity in the Central Albertine Rift.

Around Bwindi Impenetrable National Park, the current situation is much more stable, as arrangements have been made between the Ugandan park authorities (UWA) and the local communities. People are allowed to gather products from the forest in some areas of the park; this can be done in the so called Multiple Use Zones (MUZs). The products that can be extracted in these zones are medicinal plants, craft materials and seed collection for on-farm planting outside the park. In addition, some farmers are allowed to use the park for placement of

beehives for honey collection.¹⁴ These MUZs are only accessible for those surrounding communities that have signed a Memorandum of Understanding with the UWA park authorities.²³

3.3 CHARCOAL INDUSTRY

According to a recent study, the city of Goma alone consumes over 47,000 tons of charcoal a year, which represents more than 250,000 tons of wood. People around the park, having no other sources of energy, burn about 6 kg per family per day. It is estimated that more than 90% of this wood comes from Virunga National Park.⁶ The need for energy creates enormous economic opportunities for charcoal traders in the region. It can easily be stated that the charcoal industry is the main direct dynamic behind for the large scale deforestation within the boundaries of Virunga National Park, in the Mikeno sector as well as the Nyamulagira sector.

Renowned human rights worker and palaeontologist Richard Leakey has stressed the strong and direct relationship between the clearance of forest in Virunga National Park and the regional charcoal industry. In a recent Newsweek article Leakey states that a corrupt mafia of charcoal merchants has recently begun harvesting Virunga's forest, referring to Virunga's trees as "their oil wells". Cutting these trees would fuel a \$ 30 million-a-year industry, according to Newsweek.²⁶

Paulin Ngobobo, senior warden of ICCN, who is strongly committed to the protection of the mountain gorilla's habitat, has regularly reported on the strong and direct relationship between the clearance of forest in Virunga National Park and the regional charcoal industry. After accusing the charcoal merchants of being complicit in the destruction of mountain gorilla habitat, he was threatened and even abused by charcoal merchants, as he described on his weblog on www.wildlifedirect.org, as well as in the Newsweek article of July 2007. Knowing this, the recent series of killings of mountain gorillas can be seen as political assassinations, as an effort to intimidate the rangers and to urging them to stop protecting the park.²⁶

In the hunting domain of Rutshuru, 90% of the surface area has already been entirely degraded.⁶ The areas within Virunga National Park where rebels and FARDC troops are currently based, face similar threats as a result of this attractive charcoal industry.

The ICCN rangers, that currently have limited access to Virunga National Park, are fortunately working hard to prevent the transport of illegal charcoal just outside the National Park. More about the prevention of charcoal trade and transport can be read in section 5.2.

3.4 HYDROLOGICAL ISSUES

Various water bodies and wetlands in the Central Albertine Rift face different problems, from overfishing and pollution to declining water levels and even risks for explosion.

Wetlands

The impacts of resource overexploitation are very clearly observed in wetlands in the region, for instance at the Rwandan part of the Central Albertine Rift, where Kamiranzovu wetland and the Rugezi swamp are seriously under threat. Rugezi swamp is a very important habitat for endemic bird species, and for the local population it offers many opportunities as a source of fish, meat, honey and plant material like papyrus that can be used for plaiting and constructing. After the decline of its water levels in 2000, however, a severe ecological crisis arose in Rugezi swamp. When water from between the Rugezi swamp and the lakes Bulera and Ruhondo, was used for the production of hydro-electricity, the swamp dried up. The dehydration and the expansion of agricultural activities into the wetland were the most serious threats to the survival of the endemic bird species and it reduced the potentials for human use.²⁷ Following this crisis, efforts have been undertaken to counter the dehydration of the wetland and Rugezi was placed on the Ramsar List of Wetlands of International Importance late 2005.

Pollution

Proliferation of water hyacinth is a main problem in the African lakes; it grows mainly as a result of pollution by effluent from the expanding population around the lakes and leads to reduced oxygen levels and, consequently, to reduced floral and faunal diversity. In Lake Victoria the infestation of the lake by water hyacinth in the 1990s "disrupted transportation and fishing, clogged water intake pipes for municipal water, and created habitat for disease-causing mosquitoes and other insects."²⁸ It can also disrupt the operations of lake shore installations such as hydroelectric power plants. Also at Lake Kivu, the lake shared by the DR Congo and Rwanda, water hyacinth forms a threat. For years, manual removal of the water hyacinth has been the only solution to the problem. A more recent control measure has been the introduction of natural insect predators of water hyacinth. This approach seems to have been rather successful at Lake Victoria.²⁸ Also, soil erosion prevention measures near rivers and lakes can have a preventative effect, as this decreases the run-off of nutrients into the water. A drastic measure recently launched by the government of Rwanda to protect the aquatic ecosystem of Lake Kivu is the relocation of thousands of people living near the lakeshore towards other plots of land.

Fishing

Due to the profit maximizing behaviour of artisanal and industrial fishing units operating and the increasing population around the lakes, in areas with few alternative sources of employment, illegal and unsustainable fishing is a serious threat to the resources of the lakes in the region. For example, fishing at the river estuary, which usually functions as a breeding ground for fish, leads to a quick depletion of the fish stocks. It is feared that overfishing takes place in all the lakes in the Albertine Rift, Lake Albert, Lake Edward, Lake Kivu, Lake Tanganyika. The fact that all these lakes cross international boundaries certainly provides an additional challenge for the management of the fisheries. Also, "introduced species such as the Nile Perch, which were introduced to boost the economy of the fisheries, have unfortunately had a major impact on the biodiversity of these lakes by reducing species richness through predation."⁵

3.5 METHANE GAS IN LAKE KIVU

The methane gas in the bottom of Lake Kivu poses an enormous threat as well as a great opportunity for the Rwandan and Congolese people living in the region. Huge amounts of methane gas and five times as much more carbon dioxide are dissolved in the bottom waters of the lake. Lake Kivu lies just 15 km from the active Nyriragongo volcano. Fears exist that, if forced out by volcanic activity or earthquakes, the methane in the waters could ignite, causing massive explosions above the surface of the lake. Suffocating clouds of carbon dioxide could potentially drift over the surrounding lands.²⁹

These fears are not without a ground; in 1986, carbon dioxide in the water of Lake Nyos, Cameroon, came to the surface, resulting in a huge cloud of carbon dioxide flowing over the lake's surroundings and leading to the sudden deaths of 1,746 people. Lake Kivu, which is hundreds of times larger than Lake Nyos, provides a source of water, fish and sand for 2 million people, whose lives can be in danger when such a carbon dioxide cloud arises or when a large explosion takes place. Because of Lake Kivu's dangerous proportions of dissolved methane and carbon dioxide gases, UNEP calls this a "Killer Lake."³⁰ As recent as February 2008 two large earthquakes, with devastating consequences, occurred under Tshibinda Volcano, a dormant volcano located on the South-Western shore of Lake Kivu.³¹ These recent earthquakes again intensified fears that the lake gases could ignite.

The methane gas could, however, also be transformed into a great energy opportunity for the region. Because of its combustible characteristics, methane gas is ideal for use in electricity generation and heating; it is the main component of "natural gas" fed to cookers all over the world.³² The Bralirwa brewery, a branch of Heineken located at the shore of Lake Kivu, has used the methane gas extracted from the lake for 18 years, until 2004. A number of engineering companies have now been looking at ways of "harvesting" the gas. A social and environmental screening of power development options in Lake Kivu, among other lakes, has been carried out; it was recommended to get the gas to the surface and establish an electrical power generation facility as soon as possible.³³ It is expected that developing this source of energy can lower the pressure on forest in the Central Albertine Rift. It is still uncertain, however, whether the technology to extract methane gas from the lake at the large scale that is considered now, is safe enough.



Strategic Social Environmental Analysis of Power Development
Options in Nile Equatorial Lakes Region

3.6 VOLCANIC ERUPTIONS

Of course the active volcanoes in the region also pose a direct threat to the people and their environment. As the eruption of Nyriragongo Volcano in 2002 demonstrated, a major volcanic eruption could have extremely serious impacts on people's health, their villages, the vegetation and aquatic ecosystems. Potential emissions of toxic gases from the active volcano are a constant danger for humans and animals in and around the volcanic areas of the Central Albertine Rift.

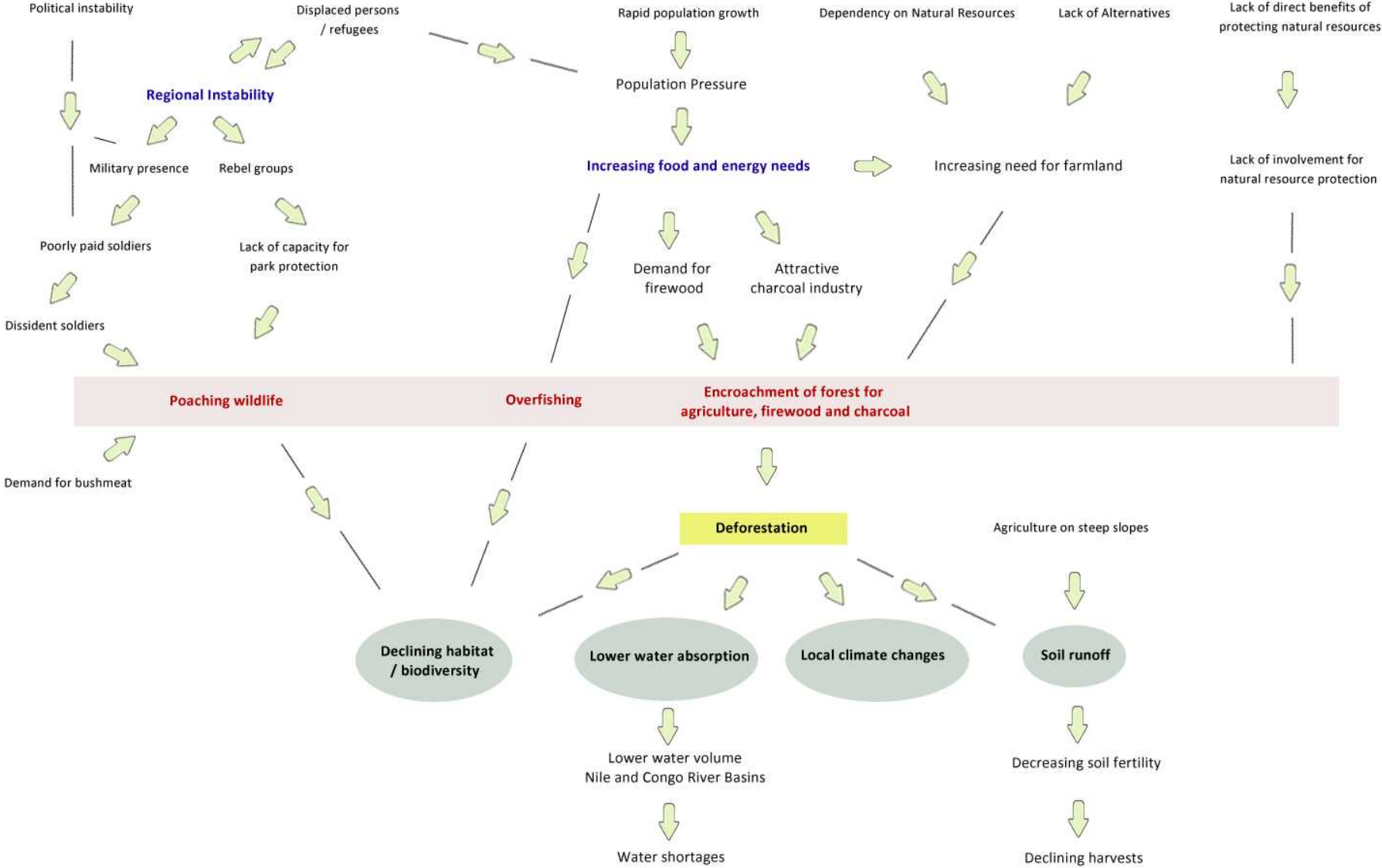
4. Analysis

Apart from the geological threats, it can be concluded from the chapter 3 that the largest environmental security threats to the Central Albertine Rift region come from the combination of:

- * Regional instability, the presence of rebels, and an ill-disciplined national Congolese army;
- * Increasing food and energy needs, resulting in a high and growing need for farmland, greater demand for firewood and an increasingly attractive charcoal industry.

The analysis of these greatly interrelated problems is demonstrated in the following model on figure 4.1. It shows how chaos and instability lead to environmental degradation.

Figure 4.1 Schematic analysis of environmental security threats in the Central Albertine Rift, Africa



5. Initiatives

In this chapter a brief overview is given of several initiatives that are being carried out to promote environmental security and poverty alleviation in the Central Albertine Rift. These initiatives are divided in four different themes; 1. Mapping and Monitoring; 2. Diplomacy and Law; 3. Finance and Economics; and 4. Empowerment and Training. Recognizing that this chapter can never be comprehensive and up-to-date, it nevertheless presents a brief inventory of various initiatives in these different fields after the IES published its latest conclusions and recommendations on its posters in October 2005.³⁴

AFRICA

Promoting Environmental Security and Poverty Alleviation in Virunga-Bwindi, Great Lakes - Africa

IES EnviroSecurity Assessments

A major proportion of the world's ecosystems and the services they perform for society and nature is being degraded or used unsustainably. The process affects human well-being in several ways. The growing scarcity of natural resources creates a growing risk for human and political conflicts, and hinders sustainable development and the poverty alleviation that depends on it. Situations involving resource abundance can also be related to serious environmental degradation, increased community health risk, crime and corruption, threats to human rights and related conditions – in short, to a decrease of security.

The overall objective of IES EnviroSecurity Assessments is to create the natural resource livelihood basis on the local, regional and international level. IES pursues this objective along the following mutually related lines: (1) the conservation of ecosystems and their related services, (2) the implementation of the international legal order, (3) the provision of economic incentives for maintenance of ecosystem services, and (4) empowerment of relevant actors and dissemination of results.

Institute for Environmental Security
 Anna Paulownastraat 113 • 2312 BC The Hague, The Netherlands
 Tel: +31 70 362 2209 • Fax: +31 70 362 1948
 info@envirosecurity.org • www.envirosecurity.org

The Institute for Environmental Security (IES) is an international non-profit non-governmental organization established in 2002 in The Hague, The Netherlands with liaison offices in Brussels, London and Johannesburg, CC.

The Institute's mission is: "to advance global environmental security by promoting the maintenance of the regenerative capacity of life-supporting ecosystems".

Our multidisciplinary work programme - Horizon 21 - integrates the fields of agriculture, education, law, finance and education and is designed to provide policymakers with a methodology to tackle environmental security risks, or to try, in order to safeguard essential conditions for sustainable development.

Key objectives of the Horizon 21 programme are:

- HORIZON 1:** Create enhanced decision tools for foreign policy makers, donors and their target groups on regional, national and local levels.
- HORIZON 2:** Promote effective linkages between environment, security and sustainable development policies.
- HORIZON 3:** Contribute to the development of a more effective system of international law and governance.
- HORIZON 4:** Introduce and evaluate financial mechanisms for the maintenance of the globe's life supporting ecosystems.
- HORIZON 5:** Build the environmental knowledge capital of people and organisations.

Our mission and programme should be seen in the context of promoting international sustainable development goals and as a contribution toward long-term poverty alleviation.

Recommendations from the Virunga-Bwindi region Case Study

ON MAPPING AND MONITORING

While the focus of these recommendations is to strengthen the joint park features of national parks, it is essential to complete the first step: assessment to have a full analysis of all ecological values of the region and to determine the viability of cooperation (which is defined by the international law) in assessment which the region is providing to its citizens. This assessment, the wider regional and global context, and the global context, the area is important as the habitat for the protection of unique species, to other usage biodiversity and for the strategic biological value of the region. The analysis of the IES report (see also the IES report on the international law) Assessment (and any other) should be carried out, also with special attention to the relevance for the local level.

The focus to the maintenance and delivery of ecosystem services should be included on the various levels (i.e. population/governance), regional (local level), national, regional, and international (national and global market), and global (impact of climate change is highest in Africa, where poverty levels are high for adaptation).

Biological assets and rivers should be listed on maps as in the pilot project on the various levels a direct and integrated view of the case is to be addressed.

A system of continuous monitoring of the ecology (and the forest, the soil, land-use) should be established with systematic ground-based field

ON DIPLOMACY AND LAW

Informal elements of cooperation should be established with IES, to present research of the parks, or any other, to be able to strengthen joint protection (see also the recommendations by the International Law Group of 16 September 1994 in Annex 1).

The national environmental legal system should be identified as to define the responsibilities, obligations and rights of the various actors and to refer to the region. It is recommended strongly to take the responsibilities and obligations of the government in the management of the region under the international environmental law into account, and to fully participate in the meetings of the international convention. The IES Environmental Law Center in The Hague should carry out a needs assessment of the countries in relation to the implementation of these conventions on the national, regional and international level.

Regulate conditions among Virunga-Bwindi region and jointly activities (including the IES) may benefit from updated nature protection monitoring system. The National Environment in the Transboundary Biosphere Management between the three states of Central Africa could be updated as a "Legal Assessment for a Transboundary Area" (including a binding treaty between the three states). Strategic research such as management should be very carefully planned and fully open (transparent) progress of the on-going consultation between the three park authorities.

ON FINANCE AND ECONOMICS

Adopting long-term financing for monitoring and management is an absolute requirement for the Virunga-Bwindi area to be successful as a joint park, to include the larger biodiversity and to "reduce losses" for the surrounding region and the international law. The donor commitment to fully only cover the maintenance of the Virunga-Bwindi area (including the forest) should be included in the national and regional level. The donor commitment to fully only cover the maintenance of the Virunga-Bwindi area (including the forest) should be included in the national and regional level. The donor commitment to fully only cover the maintenance of the Virunga-Bwindi area (including the forest) should be included in the national and regional level.

The focus pressure on the Virunga region and on the ecology in general, the higher levels has to be given to generate sources of income and employment under the conditions stipulated in each park. The population is highly dependent on the natural resources and on the forest. The population is highly dependent on the natural resources and on the forest. The population is highly dependent on the natural resources and on the forest.

ON EMPLOYMENT AND TRAINING

Other demarcation and regulation, the safety, health and education need to be considered. In the context of the region, the safety, health and education need to be considered. In the context of the region, the safety, health and education need to be considered.

Implementation of women is key in the necessary. Anthropogenic landscape to present in the area where a substantial percentage of land is used for agriculture. The implementation of women is key in the necessary. Anthropogenic landscape to present in the area where a substantial percentage of land is used for agriculture.

Virunga-Bwindi - AFRICA

The Great Lakes region in Africa is a war zone where tribal conflicts mix with the aftermath of the Rwandan genocide, power struggles in the Eastern part of the Democratic Republic of Congo, the control over precious and strategic minerals, such as diamonds, gold, cobalt and the illegal trade in timber and protected species. Many other African countries and their armies were involved and the humanitarian consequences are dramatic.

The war, both directly and indirectly (by causing refugee streams) caused widespread environmental destruction and so does the mining, logging and poaching. The protection of mountain gorillas in the border area of Rwanda, Uganda and the DRC, however, brings the three countries together, by creating employment, income, and basic health and education services for the local communities out of tourist revenues, creating incentives for co-operative protection.

The challenge now for these countries is to alleviate poverty, complement traditional forms of livelihood with sustainable alternatives, raise park management to the next level by establishing transboundary collaboration at the higher levels of administration in the 3 countries, explore and develop clean and safe alternative sources of energy. In addition to hydro-electricity, assist families with education for children, provide equal opportunities to all, and install basic facilities in communities, for instance, access to water, sanitation, health care, schools and electricity. These countries have signed and ratified all the major environmental related conventions and they have recognised the crucial role environmental conservation plays in the rest of the economy and the improvement of civil society, what the countries need first is that potential and current donors also recognise the importance of long term environmental conservation and start funding those needs.

The full report, legal analysis, and related documents for this case study are available on-line. Also the "Vision" interactive GIS interface can be used to select and view maps with various analytical indicators for different time periods. In this study area, do so:

www.envirosecurity.org/esp

5.1 MAPPING AND MONITORING

Late 2005, the IES made some recommendations in the realm of mapping and monitoring. These were: 1. to have a full analysis of all ecological values of the region and to determine the whole set of ecosystem services; 2. to identify the threats to the maintenance and delivery of ecosystem services on a local, regional, international and global level; 3. to make maps of the ecological assets and threats as to give policy makers a direct and integrated view of the issues to be addressed; and 4. to set up a system of continuous monitoring of the ecology based upon remote sensing with systematic ground-truthing. Some of these recommendations have been worked out by the IES; many others have been acted upon by other organisations:

Biodiversity surveys

In a recent article, "The biodiversity of the Albertine Rift", published in a special edition of *Biological Conservation* (Volume 134, Issue 2, January 2007, Pages 178-194) on Conservation in Areas of High Population Density in Sub-Saharan Africa, the existing literature on biodiversity surveys within sites in the Albertine Rift is summarised. The paper is the result of a collaborative effort between protected area authorities museums and many different NGOs, coordinated by Wildlife Conservation Society. This paper advances this collaborative effort by using the collated data to prioritise sites in the Albertine Rift for conservation according to their numbers of endemic and globally threatened species.³⁵

→ [The Biodiversity of the Albertine Rift](#)

Institute of Tropical Forest Conservation

The Institute of Tropical Forest Conservation (ITFC) is a division of the Mbarara University, Uganda. The mission of the ITFC, which is located just within the boundaries of Bwindi Impenetrable Forest National Park, is to lead in the implementation of biological and socio-economic research and training that furthers conservation and management of Albertine Rift's forest and biodiversity. The main focus of the ITFC is on gorilla monitoring, but other projects include community-park-wildlife interaction and research to the effect of the Multiple Use Zones.

→ [Institute of Tropical Forest Conservation](#)

Rugezi wetland

The Royal Netherlands Embassy in Rwanda has financed a study for the conservation and integrated management of the Rugezi swamp and the lakes of Bulera and Ruhondo. This study, carried out in 2004 by Helpage Rwanda and the Ministry of Local Administration, Communal Development and Social Affairs, included an ecological and hydrological inventory of the Rugezi wetland.²⁷

→ [L'étude de Rugezi \(français\)](#)

Hydrology

The US Forest Service has remained engaged in assessing the watersheds of the Virunga Mountains region. In 2005, a team of technical experts has provided guidance on structuring an analysis of the hydrology of the region. Additionally, they focused on improving the water supply to local communities who receive their fresh water by way of gravity fed pipes from sources located inside national park boundaries. In July 2006 the US Forest Service has again visited the region to make further assessments.

→ [USDA Forest Service report](#)

→ [US Forest Service International Programs](#)

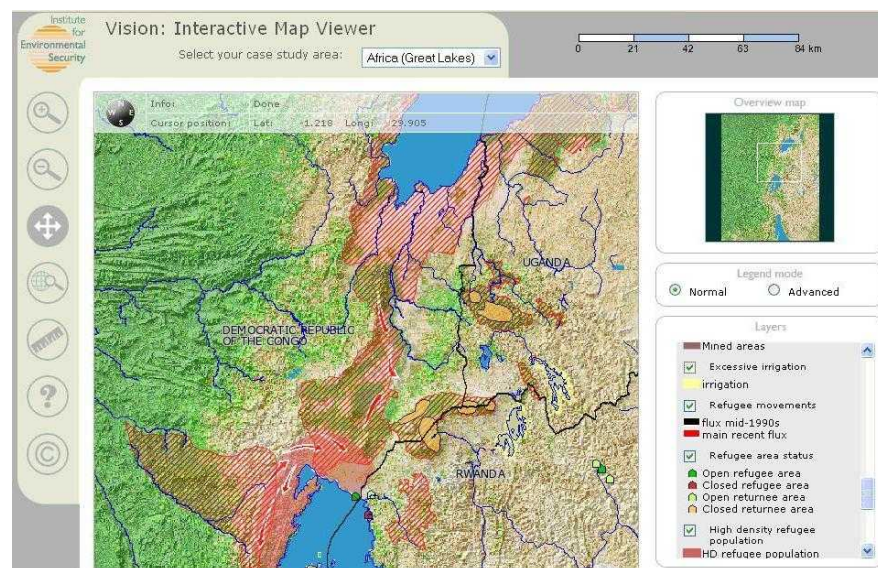
Maps and posters

In cooperation with cartographers from UNEP/Grid Arendal, the Institute for Environmental Security has produced posters, including unique maps that showed certain ecological assets and threats, as showed on page 26. These have been used to present the case studies to policy makers on different levels, both in the north as well as in the case study regions, as well as to (international) NGO's, academic researchers, students, etc.³⁴

→ [EnviroSecurity Posters](#)

Vision

The above information, ecological assets and threats, can also be viewed on Vision, the Web-GIS tool especially designed by the Institute for Environmental Security, SarVision and Maris BV, to present these issues to partners worldwide, decision makers and the general public. Different aspects of environment and security can be separately invoked on these online maps.



The various parameters, or layers, include:

- administrative data such as borders, rivers, roads and settlements
- ecosystem data, such as forest cover, hydrology, habitats, etc.
- conservation areas
- demographic and socio-economic information
- specific threats, such as deforestation and refugee concentrations

By ticking these layers "on" and "off", users can compose their own images with information of their own interest.

→ [Vision](#)

CARPE Mapper

Another interesting initiative is set up by the Central African Regional Program for the Environment (CARPE). Their Web-GIS tool, CARPE Mapper helps to monitor the environmental threats in the Congo Basin. CARPE Mapper assists conservation efforts by providing a focal point for CARPE partners to provide and share spatial information on both land use and conservation activities.

→ [CARPE Mapper](#)

Global Forest Watch Global Forest Watch offers several good interactive maps including one of Central Africa (covering Cameroon, the Central African Republic, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, and the Republic of the Congo.

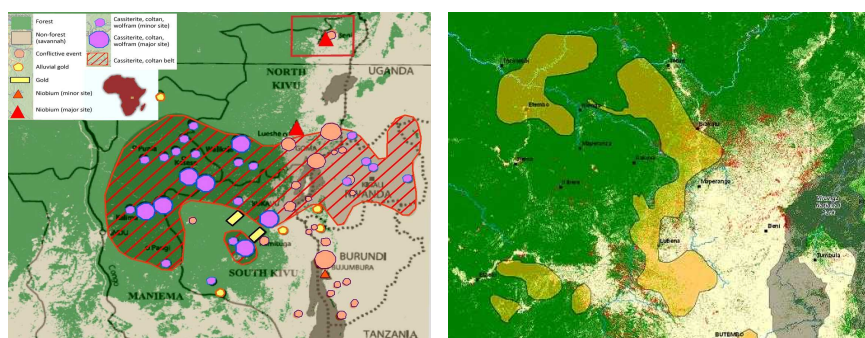
→ [Global Forest Watch](#)

GIS Centre - National University of Rwanda The GIS-and Remote Sensing Centre, situated in Butare, is an inter-faculty unit at the National University of Rwanda. Its overall mission is to build capacity at the University so that graduates will be able to apply this new technology in the planning and management of Rwanda’s resources. Research projects of the Centre include a “Zoning Plan of the Volcanoes National Park” and “Rwanda Forest Mapping”. The Centre also makes and presents various maps on economy, agriculture and population pressure in Rwanda.

→ [GIS Centre - National University of Rwanda](#)

Permanent Satellite Monitoring The Institute for Environmental Security and SarVision are working to advance the development and implementation of permanent monitoring of ecosystems with remote sensing technology. To help achieve this overall objective, in the African Great Lakes region (Albertine Rift) a small preparatory study was carried out in 2006 to demonstrate some initial examples of the use of satellite imaging for systematic monitoring. Based on this idea, a proposal has been sent out to various stakeholders in the Great Lakes region, to further develop and implement the remote sensing technology in this region. Although most actors are interested in having such a system of ecosystem monitoring in place, no sufficient funding is unfortunately available for its further development and implementation. Therefore, still no system is in place to monitor ecosystems in the Albertine Rift systematically and regularly.

Subsequently, within existing technical and financial limitations, the Institute for Environmental Security and SarVision have been working together to further improve the monitoring technology for this region, and to strengthen relationships with other leading initiatives as well as with local partners. As a result, we have been able to show several examples of environmental damage due to mining and deforestation in the Albertine Rift, in a report named “Mining, forest change and conflict in the Kivus, eastern Democratic Republic of Congo”, published in May 2008. This report also includes a forest change map classification for a small part of eastern DR Congo.



→ [Progress report 2006: Satellite Monitoring in the African Great Lakes region](#)

→ [Mining, forest change and conflict in the Kivus, eastern DR Congo](#)

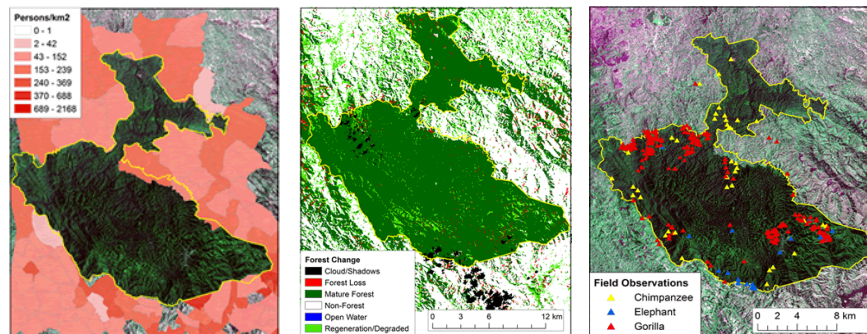
Integrated Forest Monitoring System for Central Africa (INFORMS)

The INFORMS project - Integrated Forest Monitoring System for Central Africa - was designed to monitor land-cover and land-use changes in the tropical rain forests of Central Africa through the mapping of forest types, extent, spatial distribution, and biomass using an integrated approach of remote sensing and field observations. The work of the INFORMS project in Central Africa, initiated by the Woods Hole Research Center, focuses primarily in and around protected areas including national parks, national forests, and wildlife reserves. One of the six focus areas of the INFORMS project is the Albertine Rift.

→ [Integrated Forest Monitoring System for Central Africa](#)

Protected Area Watch for the Albertine Rift (PAWAR)

The Protected Area Watch for the Albertine Rift (PAWAR) program promotes the development and use of remote sensing-derived information in conservation policy analysis, as well as encourages dialogue on leading environmental and development concerns in the Albertine Rift region.



The strategy of the PAWAR project is to increase the flow of remote sensing information into conservation management and analysis at all levels of civil society in support of conservation and decision-making. To this end, the Woods Hole Research Center works in conjunction with a consortium of local, national, and international scientific, non-profit, and government organizations in the Albertine Rift region. Unfortunately, no recent forest cover data is available; the most recent forest cover change map indicates changes in the period 1987 – 2000.

→ [Protected Area Watch for the Albertine Rift](#)

5.2 DIPLOMACY AND LAW

The set to recommendations to promote environmental security in the Central Albertine Rift also focused on diplomacy and the enforcement of (inter)national law. These included: 5. for the Congolese park authorities to establish informal channels of communication with MONUC to prevent invasions of the parks or using them as shelter and to strengthen park protection if needed; 6. to take the legal responsibilities and obligations of the countries in the region under the international environmental conventions seriously and work together as Parties to these binding law agreements; and 7. to continue with tripartite consultations among rangers and park authorities, facilitated by IGCP, and to investigate whether the Trilateral Declaration between the three States of October 2005 could be upgraded to a "Legal Framework for a Transboundary Area". Here a quick summary will be given of the initiatives that have been set up recently.

Land Rights

Despite the recent reform of the Rwandan Land Law (see section 2.6), in order to tackle the increasing land scarcity and environmental degradation, the land-related problems are not solved. In relation to that land reform a few question marks are in order here. Various academic and non-profit organisations have reviewed the new land law and suggested some changes. Kathrin Wyss, for instance, wrote that "although the land law stipulates "to establish a land system that is secure for all Rwandans", its strong focus on privatization and capitalization, along with ongoing inequalities in land access, and the regime's tendency toward historical revisionism, raise doubts about the government's true intentions."⁴² The number of land-related cases coming before a prefect court in Rwanda remains very high. "Although officially there no longer exists any ethnicity in Rwanda, many of these cases are related to ethnic discriminations in the distribution of plots to returning refugees and their resettlement," according to this review.⁴²

→ [Rwanda: A thousand hills for 9 million people](#)

For the DR Congo, among many other regions, the (International) Crisis Group is a prominent and trustworthy source of information. Focusing on all dimensions of the conflicts in the DR Congo, including the underlying factors of instability, the Crisis Group inevitably draws attention to land right issues in the DR Congo. In a recent report about Ituri district, May 2008, Crisis Group writes: "Land-related tensions that were at the origin of the conflict have not been eased and constantly threaten to lead to new inter-ethnic confrontations. With the return of refugees and internally displaced persons (IDPs) to their homes and the resumption of economic activity, a resurgence of those tensions seems inevitable. It is, therefore, indispensable to take preventive measures on the ground and to clarify the judicial muddle linked to land law and the status of chieftainships."⁴³

→ [DR Congo: Four priorities for sustainable peace in Ituri](#)

On its website, Oxfam Great Britain has a very useful list of publications related to land rights in East Africa.

→ [Land rights in East Africa: publications](#)

The UN Economic Commission for Africa, the African Union and the African Development Bank are jointly working on a Land Policy Initiative to support efforts being made by African governments in the formulation and implementation of land

policy and institutional reforms. Under this Initiative, a "Regional Consultative Workshop on Land Policy in East Africa" was held in Kigali, in January 2008.

→ [More about the workshop on Land Policy](#)

→ [Summary of the workshop](#)

Strengthening Environmental Law

Several initiatives exist to strengthen the development and implementation of environmental law in this part of Africa. The mission of the Environmental Law Institute is to advance environmental protection by improving environmental law, policy, and management.

→ [Environmental Law Institute, Africa Program](#)

Combating illegal trade in natural resources

To counter the illegal trade in natural resources, that deprives citizens of the DR Congo and other developing countries of their right to security and development, the Pathfinder project has been set up. Coordinated by the Institute for Environmental Security, this project aims to promote the strengthening of legal mechanisms which importing and transit states could use to block illicitly obtained natural resources from entering their national markets, and to dry up funds that are used to finance conflict in exporting countries such as the DR Congo.

→ [Pathfinder project](#)

Advance Force of Congo Rangers

To strengthen protection of especially Virunga National Park, the Advance Force of Congo Rangers has been set up in the beginning of 2006, with funding from the EU, and strong support from the Frankfurt Zoological Society (ZGF) and Africa Conservation Fund. The Advance Force is a group of 49 elite Congolese rangers who were given 6 months special force training, including a tough physical regime and firing lessons. The Advance Force rangers are meant to be deployed only in emergencies, in order to help protect the mountain gorillas and hippos in Virunga National Park as well as to help protect the last northern white rhinos in Garamba National Park. The Advance Force rangers are divided into three small, mobile troops. When needed, they share information with MONUC peacekeepers. They perform a different role to that of regular ICCN rangers. They are deployed throughout Virunga National Park as required by emergencies such as attacks to ranger posts and immediate threats to mountain gorilla or hippo populations. They escort regular rangers, protecting them from the men of renegade army general Laurent Nkunda, they protect civilians on the edge of the park, arrest illegal loggers, poachers, etc.^{20a}.

^{20b}

→ [Weblog Advance Force at Wildlife Direct](#)

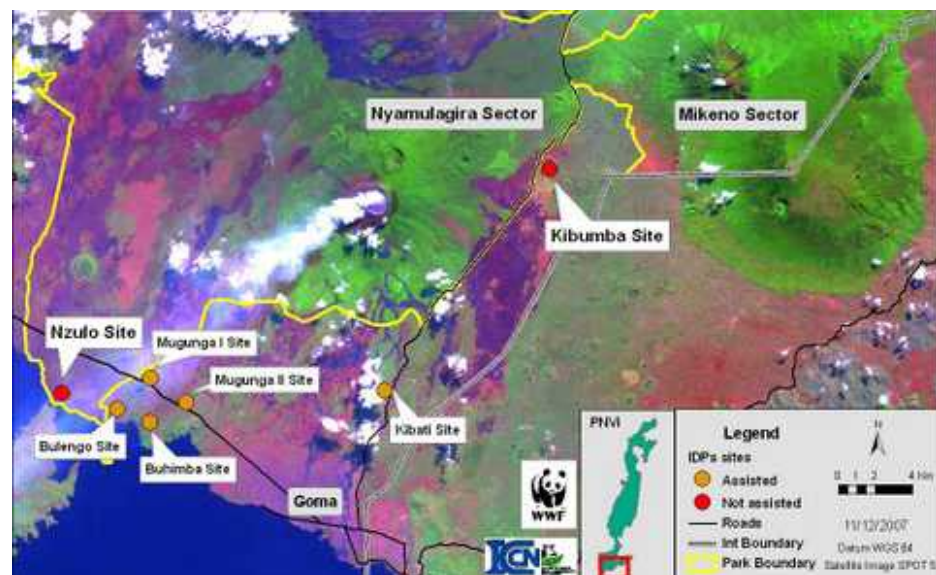
Charcoal transport prevention

Despite of the insecurity and the lack of access to the national parks, the ICCN rangers around Virunga National Park are trying to tackle the illegal trade in natural resources. Since the end of December 2007, the park authorities have seized over 40 tonnes of charcoal during anti-illegal charcoal patrols north of Goma, around Virunga National Park. Charcoal burning has increased enormously as a result of the insecurity in the area. Wildlife Direct estimated in mid-December that there had been "a 10-fold increase in the illegal charcoal trade since September 2007", because of a lack of control in the protected area, due to the escalation of fighting between Congolese government troops and rebels allied with dissident General Laurent Nkunda.²⁰



After the ICCN received legal permission from the National Prosecutor of the DR Congo, 36 rangers were mobilized to halt the trucks full of illegally burned charcoal coming out of the protected areas. The seized charcoal has been transported to camps for internally displaced persons (IDPs) near the park. The camps that have benefited are: Mugunga I, Mugunga II, Buhimba & Bulengo – where a total of some 65,000 people have found refuge.²⁰

Figure 5.1 IDP sites and Virunga National Park around Goma, DR Congo, Jan. 2008



Source: Wildlife Direct.²⁰

Forests in the DR Congo

Early 2006 CIFOR published an excellent report reviewing the forest sector of the Democratic Republic of Congo. It analyses reforms undertaken since 2002 and it recommends priorities for the upcoming four to five years.

→ [Forests in the DR Congo \(CIFOR report\)](#)

Environmental Security Assessment

The Institute for Environmental Security (IES) is working on an environmental security assessment of the DR Congo. This will be developed within the framework of IES' Environmental Security for Poverty Alleviation programme, largely supported by the Netherlands Ministry of Foreign Affairs. More information about this assessment, in which a variety of experts will be involved, can be found on the website of the IES soon.

→ [Environmental Security in the DR Congo](#)

Transboundary Cooperation

Starting in the early 1990's some form of cooperation between the park authorities of the three countries has been established. Due to the continuous efforts of the three park authorities, facilitated by the International Gorilla Conservation Programme (IGCP), the emphasis has mainly been on developing informal mechanisms for field level collaboration and on strengthening the capacity of each of the three authorities to effectively manage the forested parks as a regional ecosystem.³⁶

→ [Legal Analysis of Transboundary Cooperation in Natural Resources Management](#)

To get greater political support for increased cooperation in the field of protected area management, the issue of transboundary cooperation has been brought to an international political level. In October 2005 the ministers of DR Congo, Rwanda and Uganda signed a tripartite declaration on "the transboundary natural resources management of the transfrontier protected area network of the Central Albertine Rift". By doing so, the governments of the three countries sharing the Virunga Volcanoes Conservation Area took an important step towards the formal establishment of a transboundary protected area. This declaration aims to establish a strategic transboundary collaborative management system.

Ministers from Rwanda, the DR Congo and Uganda sign the Tripartite Declaration. From left to right: Protais Mitali, Anselme Enulungu and Jovino Akaki Ayumu.



Further interpretation of this declaration was given by the Transboundary Core Secretariat in the form of a ten year transboundary strategic plan. Meetings of this Core Secretariat, composed of the directors of ORTPN, UWA and ICNP, were facilitated by the International Gorilla Conservation Programme, funded by USAID. Early 2008 the Netherlands Ministry of Foreign Affairs and the Buffet Foundation decided to support the implementation of the transboundary strategic plan, coordinated by the World Wide Fund for Nature (WWF).

The main challenge of the Core Secretariat is to connect the various national plans of Rwanda, Uganda and the DR Congo to this transboundary regional plan. One of the results the Core Secretariat already established has been the signing of a Memorandum of Understanding between the three park authorities, with respect to the collaborative monitoring of and sharing revenues from transfrontier gorilla

tourism on a 50-50 basis. If, for example, the “Rwandan” gorillas have moved to Uganda and all tourists go to Uganda, 50% of the revenues in Uganda will be shared with Rwanda.

→ [Regional Collaboration](#)

Nile Basin Initiative As mentioned in 2.3, the Albertine Rift is the divide between the Congo Basin and the Nile Basin. Because the water in all the Albertine Rift countries contributes (partly and sometimes indirectly) to the Nile River, the DR Congo, Burundi, Rwanda and Uganda are member states of the well-known Nile Basin Initiative (NBI). This is a partnership initiated and led by the riparian states of the Nile River through the Council of Ministers of Water Affairs of the Nile Basin states. The NBI seeks to manage the river in a cooperative manner, share substantial socioeconomic benefits, and promote regional peace and security. Via this initiative, the countries of the Albertine Rift cooperate with the riparian Nile Basin states Tanzania, Kenya, Ethiopia, Sudan and Egypt.

→ [Nile Basin Initiative](#)

International Relations Relations between the states in the Great Lakes region are slowly improving, so it seems there is a momentum for a peaceful solution of internal and transboundary disputes.

Conference of the Great Lakes region After successful democratic elections in the DR Congo, in July and October 2006, a legitimate government in Kinshasa was installed. In December of that year, Heads of States from the region – including the elected president of the DR Congo, Mr Joseph Kabila - came together in Nairobi, during the annual “Conference of the Great Lakes Region”. The eleven core countries of this Conference are Angola, Burundi, Central African Republic, Republic of Congo, Democratic Republic of Congo, Kenya, Rwanda, Sudan, Tanzania, Uganda, and Zambia. By signing the “Pact on Security, Stability and Development in the Great Lakes Region” these countries promised to work peacefully together in order to achieve lasting peace, stability and development. Although ratification of this Pact is still ongoing, it has proved to be the basis for continuing peaceful cooperation.

→ [International Conference on the Great Lakes region](#)

Dealing with shared oil reserves DR Congo and Uganda have been trying to find a peaceful and diplomatic solution for their conflict over the oil reserves under Lake Albert. Ugandan president Yoweri Museveni and his Congolese counterpart, Joseph Kabila, held a summit meeting in Arusha, Tanzania on September 7 and 8, 2007, in an attempt to sort out the border disputes. They agreed that the border dispute and the sharing of oil and other resources which straddle the frontier should be resolved by diplomatic means. Although they signed this accord, the “Ngorodoto Agreement”, another military clash erupted on the lake later that month, after the seizure of an oil exploration boat. So it can be concluded that the oil disputes are not settled yet. Moreover, the two states put on ice a resumption of diplomatic relations.^{37, 38}

Dealing with Armed forces in Eastern DR Congo As elaborated upon in chapter 3 there are high numbers of rebellious and highly violent armed forces in the eastern part of the DR Congo. These forces pose a great threat to regional, national and international stability. Rwanda fears for cross-border

attacks by Interahamwe (FDLR) militia, while the Congolese government holds Rwanda responsible for supporting Nkunda's forces. During the Interministerial meeting of the states of the Great Lakes Conference in Nairobi, in November 2007, a diplomatic solution to this long drawn-out matter was reached; Rwanda and DR Congo have decided to develop a shared approach to tackle FLDR and Nkunda's forces.

Goma "Actes d'Engagement"

In January 2008 the government of the DR Congo and 25 rebel and militia groups have signed a deal in Goma, after two weeks of peace negotiations. The Goma deal establishes a ceasefire and offers an amnesty for the rebels and militias, including the Tutsi guerrillas loyal to renegade General Laurent Nkunda. The "Actes d'Engagement" were expected to be an important breakthrough in the stagnating peace process. However, whether the deal leads to actual improvements in the security situation, depends on the willingness of the leaders in the region to implement it. Signing the Goma Agreement has unfortunately not enabled the ICCN to enter (the gorilla / Mikeno sector of) the Virunga National Park. This is strictly forbidden by Nkunda's rebels.^{20a}

Economic integration

In July 2007, Rwanda and Burundi formally joined Kenya, Uganda and Tanzania in the East African Community (EAC). The EAC aims at widening and deepening cooperation among the member states in, among others, political, economic and social fields. Also the re-launch of the Economic Community of the Great Lakes Countries (CEPGL), an alliance that aims at promoting regional economic cooperation and integration between Rwanda, DR Congo and Burundi, can contribute to regional cooperation.

→ [East African Community \(EAC\)](#)

5.3 NATURE CONSERVATION

Next to the already existing conservation initiatives, carried out mainly by ICCN, UWA and ORTPN, with assistance from WWF, WCS, Dian Fossey and others, we have seen new remarkable initiatives and developments with regard to nature conservation. Some of these are presented here:

Rwanda National Conservation Park

To expand the habitat of a group of some 15 chimpanzees in Gishwati Forest Reserve, an ambitious project has started late 2007, in order to create forest corridors to connect Gishwati Forest Reserve to Nyungwe National Park, 50 kilometres away. It is a collaborative effort of the Rwandan government, and two organisations from the United States, Great Ape Trust of Iowa and Earthpark.

The four objectives of this reforestation project are: to create "Rwanda National Conservation Park"; to restore ecosystem services in the form of improved water quality, reduced soil erosion and flooding, fewer landslides and increased sequestration of carbon; to restore natural biodiversity with special emphasis on chimpanzees as a keystone and flagship species; and to generate income through ecotourism, investment opportunity and local employment.

→ [Rwanda National Conservation Park](#)

Human-Gorilla Conflict Resolution

In an effort to tackle the problem of gorillas leaving the park and destroying crops, UWA and IGCP have set up the Human Gorilla conflict resolution (HuGo) project. The main goal is to ease the tensed situation between the park authorities and the local communities and to increase the level of community support for gorilla conservation. Gorilla Monitoring and Response teams were installed. These teams consist of about 40 volunteers from the community, who are supposed to gently chase back the gorillas when they move outside the park, by ringing bells, whistling, shouting and herding.⁴¹

→ [Human Gorilla Conflict Resolution – the Uganda experience](#)

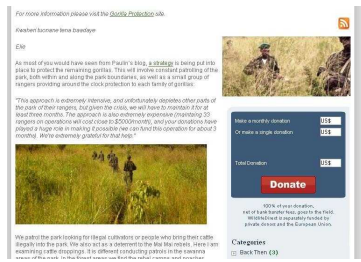
Global attention

Since the work of Dian Fossey the endangered mountain gorillas have managed to attract global attention; this has direct and indirect benefits for their protection. Income from donors and tourism has been used for their habitat protection as well as community projects to reduce community overexploitation of the habitat. Many organisations working in the region are mainly focused on protecting this species, such as Dian Fossey Gorilla Fund International, Wildlife Direct, World Wild Fund for Nature (WWF), International Gorilla Conservation Programme (IGCP), the Frankfurt Zoological Society (ZGF), to name only a few.



National Geographic and BBC have always been very interested in news about the region, but the recent gorilla killings in July sparked an enormous amount of extra attention, also from other media all over the world; from the Arabic news network Al Jazeera to the American magazine Newsweek, several newspapers and tv-stations; they all showed interest in the developments in the region.

Weblogs



Somewhat related to the previous section, are the weblogs which are hosted by Wildlife Direct, an organisation that was set up in 2006. After many years of working in almost complete isolation, these weblogs give more attention for the work of the ICCN, the Advance Force of Congo Rangers, and several NGOs. On these weblogs the (chief)

rangers write weekly or daily updates on a wide range of subjects, such as the daily activities of the Congo Rangers, the life of their families, dealing with rebel attacks, the threats to the mountain gorilla and hippo populations, the health situation of certain individuals, etc. Through these “blogs”, interested individuals and organisations have the opportunity to watch and read about the life and work of the Congo Rangers. As a consequence these weblogs have boosted financial assistance for the Congo Rangers, including the Advance Force.

→ [Weblogs on Endangered Animals in Africa](#)

5.4 FINANCE AND ECONOMICS

To realize structural environmental improvements in the region, IES' advice to the international community and national governments included financial and economic elements; recommendations were the following: 8. to design a long term financing mechanism for monitoring and management of the Virunga-Bwindi region, possibly in the form of a Multi-Donor Trust Fund; 9.a. to give highest priority to generating sources of income and employment outside the subsistence agriculture, and to support small to medium industries and the ICT sector; 9.b. to support a clean energy strategy for the countries sharing the Virunga Massive, including creating options for CDM projects; and 10. to integrate the environmental management needs in the national (Economic Development and) Poverty Reduction Strategy Papers.

Trust Funds

A trust fund specifically set up for protecting the Ugandan part of the mountain gorilla habitat (Bwindi Impenetrable Forest National Park and Mgahinga National Park) is the Mgahinga and Bwindi Impenetrable Forest Conservation Trust Fund (MBIFCT). "This was one of the first conservation trusts established in the world, in 1996, with the intention being that the initial investment of \$4 million US from the World Bank Global Environment Facility (GEF) would generate sufficient interest to fund conservation and development activities in perpetuity. MBIFCT supports park management and research inside the parks, and community development projects (such as infrastructure) outside the parks. It has targeted specific groups of beneficiaries, and has worked particularly



closely with the Batwa people in the area, for whom it has purchased blocks of land.³⁹ Unfortunately the trust suffered very badly during the global stock market declines, and has not been able to invest as much money in its target activities as had been hoped. Some experts state that MBIFCT lacks capacity and spends too much money on low-priority activities such as workshops and its own headquarters (pers. communication 2007).

Since the trust fund approach can be very useful as a mechanism for funding conservation and development work, some other initiatives have also been mentioned. The World Bank strives for a Multi-Donor Trust Fund for funding conservation and development activities in the DR Congo. The Netherlands Ministry of Foreign Affairs supports the launch of a Multi-Donor Trust Fund for the Congo Basin including Rwanda and Burundi.

→ [MBIFCT](#)

Clean Development Mechanism

As this stage, there are no projects in the Central Albertine Rift carried out under the Clean Development Mechanism (CDM). Just north of the Albertine Rift though, in the north-western part of Uganda, a CDM-funded project - the West Nile Electrification Project- is being carried out. The objective of this small scale project, bilaterally funded by Finland and The Netherlands, is to build and operate a hydroelectric power plant.⁴⁵ Although this project, which stimulates energy security in the West of Uganda, is in fact located outside the Albertine Rift it can indirectly have positive impacts on the ecosystems of the Albertine Rift. With a sufficient and reliable energy supply, the "West Nile Region has the potential to become one of Uganda's more productive agricultural areas" and also coffee processing, cotton ginning, tea processing, edible oil extraction and grain milling for instance can give a boost to

economic development.⁴⁵ Furthermore, by meeting the households' energy needs in this part of the country, this project could reduce the pressure on the natural resources of the Central Albertine Rift for firewood and charcoal.

In Rwanda, Burundi and the DR Congo, no CDM projects have been issued so far.

→ [CDM Project Activities](#)

5.5 EMPOWERMENT AND TRAINING

Strongly related to promoting sustainable economic development and finance, as mentioned in the previous section, IES has also made recommendations in the sphere of empowerment and training. In line with earlier suggestions, the IES recommended that: 11. after demobilisation and repatriation, the rebels, militias and refugees need to be trained in skills outside subsistence agriculture; and 12. to stimulate empowerment of women, which is key in order to realize the necessary demographic transition.

Enterprise, Environment and Equity

The Enterprise, Environment and Equity in the Virunga Landscape of the Great Lakes (EEEGL) program is a joint venture of CARE and the International Gorilla Conservation Programme (IGCP) - a consortium of three international conservation NGOs (WWF, AWF, and FFI) that is a leader in conservation programming in this region. It aims to increase livelihood opportunities for local communities, particularly benefiting the more marginalised and vulnerable groups, based on sustainable use of natural resources, and improved governance of these resources thus contributing substantially to poverty reduction and improved environmental conservation in the Virunga landscape of the transboundary region of Uganda, Rwanda and DR Congo. The program comprises four major components/themes, which are:

(1) Enterprise: microfinance, ecotourism and non-ecotourism based enterprise, (2) Participatory natural resource management, including tourism revenue sharing, (3) Community empowerment: organisational strengthening and policy influencing, and (4) Transboundary collaboration and learning.

→ [Enterprise, Environment and Equity](#)

Prolinnova

Prolinnova (PROmoting Local INNOVAtion) is an NGO-initiated programme to build a global learning and advocacy network on promoting local innovation in ecologically-oriented agriculture and natural resource management. The focus is on recognising the dynamics of indigenous knowledge and learning how to strengthen the capacities of farmers (including peasant/family farmers, forest dwellers, pastoralists and artisanal fishers) to adjust to changing conditions. The initiative is active in South-West Uganda under the coordination of Environmental Alert.

→ [Prolinnova](#)

CATALIST

The Netherlands Government, through the Embassy of the Kingdom of The Netherlands in Rwanda, has committed €22 million (US \$28 million) to the project Catalyzing Acceleration of Agricultural Intensification for Stability and Sustainability (CATALIST). The Dutch Directorate General for Development Cooperation (DGIS) is providing another €1.5 million (\$1.9 million) through the Strategic Alliance for Agricultural Development in Africa (SAADA).

The CATALIST project will help maintain biodiversity, improve environmental management, intensify agricultural productivity, and develop markets for both agricultural inputs and the crops that poor farmers produce in the Great Lakes region. The project is applying the HIMO approach (Haute Intensité de Mains d'Oeuvre), employing local people, refugees, and demobilized ex-combatants in labour-intensive public works to plant trees and build terraces and roads.



The goal is to accelerate economic growth, reduce poverty, and promote peace and stability, partly by establishing or strengthening the capacities of farmer and agro-input dealer organizations. IFDC will work through farmers' organizations, several national and international NGOs, the private sector, donors, and other consortia. This makes the CATALIST project an excellent example of how environmental management and poverty reduction can be combined.

CAPMER

The Centre for Support to Small and Medium Enterprises in Rwanda was launched recently, in order to promote the establishment and development of small and medium sized enterprises (SMEs). In collaboration with The Royal Netherlands Embassy in Rwanda, CAPMER supports SMEs in agribusiness for the transformation of non-traditional agricultural products in Rwanda. The overall objective of this programme is to contribute to the development of market-oriented agriculture by supporting industrial production units for the transformation of non-traditional agricultural products such as milk, irish potatoes, passion fruit, banana, honey, flowers, spices, castor plant, cassava, hides and skins.

→ [CAPMER](#)

Virunga Environmental Programme

The Virunga Environmental Programme (PEVi), coordinated by WWF and ICCN, works on the further development of education and awareness of natural resources management activities around Virunga National Park, to ensure the conservation of the park. Direct objectives are to train and inform the population living around the park on the ecological and economical importance of the park, to help these people to manage their natural resources and to improve relations between the local people and ICCN in key areas around the park.

→ [Virunga Environmental Programme \(PEVi\)](#)

Mushroom production

Considering the shortage of land - population density is now over 600 per km² - many organisations realize that alternatives have to be found outside agriculture. IGCP has supported a project in the region aimed at the production of mushrooms, an activity which takes up little space. In cooperation with the Institute of Agronomic Sciences of Rwanda (ISAR), based in Butare, mushroom seeds and training have been given to farmers, in 15 different sectors (12 of which are bordering the national park). Together with ISAR, IGCP explores the possibilities for farmers to add value to their primary products, f.e. to chip potatoes and to better store harvests.

5.6 ECO-TOURISM OPPORTUNITIES

Eco-tourism

To increase the local support for protected areas, even in densely populated areas such as in Rwanda, the tourism industry can play an important role. In this region, characterised by high endemism and great biodiversity, tourism is strongly focused on nature, such as bird watching and mountain gorilla tracking. Tangible revenues from the tourism industry, for instance in the sectors of transport, construction, accommodation, food production, handicraft production, and tourist guiding, may strongly encourage people to protect the natural resources of their region. In the end, this is the basis of their livelihood; if forests disappear, the mountain gorillas, their “sources of income” will disappear.

→ [Rwandan Office for Tourism and National Parks](#)

→ [Uganda Wildlife Authority](#)

→ [Congolese Institute for the Conservation of Nature](#)

Bwindi Advanced Market Gardeners' Association (AMAGARA)

One of the main elements in the analysis of the situation (see chapter 4) is the lack of local involvement for natural resource protection. This is mainly the result of a lack of direct benefits of protecting natural resources for the local people. Acknowledging this problem, the IES has supported the setup of the Bwindi Advanced Market Gardeners' Association (AMAGARA) in 2006.

The majority of subsistence farmers living close to the edge of the forest do not benefit from the tourism industry. Instead, they live in conflict with the National Park, because its existence deprives them of access to traditional income generating activities. To make the farmers benefit from tourism more, they are trained in crop production and natural resource management, consolidating and grading produce, and finally marketing products to the tourist lodges. Their involvement in the tourism industry increases their income, while at the same time establishing a positive attitude towards conservation and boost local involvement for protecting natural resources. After the start-up support by the IES, the project has also received support from other organisations, such as the Rufford Small Grants Foundation.





→ [Bwindi AMAGARA](#)

Virunga Artisans

Through supporting Virunga Artisans, IGCP's Business Enterprise Team stimulates local artisans, in Nkuringo, Uganda, and Kinigi, Rwanda to market their quality crafts, baskets, carvings, wearable art, coffee and tea, thereby enabling these artisans to make a living outside the parks. They also assist community groups to design new products and improve the quality and marketability of traditional crafts.

→ [Virunga Artisans](#)

Art of Conservation

This outreach programme encourages artistic expression as a form of communication. The target audience for Art of Conservation is the community who live near the Volcanoes National Park, Rwanda. The art classes provide instruction in basic drawing and introduce ideas about gorillas, nature, and the interconnectedness of life.

→ [Art of Conservation](#)

Sabinyo Community Lodge Association

Based on the recognition that that tourism offers both income generating as well as conservation opportunities at a local level, IGCP has supported the building of tourism lodges in a cooperative initiative between private sector and a local association, the Sabinyo Community Lodge Association. Regarding quality and price, this accommodation is directed at so-called 'high end' tourism. Next to gorilla-viewing tourism (which clearly has a maximum, 14.000 visitor permits per year in Rwanda) IGCP also aims to promote cultural tourism, including community walks, where tourists can visit schools or explore caves, enjoy traditional dance and entertainment, drink local beer, and buy handicrafts from local manufacturers. Unfortunately these cultural tourism activities are not operational; it is uncertain when these activities will be started up.

AMAHORO Tours

AMAHORO Tours is a tour operator, involving local people as partners in the development of tourist activities. Based in based in Ruhengeri (Musanze), AMAHORO Tours is operating five different "cultural tours", where tourists can witness and participate in local activities such as brick making, traditional healing, bee keeping, traditional dances, etcetera.

→ [AMAHORO Tours](#)

Iby'iwacu

Iby'iwacu village is established as an area around Volcanoes National Park, Rwanda, to display lifestyles, activities, artifacts and ways of living of local people. This initiative, set up by some private investments, has great potential, as it generates

income for poor local people. About 500 people, including ex-poachers, participate in Iby'iwacu. They are supported - not by receiving direct financial support - but through projects such as healthcare, water tanks and school materials.

One of the ex-poachers is legendary to have been uncatchable. His 'conversion' has been an example to many. At this stage six local children are being supported from primary school to university, which encourages local kids to be well educated. In the village, next to cultural activities for tourists, a local man is appointed teacher, teaching English to the villagers. Plans exist to provide more historical and cultural information in the village, and to provide accommodation in the village.

→ [Iby'iwacu](#)

Ikoro Tented Camp

Ikoro Tented Camp is an overland camp still under construction, in Musanze district, Rwanda. It is expected to open in September 2008. While employing around 250 staff, the relations between employer and staff are unique in the area. Staff, hired mostly for construction in this phase, is encouraged to think along on construction and operation of the facility. Many of the staff that will eventually be laid off, can receive training and support, together with the Netherlands Development Organization SNV, to prepare an own business in for instance laundry or cleaning. Also, laid off construction workers are receiving help in organising their agricultural plots in such a way that it forms a steady supply line for the overland camp. This way of cooperation with local communities creates among them trust, loyalty and pride of being part of this company. This has paid off, amongst others, in safety and security of assets.

Demonstration tour IES and SNV- Rwanda

The IES is currently working with the ORTPN to stimulate out-of-park community based tourism near Volcanoes National Park. In May 2008, the Netherlands Development Organization SNV and the Institute for Environmental Security have, in cooperation with ORTPN, organised a tour to demonstrate district authorities how tourism enterprises can benefit local communities. Visits were paid to the two projects mentioned above, Iby'iwacu and Ikoro Tented Camp, giving district authorities ideas and inspiration about how they themselves can play a constructive role in such community-based tourism development within their district.



6. More ideas & Recommendations

MAPPING AND MONITORING

Given the insecurity and difficult access to Virunga National Park at this moment, the government authorities and rangers require specific satellite information for law enforcement, in order to control logging and mining. Also for the production of sustainable biofuels in the region, the use of satellite images is indispensable for monitoring plantation development. Therefore, it is strongly recommended to the Congolese national government, international financial institutions - in particular the World Bank - conservation agencies as well as bi- and multilateral donors, to invest in the development of systematic satellite monitoring, using the new (radar) imaging approaches presented in this study on a larger scale. This will help to increase transparency, fight corruption and advance good governance in the mining and logging sectors of the Democratic Republic of Congo.

Appreciating the enormous potential of using remote sensing technologies for early warning, and also recognizing the impact that environmental degradation can have on security and stability, special attention should be given to such initiatives as the European network of excellence Global Monitoring for Security and Stability (GMOSS). Environmental changes like deforestation, mining, drainage of vulnerable ecosystems, etc. can be important contributing factors to insecurity. By using its outstanding earth observation capacities to monitor environmental change, GMOSS can become a very important player in analysing present and future threats to security worldwide.

DIPLOMACY AND LAW

Given the economic and ecological importance of the Central Albertine Rift, the DR Congolese authorities and the international community should do their utmost to protect the ecosystems of the region. In that respect, it is recommended to strengthen civil-military cooperation in and around Virunga National Park. MONUC should work closely together with the Congolese park authorities and provide assistance and support to initiatives such as the Advance Force of Congo Rangers.

All humanitarian organisations should respect national and international law and not build any infrastructure - including camps for displaced people - within the protected areas, the largest of which (Virunga National Park) even has the status of UNESCO World Heritage Site.

In order to address the unequal distribution of land and other natural and mineral resources, the government of the DR Congo should take the following measures, as defined by the International Crisis Group:

- Establish a land commission, composed of provincial authorities and representatives of all communities, mandated to review title deeds and recommend practical measures for the redistribution and re-allocation of estates and ranches in Masisi and Rutshuru so as to reinstall/ reinsert landless internally displaced persons and refugees, improve inter-communal relations and prevent renewed disputes.⁴⁴

- Initiate a process of consultations with the aim to present to parliament before the end of 2008 a revised draft of the land laws that clarifies the status of traditional chiefs.⁴³
- Ensure strict application of the mining code and the forest code; institute a moratorium on new mining and forestry concessions until a framework regulation for effective control of the sector has been put into place.⁴³
- Improve economic opportunity and control and exploitation of mineral wealth in North Kivu by:
 - a) strengthening agencies responsible for tax collection and supervision of mines.⁴⁴
 - b) creating mechanisms for the certification and tracking of minerals and other natural resources.⁴³
- Order the military prosecutor to initiate official investigations into the alleged complicity of officers of the Forces Armées de la République Démocratique du Congo (FARDC) in the illegal exploitation of natural resources and mining, and initiate a judicial investigation into illegal forestry in order to dismantle transnational mafia networks involved in the illegal exploitation of wood.⁴³

The illegal trade in natural resources deprives the citizens of the DR Congo of their right to security and development, while creating instability in border regions and damaging the conservation of ecosystems. Not only the government of the DR Congo, but also importing countries have a responsibility - in cooperation with the DR Congo - to ban illegally obtained natural resources such as timber, gold, coltan and tin, from becoming highly liquid commercial assets. What is needed is an appropriate legal regime and set of procedures to translate this responsibility into an effective peacekeeping tool. A first step, as designed by the Pathfinder project (see page 33), should be to provide technical assistance to importing countries, to strengthen their mechanisms to deter and prevent the importation of the illicitly exported natural resources from states such as the DR Congo, which lacks adequate monitoring and oversight capabilities.

FINANCE AND ECONOMICS

The World Bank could set up a Multi-Donor Trust Fund that could serve to fund activities aimed at promoting security and sustainable development in this part of Africa. Given the transboundary character of the ecology of the Congo Basin, this Trust Fund should not only be geographically directed at the DR Congo, but should also include other countries of the Basin, plus Burundi, Rwanda and, possibly, Uganda.

If Uganda will not be included in such a Multi-Donor Trust Fund, attention and support should be given to efficiently manage and control the Mgahinga and Bwindi Impenetrable Forest Conservation Trust Fund (MBIFCT), making it a more effective mechanism for conservation and development.

For a sustainable economic development the Albertine Rift countries need to strengthen their energy security, by generating more energy in a clean and sustainable way. They can realize this goal by making use of for instance solar power, wind, hydropower and a (careful) exploitation of the methane gas in Lake Kivu. Alternatives for the use of firewood and charcoal need to be developed as

soon as possible. Donors could play a decisive role in supporting the research and development on such alternative energy sources for the region.

Most importantly, to sustain the lives of the people, and the economy of the country, major reforestation projects are needed all around the region, especially in Burundi and Rwanda, where an agroforestry approach is recommended. By planting the right types of trees on their lands, farmers can significantly increase local forestry resources, improve the quality of their farmlands and stop soil erosion. At the same time, planting such forest gardens will support new income generating opportunities, while establishing sustainable supplies of high-protein animal forage, fuel wood, berries, beans, organic fertilizer, etc.

Acknowledging the recent intensification of the refugee problems in and around Virunga National Park, activities to protect the forest resources and to avert a fuel wood crisis should be strongly supported. International organisations should continue to support local communities and displaced people near the protected areas by distributing fuel wood from plantations, thereby preventing these communities to enter the protected areas for collecting their fuel needs.

To prevent the livelihoods of communities surrounding the Virunga Volcanoes region, as well as to demarcate the boundaries of the protected areas, financial and logistical support should be given to strengthen and extend the "buffalo wall" in places where it is needed.

EMPOWERMENT, TRAINING & ECO-TOURISM

Given the fact that local communities living around the Rwandan Volcanoes National Park do not benefit sufficiently from the high-end gorilla tourism in their region, support should be given to organisations that strive to improve this situation. If the situation remains unchanged, it is feared that deforestation for fuel wood, charcoal and agricultural land, especially in the densely populated Rwandan and Congolese side of the border, cause irreversible damage to the national park. Assistance could be offered to the park authorities to deal with this challenge, by identifying ways to improve the system of benefit sharing, in order to increase local farmers' involvement in nature conservation. Also, non-governmental initiatives to provide local people with viable economic opportunities, such as those supported by the International Gorilla Conservation Program, deserve a great deal of support from national governments as well as from the international community. Strategies to improve crop quality and develop marketing skills, as implemented in the Ugandan AMAGARA project, could possibly also be adopted in other villages in the region.

District authorities are in the key position to bring more actors in tourism together. First of all, it is recommended that they increase their knowledge on tourism. They can then analyse the unique tourism potential of their area and start to market it. Not only international tourists, but also domestic tourists want to see and learn about the different regions in their country. District authorities can therefore make their people aware of the benefits tourism can bring to these communities, for instance via supply of agricultural products, or increased employment. It is assumed that such activities by district officials will create understanding for the local economic potential of new enterprises and encourage people to take more initiative. Hence, this would all serve to stimulate local economic development, while creating further support for nature conservation.

7. Abbreviations & Acronyms

AMAGARA	Advanced Market Gardeners' Association
AWF	African Wildlife Foundation
CATALIST	Catalyzing Acceleration of Agricultural Intensification for Stability and Sustainability
CAPMER	Centre d'Appui aux Petites et Moyennes Entreprises au Rwanda <i>Centre for Support to Small and Medium Enterprises in Rwanda</i>
CARPE	Central African Regional Program for the Environment
CEPGL	Communauté Economique des Pays des Grands Lacs <i>Economic Community of the Great Lakes Countries</i>
CBFP	Congo Basin Forest Partnership
CDM	Clean Development Mechanism
CIFOR	Centre for International Forestry Research
CNDP	Congrès National pour la Défense du Peuple <i>National Congress for People's Defense</i>
DR Congo / DRC	Democratic Republic of Congo
EAC	East African Community
EEEGL	Enterprise, Environment and Equity in the Virunga Landscape of the Great Lakes
ESPA	Environmental Security for Poverty Alleviation
FARDC	Forces Armées de la République Démocratique du Congo <i>Armed Forces of the DR Congo / Official Army of the DR Congo</i>
FDLR	Forces Démocratiques de Libération du Rwanda <i>Democratic Liberation Forces of Rwanda</i>
FFI	Fauna & Flora International
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information System
GMOSS	Global Monitoring for Security and Stability
HIMO	Haute Intensité de Mains d'Oeuvre <i>High Labour Intensive Work</i>
HuGo	Human Gorilla conflict resolution
ICCN	Institut Congolais pour la Conservation de la Nature <i>Congolese Institute for the Conservation of Nature</i>
IGCP	International Gorilla Conservation Programme
IES	Institute for Environmental Security

INFORMS	Integrated Forest Monitoring System for Central Africa
ISAR	Institute of Agronomic Sciences of Rwanda
IFDC	International Fertilizer Development Center <i>International Center for Soil Fertility & Agricultural Development</i>
ITFC	Institute of Tropical Forest Conservation
Km	Kilometre
MBIFCT	Mgahinga and Bwindi Impenetrable Forest Conservation Trust Fund
MONUC	Mission des Nations Unies en République Démocratique du Congo <i>United Nations Mission in the Democratic Republic of Congo</i>
MUZ	Multiple Use Zone
NBI	Nile Basin Initiative
NGO	Non-Governmental Organisation
ORTPN	Office Rwandais du Tourisme et des Parcs Nationaux <i>Rwanda Office of Tourism and National Parks</i>
PEVi	Virunga Environmental Programme
Prolinnova	PRoMoting Local INNOVATION
PAWAR	Protected Area Watch for the Albertine Rift
Radar	Radio Detection and Ranging
SAADA	Strategic Alliance for Agricultural Development in Africa
SME	Small and Medium sized Enterprise
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees <i>UN Refugee Agency</i>
USAID	United States Agency for International Development
UWA	Uganda Wildlife Authority
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature
ZGF	Zoologische Gesellschaft Frankfurt <i>Frankfurt Zoological Society</i>

8. Sources

- ¹ Gleditsch, N. P. (2001); "Environmental change, security and conflict". In C.A. Crocker et al. (eds), *Turbulent Peace, the Challenge of Managing International Conflict*. Washington: United States Institute of Peace, 2001, Chapter 4, pages 53-68.
- ² U.K. Prime Minister's Strategy Unit (2005); *Countries at Risk of Instability: Future Risks of Instability*, PMSU background paper 3, February 2005.
- ³ Blom, A., & Bowie, R. (2001); *Albertine Rift Montane Forests (AT0101)*. World Wildlife Fund. Retrieved 22 July, 2004. Available on the World Wide Web: http://www.worldwildlife.org/wildworld/profiles/terrestrial/at/at0101_full.html
- ⁴ UNEP (2004); *Global International Waters Assessment East African Rift Valley Lakes, GIWA Regional assessment 47*. Odada, E.O., Olago, D., Kulindwa, K.A.A., Bugenyi, F., West, K., Ntiba, M., Wandiga, S. and J. Karimumuryango. University of Kalmar, Kalmar, Sweden. Available on the World Wide Web: <http://www.giwa.net/publications/r47.phtml>
- ⁵ Plumptre, A.J., L. Chapman and G.Patterson (2003); *The Lakes of the Albertine Rift*. Available on the World Wide Web: <http://albertinerift.org/media/file/Biodiversity-8.pdf>
- ⁶ Congo Basin Forest Partnership (2006); *The Forests of the Congo Basin: State of the Forest 2006*. Available on the World Wide Web: http://carpe.umd.edu/resources/Documents/THE_FORESTS_OF_THE_CONGO_BASIN_State_of_the_Forest_2006.pdf
- ⁷ Cresti, D. (2007); *Analysis and Design of Household Rainwater Catchment Systems for Rural Rwanda*. Massachusetts Institute of Technology, Department of Civil and Environmental Engineering. Available on the World Wide Web: http://mit.edu/kdoyle04/Public/Cresti_Final%20Thesis.pdf
- ⁸ Kameri-Mbote, P. (2007); "Conflict and Cooperation: Making the Case for Environmental Pathways to Peacebuilding in the Great Lakes Region". In: *Environmental Change and Security Program Report, Issue 12, 2006-2007*.
- ⁹ Ramsar (2007); *What are wetlands?* Available on the World Wide Web: http://www.ramsar.org/about/about_infopack_1e.htm
- ¹⁰ WCS (2007); *Endemic species in the Albertine Rift*. Wildlife Conservation Society, Albertine Rift Program. Available on the World Wide Web: <http://www.albertinerift.org/arift-home/arift-species/endemic>. If not available, check: <http://www.wcs.org/international/Africa/Albertinerift>
- ¹¹ McNeilage, A., M.M. Robbins, M. Gray, W. Olupot, D. Babaasa, R. Birariho, A. Kasangaki, H. Rainer, S. Asuma, G. Mugiri and J. Baker (2002); *Census of the mountain Gorilla (Gorilla beringei beringei) population in Bwindi Impenetrable National Park, Uganda*.
- ¹² World Bank, data and statistics. Data: 2006. Available on the World Wide Web: <http://www.worldbank.org/data/countrydata/countrydata.html>

- ¹³ UNDP, Human Development Indicators, 2007/2008. Available on the World Wide Web:
<http://hdr.undp.org/en/statistics/>
- ¹⁴ Plumptre, A.J., Kayitare, A., Rainer, H., Gray, M., Munanura, I., Barakabuye, N., Asuma, S., Sivha, M., and Namara, A. (2004). *The socio-economic status of People Living Near Protected Areas in the Central Albertine Rift*. Albertine Rift Technical Reports Volume 1, IGCP, WCS, CARE.
- ¹⁵ Van de Giessen, E. (2005); *Natural resources; source of violence, source of peace. A study on the role of natural resources in violence and peace in the African Great Lakes region with special attention to the tri-national Virunga Volcanoes region*. Centre for Conflict Studies and Human Rights, Utrecht University. Available on the World Wide Web:
<http://www.envirosecurity.org/news/articles/THESIS%20CONFLICTSTUDIES.pdf>
- ¹⁶ Burgess, N., A. Balmford, N.J. Cordeiro, J. Fjeldsa, W. Kuper, C. Rahbek, E. W. Sanderson, J.P.W. Scharlemann, J.H. Sommer, P.H. Williams (2007); Correlations among species distributions, human density and human infrastructure across the high biodiversity tropical mountains of Africa; *Biological Conservation*, 134 (2007) pages 164–177.
- ¹⁷ Boffa J.M, L. Turyomurugyendo, J.P. Barnekow-Lilleso and R. Kindt (2005); "Enhancing farm tree diversity as a means of conserving landscape-based biodiversity." *Mountain research and development*: Volume 25, Issue 3.
- ¹⁸ UN News Centre (2007); *Security Council urges political solution to crisis in eastern DR Congo*, 23 July 2007. Available on the World Wide Web:
<http://www.un.org/apps/news/story.asp?NewsID=23310&Cr=democratic&Cr1=congo>
- ¹⁹ Kalpers, J. (2001); *Volcanoes under Siege: Impact of a Decade of Armed Conflict in the Virungas*. Washington D.C., Biodiversity Support Program, Publication number 144.
- ^{20a} Wildlife Direct; *Gorilla weblog*. Available on the World Wide Web:
<http://gorilla.wildlifedirect.org/>
- ^{20b} Wildlife Direct; *Elie Mundima weblog*. January 8, 2007. Available on the World Wide Web:
<http://elie.wildlifedirect.org/>
- ²¹ Boudreaux, K. (2007); *State Power, Entrepreneurship, and Coffee: The Rwandan Experience*. Mercatus Center. Available on the World Wide Web:
http://www.mercatus.org/repository/docLib/20070424_The_Rwandan_Experience-Boudreaux.pdf
- ²² Pottier, J. (2006) "Land Reform for Peace? Rwanda's 2005 Land Law in Context," *Journal of Agrarian Change* 6 (4).
- ²³ Korbee, D. (2007). *Environmental Security in Bwindi: a focus on farmers*. Institute for Environmental Security, The Hague. Available on the World Wide Web:
http://www.envirosecurity.org/esp/Environmental_Security_in_Bwindi.pdf

- ²⁴ Frankfurt Zoological Society (2006); *New FZS census finds a 98% decline in the Hippopotamus population of the Virunga National Park, DRC*. Available on the World Wide Web: http://www.zgf.de/presse/archiv/PMKongo_26Okt_engl.pdf
- ²⁵ WWF (2005); *World's largest population of hippos soon to be wiped out*. 12 Sep 2005. Available on the World Wide Web: http://www.panda.org/about_wwf/where_we_work/africa/where/drc/news/index.cfm?uNewsID=23191
- ²⁶ Newsweek (2007); *Gorilla warfare*. Newsweek, August 6, 2007.
- ²⁷ MINALOC (2004); *Mission d'etude de la conservation et de la gestion intégrée du marais de Rugezi et de son bassin versant*. Ministère de l'Administration Locale, du Développement Communautaire et des Affaires Sociales, Helpage Rwanda, May 2004.
- ²⁸ UNEP (2006) *Lake Victoria: Falling Water Levels Concern for Growing Population*. Available on the World Wide Web: http://na.unep.net/AfricaLakes/AtlasDownload/Lake_Victoria.pdf
- ²⁹ MONUC (2007); *Congo lake's deadly gases could be hidden blessing*. Available on the World Wide Web: <http://www.monuc.org/news.aspx?newsID=14560>
- ³⁰ UNEP. *Africa's Killer Lakes*. Available on the World Wide Web: <http://na.unep.net/AfricaLakes/AtlasDownload/PDFs/Africas-Chapter3-2a-Screen.pdf>
- ³¹ Seach (2008); *Tshibinda Volcano, DR Congo, February 14*. Available on the World Wide Web: http://volcanolive.blogspot.com/2008/02/tshibinda-volcano-democratic-republic_14.html
- ³² BBC (2007); *Rwanda's Underwater Powerhouse*. 4 May 2007. Available on the World Wide Web: <http://news.bbc.co.uk/2/hi/africa/6624395.stm>
- ³³ SSEA (2007); *Strategic/Sectoral, Social and Environmental Assessment of Power Development Options in The Nile Equatorial Lakes Region, Final Report*, Nile Basin Initiative, SNC Lavalin International, February 2007.
- ³⁴ Institute for Environmental Security (2005). *Poster Virunga-Bwindi region*. Available on the World Wide Web: http://www.envirosecurity.org/espa/PDF/poster_Africa.pdf
- ³⁵ Plumptre, A.J., T.R.B. Davenport, M. Behangana, R. Kityo, G. Eilu, P. Ssegawa, C. Ewango, D.Meirte, C. Kahindo, M. Herremans, J.K.Peterhans, J.D. Pilgrim, M. Wilson, M. Languy and D. Moyer (2007); "The biodiversity of the Albertine Rift". In: *Biological Conservation*, Volume 134, Issue 2, January 2007, Pages 178-194, Conservation in Areas of High Population Density in Sub-Saharan Africa. <http://www.sciencedirect.com/science/journal/00063207>
- ³⁶ Bronkhorst (2005); *The Virunga Volcanoes and the Bwindi Impenetrable National Park: Co-operation in the management of shared natural resources and the concept of Transboundary Protected Areas; Prototype EnviroSecurity Assessments - Great Lakes region of Africa, Part 2: Legal Analysis*. Institute for Environmental Security and Bronkhorst International Law Services. Available on the World Wide Web: http://www.envirosecurity.org/espa/PDF/IES_ESA_CS_Great_Lakes_region_of_Africa_Legal_Analysis.pdf

- ³⁷ Environment News Service (2007); *Oil War Feared Between Uganda and DR Congo*. 2 October 2007. Available on the World Wide Web: <http://www.ens-newswire.com/ens/oct2007/2007-10-02-02.asp>
- ³⁸ State House, the Republic of Uganda (2007); *Uganda And DRC Sign Joint Bilateral Agreement*. 9 September 2007. Available on the World Wide Web: <http://www.statehouse.go.ug/news.detail.php?category=News%20Release&newsId=1314>
- ³⁹ Sandbrook, C.G. (2006); *Tourism, conservation and livelihoods: the impacts of gorilla tracking at Bwindi Impenetrable National Park, Uganda*; University College London, University of London.
- ⁴⁰ BBC News (2008). *UN troops 'armed DR Congo rebels'*. 28 April 2008. Available on the World Wide Web: <http://news.bbc.co.uk/2/hi/africa/7365283.stm>
- ⁴¹ Bayamukama, J and S. Asuma (2006); *Human-Gorilla Conflict Resolution (HuGo) - the Uganda Experience*. Gorilla Journal, Volume 32, June 2006.
- ⁴² Wyss, K. (2006); *A Thousand Hills for 9 Million People; Land Reform in Rwanda: Restoration of Feudal Order or Genuine Transformation?* FAST Country Risk Profile Rwanda. Available on the World Wide Web: <http://www.reliefweb.int/rw/rwb.nsf/db900sid/LTIO-6WQN58?OpenDocument>
- ⁴³ Crisis Group (2008); *Congo: Four Priorities for Sustainable Peace in Ituri*. Africa Report 140, 13 May 2008. Available on the World Wide Web: <http://www.crisisgroup.org/home/index.cfm?id=5425&l=1>
- ⁴⁴ Crisis Group (2007); *Congo: Bringing Peace to North Kivu*. Africa Report 133, 31 October 2007. Available on the World Wide Web: <http://www.crisisgroup.org/home/index.cfm?id=5134&l=1>
- ⁴⁵ UNFCCC WNEP (2007); *United Nations Framework Convention on Climate Change, West Nile Electrification Project*. Available on the World Wide Web: <https://cdm.unfccc.int/Projects/DB/SGS-UKL1163762379.92/view.html>