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# **ENVIRONMENTAL MANAGEMENT IN RWANDA**

**Have the National Conservation Plans Worked?**

**Thérèse Musabe and Innocent Kabenga**



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**Organization for Social Science Research in Eastern and Southern Africa**

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Organization for  
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Research in  
Eastern and  
Southern Africa

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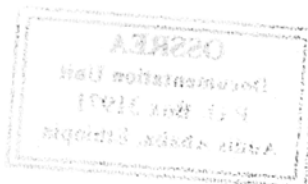
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<b>ACNR</b>	Association pour la Conservation de la Nature au Rwanda
<b>ARECO-RWANDA</b>	Association Rwandaise des Ecologistes
<b>AP</b>	Action Plan
<b>APR</b>	Association pour la Protection de l'Environnement
<b>AREDI</b>	Association Rwandaise pour l'Environnement et le Développement Intégré
<b>BRALIRWA</b>	Brasserie et Limonaderie du Rwanda (the Beer Company of Rwanda)
<b>BSAP</b>	Biodiversity Strategy and Action Plan
<b>CBOs</b>	Community Based Organisations
<b>CW</b>	Constructed Wetlands
<b>EAP</b>	Environmental Action Plan
<b>GEC</b>	Green Environment Conservation
<b>GTZ</b>	German Technical Cooperation Agency
<b>Inhab.</b>	Inhabitant
<b>IRST</b>	Institut de Recherche Scientifique et Technologique du Rwanda (Institute of Scientific and Technological Research)
<b>ISAR</b>	Institut des sciences agronomiques du Rwanda (Rwandan Agronomic Sciences Institute)
<b>KIST</b>	Kigali Institute of Science, Technology and Management
<b>MINAGRI</b>	Ministry of Agriculture, Livestock and Forestry
<b>MINICOM</b>	Ministry of Commerce, Industry and Tourism
<b>MINETO</b>	Ministry of Environment and Tourism
<b>MINIFIN</b>	Ministry of Finance and Economic Planning
<b>MINITERE</b>	Ministry of Land, Human Resettlement and Environmental Protection
<b>MINITRACO</b>	Ministry of Public Works, Transport and Communication

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<b>MINIRENA</b>	Ministry of Energy, Water and Natural Resources
<b>NES</b>	National Environmental Strategy
<b>NGOs</b>	Non-governmental Organisations
<b>NUR</b>	National University of Rwanda
<b>ORTPN</b>	Rwandan Office for Tourism and National Parks
<b>ORN</b>	Office Rwandais de Normalisation (The Rwandan Bureau of Standards)
<b>PCFN</b>	Projet de la Conservation de la Forêt de Nyungwe (The Nyungwe Forest Reserve Conservation Project)
<b>PNUE</b>	Programme des Nations Unies pour Environnement
<b>REASON</b>	Rwanda Environment Awareness Services Organisation
<b>RPF</b>	Rwandese Patriotic Front
<b>WCED</b>	World Commission on Environment and Development

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## ENVIRONMENTAL MANAGEMENT IN RWANDA: HAVE THE NATIONAL CONSERVATION PLANS WORKED?

### ACKNOWLEDGEMENTS

#### 1.1 The Natural Environment

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#### Thérèse Musabe and Innocent Kabenga

#### 1.1.2 Population

Before the 1994 genocide, Rwanda had one of the most rapidly growing populations in Africa (3.4-3.7% annually) and one of the highest population densities (210-250 persons/km<sup>2</sup>). Even today, with a population estimated at around 8 million distributed on 27,833km<sup>2</sup>, Rwanda is still the most densely populated country in Africa. Its population density is estimated at around 217 persons/km<sup>2</sup> with about 60% of the population below the age of 15 years. More than 80% of the population live in rural areas, with major concentrations in the most densely populated region is Ruhondo in Butaruka, with 270 persons/km<sup>2</sup> as opposed to Rusumo in Kibungo with 63 persons/km<sup>2</sup> (INSTAT, 1997).

The high population density is explained by the fact that Rwanda and Burundi historically were the only areas of central Africa not affected by the slave trade because of their strong military force. The population increase has been facilitated by a favourable climate and fertile volcanic soils (Deltour, 1979).



# ENVIRONMENTAL MANAGEMENT IN RWANDA: HAVE THE NATIONAL CONSERVATION PLANS WORKED?

## 1. INTRODUCTION

### 1.1 The Natural Environment

#### 1.1.1 Physical Characteristics

Rwanda is a small landlocked country found in the Great Lakes region. It is characterised by a series of long sharply defined hills with steep, convex slopes and flat ridges intersected by valleys.

The topography gradually rises from the eastern part of the country at an average altitude of 1,250m to the Congo-Nile Divide and in the northern highlands at an altitude ranging from 2,200m to 3,000m. This region is characterised by the steepest slopes in the country. The highest peaks are Birunga Volcanoes (4,507m) found in Volcanoes National Park bordering Rwanda, Uganda and Democratic Republic of Congo (DRC). To the west of the mountains, the land slopes steeply to Lake Kivu in the Rift Valley. The eastern and southern portions constitute the savannah regions of Akagera and Bugesera Basins (1,500-2,000m), culminating in extensive wetlands at the border with Burundi and Tanzania. The varied topography is responsible for a wide range of regional climatic conditions and ecosystems.

A big portion of Rwanda is characterised by a large number of steep hills and mountains. For instance, 70% of the cultivated area has slopes greater than 10% while fields on 5% of the agricultural area have slopes greater than 80% (Rossi 1984). This has led to high erosion.

#### 1.1.2 Population

Before the 1994 genocide, Rwanda had one of the most rapidly growing populations in Africa (3.4-3.7% annually) and one of the highest population densities (210-350 persons/km<sup>2</sup>). Even today, with a population estimated at around 8 million distributed on 27,833km<sup>2</sup>, Rwanda is still the most densely populated country in Africa. Its population density is estimated at around 317 persons/km<sup>2</sup> with about 49% of the population below the age of 15 years. More than 95% of the population live in rural areas, with uneven distribution. The most densely populated region is Ruhondo in Ruhengeri with 820 persons/km<sup>2</sup> as opposed to Rusumo in Kibungu with 62 persons/km<sup>2</sup> (MINIFIN 2001).

The high population density is attributed the fact that Rwanda and Burundi historically were the only areas of central Africa not affected by the slave trade because of their strong military force. The population increase has been facilitated by a favourable climate and fertile volcanic soils (Ohlsson 1999).

### 1.1.3 Climate

The average daily temperature is 25°C with a possible maximum of 30°C except in the highlands, where the daily range is 12°C to 15°C. There are four seasons: a long rainy season (mid-March to May), where 40 % of the annual precipitation is recorded, followed by a long dry season (mid-May to mid-October), which lasts from two months in the northwest and on the Congo-Nile Divide, to four months in the east. This long season is followed by a short rainy season (mid-October to mid-December) and a short dry season (mid-December to mid-March).

The precipitation increases with higher altitudes and varies from about 800mm in the east to about 1,600mm in the northeast, where volcanoes are covered by rainforests.

### 1.1.4 Wetland Ecosystems

Wetlands refer to a diverse range of ecosystems with vegetation that is covered, permanently or temporarily, by either fresh or salt water (Dugan 1993). For the purpose of the study, any area of marsh, savannah, forest or open water, whether artificial, permanent or seasonal, with water that is either static or flowing, will be considered as a wetland.

An inventory<sup>1</sup> carried out in 1989-1992 estimated that the total area of swamps and marshlands in Rwanda was 164,947ha; of which 111,871ha belong to the lower hydrographical systems and 53,076ha to the primary system. The area under agricultural use was estimated at 93,754ha. Large wetlands are located along major rivers (Nyabarongo, Akanyaru, and Akagera) and cover several hundred kilometres. Numerous lakes, surrounded by large stretches of papyrus swamps, are found within the system. During the rainy season from March to May, the wetlands play an important regulatory function, acting as buffers and reducing maximal flow rates. During the dry season, they help to maintain a relatively high flow rate. The hydrographical system of small swamps is determined by the conditions of their basin (SOGREAH 1992).

The swamps include high altitude swamps in the mountains and papyrus swamps at lower altitude. A few swamps are protected in Volcanoes National Park and the Nyungwe Forest Reserve. Wetlands outside the main reserves are poorly protected and managed. Most of the wetlands are disappearing due to planned and unplanned conversion of those wetlands into agricultural land. About 57% of the country's wetland area (about 160,000ha) is currently used, of which about 71% is cultivated (SOGREAH 1992).

Rwanda has several lakes, which occupy an area of 1250 km<sup>2</sup>, 4.7% of the area of the country. The country is divided by Congo Nile Ridge into two major water basins. The Congo River Basin in the west covers 33% of the national territory and receives 10% of the national waters. The Nile River

Basin in the east covers 67% of the territory delivering 90% of the national waters. Waters of Nile River Basin flow out through Akagera River, which is the main headstream of the Nile. It is estimated that Akagera River contributes 8 to 10% of the waters of the Nile (Hydroplan 2001).

### **1.1.5 Natural Forest Ecosystems**

Natural forests are confined to the rain forests covering the mountains in the Congo-Nile watershed, which includes the most extensive area of mountain forests in Africa. The only large forest left in Rwanda today is Nyungwe Forest Reserve, one of the major watershed catchments in the southwest, and Virunga Volcanoes National Park, noted for its population of mountain gorillas. It includes mountain forests, afro-alpine vegetation and high altitude grasslands (Potter et al. 1993).

There are also other mountain forest patches dotted around the country. The main are Cyamudongo and Mukura. Patches of true forest still occur on the Virunga, though most of the natural forests on this range consist of bamboo forests and open moors. Outside Nyungwe Forest and Virunga, practically no mountain grassland is left in Rwanda, the highlands are instead dominated by terraced agriculture. A rapid population growth, limited land base and growing competition for resources have steadily decreased forest resources. Widespread deforestation throughout Rwanda has had an impact on agriculture with soil being washed away leading to low produce.

### **1.1.6 Savannah Ecosystem**

The largest area of natural habitat is the Akagera National Park, a treed savannah in the eastern and southeastern regions of the country characterised by high grass meadows (*Hyparrhenia*) and high thorn bush. The Akagera National Park, which is a mosaic of savannah woodland and grassland dominated by thorny acacia trees, is the most important area for large mammals in the country.

## **1.2 Significance of the Study**

Many countries in Africa have undergone rapid population growth, which has not been matched with a consequent management of natural resources that cater for the increasing demand for the resources. Rwanda has not only been under population pressure, but has also principally experienced profound social and political changes with implications for biological diversity due to extensive destruction, degradation and severe depletion of natural resources.

Rwanda's natural resources have been an important source of national and households' income. By far, the worst threat to the natural resource has been deforestation because of excessive demand for land and household

energy. The destruction of the mountain forest has been especially remarkable.

Recently, Rwanda struggled with the task of resettling more than 2 million people in the aftermath of the war of 1990-1994. Since there is no new land available, deforestation and encroachment of protected areas for settlement have put severe pressure on the environment, with large-scale movements of population and livestock threatening the fragile ecological zones. Although reliable data on forest clearance are difficult to obtain, recent estimates suggest that almost 50% of the original forest land has already been lost.

The loss of large protected areas due to agricultural activities and environmental degradation over the last two decades has become a major concern. In the 1980s, the government's concern over conservation and environmental protection took another dimension. This is reflected in the plans, policies and legislations put in place even though they were sector-based and not thoroughly developed. Despite the existence of the policies and legislations and the organisations in charge of their implementation, it appears that there are some gaps in the actual application of conservation measures.

The study will examine how conservation and environmental protection plans are addressed in Rwanda. Legal and institutional frameworks that deal with conservation and environmental protection as well as related data will be studied to find out whether the conservation policies and plans have worked. The study will also attempt to come up with workable recommendations for better environmental management.

## 2. BACKGROUND

### 2.1 Global Overview

People have been using land with its natural resources without considering the environmental consequences. However, today there is increasing concern about the effect of rapidly growing population upon the environment. Finite resources such as copper, oil, tin, etc., are rapidly becoming depleted and there is no way in which they can be replaced. Even renewable resources such as fish-stocks and timber are being overexploited at an alarming rate. The growth of human population and the environmental pressure imposed by economic development are posing great challenges for the environment.

While developed countries face severe threats related to the depletion of the earth's ozone layer and the green house effect, developing countries suffer greatly from deforestation and land degradation, because of heavy reliance on agriculture. Poverty also is the major agent linked to environment. Over the last decade the poverty-environment hypothesis has become a major

concern for international development agencies and policy makers. The Brundtland Commission (WCED 1987), the World Bank's report on environment and development (World Bank 1992) and the United Nations Environment Programme Report (1995) on poverty and environmental degradation, focus on the connection between poverty and environmental degradation.

An increasing awareness of the loss of the world's biological diversity during the last two decades has stimulated national and international efforts towards conservation-oriented programmes and policies. The Brundtland Report, "Our Common Future" and the "Agenda 21" that resulted from the 1992 Rio de Janeiro Earth Summit have initiated countries all over the world to devise conservation strategies, policies, action plans and legislations to curb the trend or even reverse the threatening destruction of the environment. The question whether these have worked as expected is difficult to answer.

In the PNUE (2000) report on the future prospects of the environment, the author stresses the difficulty of having quantitative analysis on the success or failure of public administration initiatives in environmental conservation. It is very difficult to give a straightforward answer to such questions as: Did the expressed intentions have a follow-up? Did this follow-up have positive effects on the environment? Are these effects sufficient? The reason is that the quality of follow-up differs from one country to another and data may be inadequate or non-existent. Moreover, there are no mechanisms to determine which policy has contributed to which environmental change. A complete analysis requires an elaboration of the monitoring mechanisms and of the evaluation of policy effects on environmental quality (PNUE 2000).

## **2.2 Environmental Initiatives at the Regional (Africa) Level**

During the international conference on environment that took place in 1972 in Stockholm, African nations together with other developing countries from Asia and Latin America were not comfortable with the conference's agenda. Their main concern, the lack of development, was not a priority of the agenda. They also feared that rigorous environmental measures imposed by the West would curb their economic development. Eventually, the Stockholm Plan of Action included the concerns of developing countries (Conférence des Nations Unies sur l'Environnement 1971).

The following decade, many African countries enacted environmental laws, prepared environmental policies and established organisations, but the structures came on top of the existing government decision-making structures dealing with natural resource management, tourism, water and forestry. They were essentially co-ordinating bodies. In the 1980s, some

countries prepared national environmental conservation strategies and action plans sometimes combined with national plans of action against desertification.

However, most of the environmental co-ordinating agencies did not have funds, qualified personnel, necessary equipment and competence to implement the action plans and reinforce the laws. However, during the same decade, termed "the lost decade", other constraints worsened the situation. For instance, economic stagnation, deterioration of exchange rates that affected the balance of payment, an increase in debt, corruption and civil disturbances affected the initiatives undertaken in favour of environmental protection in many countries (UNEP 1993).

A new initiative was launched in Cairo in 1985 when, for the first time, African Ministers of Environment met in a conference sponsored by the Organisation African Unity (OAU), the United Nations Economic Commission for Africa (ECA) and the UNEP. Four specialised committees on principal ecosystems in the region (deserts and arid zones, forested and afforested areas, river and lake basins, and island ecosystems). The conference also established eight technical co-operation networks: soil and fertilisers, climatology, water resources, education and training, science and technology, biological diversity, energy and environmental control (PNUE 2000).

Poverty in Africa is the main problem faced by public administration because poverty is considered as the cause and consequence of environmental degradation and resource depletion. Therefore, policies and programmes on environmental conservation must go hand in hand with poverty reduction programmes to achieve positive results.

The South African Development Conference (SADC) member countries, cognisant of the link between environmental degradation and poverty, have established a plan of action for economic growth that takes into consideration equity and sustainable development. The plan is based on three major points that can be achieved only in tandem or not at all: i) acceleration of economic growth to achieve more equity and self-sufficiency; ii) improvement of health conditions, incomes and life standards for the poor; and iii) ensuring an equitable and sustainable use of the environment and the natural resources (PNUE 2000).

African countries have recently embarked on poverty reduction programmes while at the same time establishing environmental laws and policies. It is too early to evaluate those actions but implementation mechanisms and control that will be put in place and the participation of local communities will be determining factors for their success.

## **2.3 Major Environmental Concerns at the National Level**

As stated in the common country assessment paper (UNDP 2000), Rwanda, like most other African countries, faces an unsustainable spiral of growing population, decreasing per capita food supplies, and worsening environmental degradation. The consequences as well as the critical links are poverty, high population growth, subsistence agriculture, and fuel wood as a primary source of domestic energy. Over-cropping and overgrazing have contributed to soil erosion and desertification.

The links between poverty, food insecurity and environmental degradation have been gravely exacerbated since the 1994 genocide. Around 66% of the active population are now considered poor (compared to 53% before 1994). The situation has been worsened by the massive destruction of livestock, which incurred a serious depletion of organic fertiliser, the only form of input available to most farmers. In addition, the instability created by the war and the massive displacements of people have negatively affected the socio-economic development. Recent assessments indicate that approximately 60% of the population cannot produce enough food to meet basic nutritional requirements, while 35% of the households have access to only half a hectare of land, which is cultivated continuously (UNDP 2000).

### **2.3.1 Urban Environment**

Urban environment suffers from different human activities that add to pollution. Master plans prepared and approved for Rwandan urban areas have not been implemented. For instance, the Ruganwa Valleys that were allocated for botanical or zoological gardens are today industrial areas exposed to all types of soil, water and air pollution (Mugemana 2001a).

Waste management is a major problem facing urban centres. Liquid waste is poured untreated into rivers while solid waste is dumped in open dumpsites, leaching into underground water. Wastes from hospitals, clinics and pharmacies are supposed to be incinerated. However, according to MINITERE (2001b), apart from the main hospitals in the capital city, Kigali Hospital and King Fayçal Hospital that incinerate some waste using their incinerators, toxic wastes from hospitals are dumped in public dumpsites.

### **2.3.2 Arable Land**

Land is the main resource for most households in Rwanda (IMF 2000). According to the 1996 CIA World Fact Book on Rwanda, the land use in Rwanda is composed of 29% of arable land, 11% of permanent crops, 10% of forests, wood and natural reserves.

There has always been pressure exerted on the limited available land by the quickly growing population. This has led to a severe decline in agricultural

production. Wetlands, protected areas and marginal lands have been cleared for cultivation, which results in soil degradation. The deterioration of soil reduces food availability for people who depend solely on agriculture

Rwanda has a dual land tenure system. On the one hand, the customary land tenure system that is based on male inheritance (Pauwels 1964) is applied to rural land though a new comprehensive land law is being proposed for enactment to give women equal land rights. The tenure system does not clearly define the property rights enjoyed by the owner, which limits the use of land. On the other hand, the written land legislation, which covers urban and rural lands that belong to churches and other institutions introduced by the colonial administration, confers various property rights to the landowner such as lease, land title and mortgage (MINITERE 2001a). Arable land problems remain an important challenge. Thus, to avoid future conflicts related to land scarcity, land use planning and management have to be a priority.

### 2.3.3 Protected Areas

Protected areas in Rwanda comprise Volcano, Akagera, and Nyungwe National Parks. There are also two remaining natural forests, Gishwati and Mukura, which have been under severe pressure from human settlement. Originally, these areas covered 4,020km<sup>2</sup> and they were legally established to protect the natural reserves. However, as depicted in table 1, from 1958 to 2000 about 70% of the total natural reserves were wiped out by farmers seeking more land for cultivation (MINAGRI, 2000).

Table 1. Regression of forests and treed savannahs from 1958 to 2000 (1000ha)

Habitats	Area (ha)						% area left
	1958	1970	1980	1990	1996	2000	2000
Natural forests	634	591.8	513.6	451.2	383.7	221.2	35.0
Nyungwe and Cyamudongo	114	108.8	97.5	94.5	94.4	92.5	81.0
Gishwati	28	28.0	23.0	8.8	3.8	3.8	2.0
Volcano National Park	34	16.0	15.0	2.8	12.8	12.0	35.0
Akagera National Park	241	241.0	241.0	241.0	241.0	90.0	37.0
Umutara Hunting Area	64	45.0	45.0	34.0	0.0	0.0	0.0
Eastern Savannahs and Galleries	150	150.0	90.0	55.0	30.0	25.0	17.0
Total	1268	1188.6	1027.2	902.4	767.4	445.6	36.9

SOURCE: MINAGRI. Plan National Forestier, 2000.

The destruction of the natural forests (Gishwati, Nyungwe and Mukura) has multifaceted negative impacts on the water sources that spring from those



natural forests, on the weather, on the biodiversity and on the soil. Although the country has pledged to uphold the 1968 Algiers Convention on the Environment, it has failed to abide by it because of lack of trained personnel, financial constraints, inappropriate policy and political instability. The government must translate policies into action based on locally available means by adopting integrated and participatory approach aimed particularly at communities living near the reserves.

**2.3.4 Biodiversity** Rwandan biodiversity comprises hundreds of plant and animals some of which are among protected species identified by the Washington Convention. These include the orchids, mountain gorillas (*Gorilla gorilla beringei*), *Loxodonta africana*, *Sincerus caffer*, *Panthera leo* and *Tragelaphus oryx* (MINITERE 2001b).

The biodiversity degradation results from natural factors and human activities. The natural factors include erosion, landslides, floods, drought, proliferation of competitive species and diseases. The human factors include demographic pressure, overexploitation of biological resources, uncontrolled introduction of exotic species, bush fire, poaching and war.

### **2.3.5 Energy Problems**

Problems related to energy has become of prime concern because of the population's heavy reliance on firewood. Before 1990, Rwanda's wood consumption was 2.3 million cubic meters annually; 91% of which was for domestic use (Mitchel 1997). Currently, over 96% of the population depends on firewood for fuel (UNDP 2000). At the same time, Rwanda's abundant alternative energy sources - methane gas, peat, biogas and solar energy - have not been developed for use (MINETO 1996). Overall, Rwanda is caught in a vicious circle where increasing pressures for land and fuel wood result in high levels of environmental degradation, which in turn foster a decline in agricultural production. In addition, lack of effective management of Rwanda's relatively abundant water resources as sources of energy is another problem.

### **2.3.6 Mineral Resources**

The limited mineral resources are gold, tin, tungsten, peat, construction stones, ornament stones and industrial minerals. From 1989 to 1995, minerals ranked third among exported products, after coffee and tea (MINETO 1996).

Mineral deposits are spread in many different districts in Rwanda where local communities use rudimentary methods of extraction. According to the Ministry of Environment, in 1988, the mineral contribution to the national economy was only 0.45% compared to 10% in 1981. It is obvious that Rwanda could increase its mineral exports and earn foreign currency that is

badly needed; however, there should be strict guidelines and regulations based of Environmental Impact Assessment (EIA) regarding extraction procedures.

### 2.3.7 Water Resources

In 1998, the MINAGRI elaborated the National Water Resources Management Policy (MINAGRI 1998). Its main objective was to support sustainable economic and social development as well as to alleviate poverty. The policy provided guidance to the water sector, government departments dealing with water resources, foreign development partners, local and international NGOs and the population at large. Although the national policy paper was produced in July 1998, it has not yet been endorsed as a legal framework. However, the necessity of that policy cannot be overemphasised as different reports suggest that water resources are being misused and levels in many lakes and rivers (Muhazi, Mulera, Kivu, Kagera, etc.) are decreasing progressively.

Table 2 gives an overview of the main environmental problems in Rwanda before the war of 1990-1994. The situation has worsened since then with a massive return of refugees and a large number of internally displaced people who pushed an ever-increasing number of people into ecologically sensitive areas such as the country's remaining natural forests and natural reserves. As a result, the Mutara Hunting area has been totally occupied and two-thirds of Gishwati Forest has been destroyed.

Table 2. A summary of environmental problems in Rwanda

Domain	Main types of environmental problems
1. Population and land-use planning	<p>Inadequate balance between population and natural resources characterised mainly by:</p> <ol style="list-style-type: none"> <li>a) Demographic pressure on natural resources;</li> <li>b) Massive degradation of lands;</li> <li>c) Increasing poverty in rural areas;</li> <li>d) Rwandan mentality of having large families;</li> <li>e) Lack of rational policy on rural and urban areas, management and planning;</li> <li>f) Absence of systematic integration of demographic factors in global analysis of environmental and development issues;</li> <li>g) Inappropriate location of industries; and</li> <li>h) Dispersed habitat.</li> </ol>
2. Agriculture	<p>Absence of sustainable agriculture and rural development. The main causes are:</p> <ol style="list-style-type: none"> <li>a) Lack of agrarian legislation;</li> <li>b) Decrease in soil fertility due to intensive crop production and soil erosion;</li> </ol>

- c) Absence of integrated conception of land management and planning;
  - d) Fragmentation of land;
  - e) Demographic pressure on agricultural space and natural forest reserves;
  - f) Intensive cultivation (or soil overexploitation) and cultivable land degradation;
  - g) Ecological degradation due to deforestation;
  - h) Inadequate techniques and methods of cultivation; and
  - i) Inefficient programmes for agricultural production.
3. Natural areas and biological diversity      Many factors are threatening the natural ecosystems equilibrium. These are:
- a) Bush fires;
  - b) Poaching;
  - c) Irrational exploitation of natural resources;
  - d) Lack of national strategy for preservation of biodiversity and sustainable utilisation of biological resources to enable socio-economic development of the country;
  - e) Lack of an exhaustive inventory of the elements that compose the biological diversity of the country;
  - f) Lack of population awareness on the importance of biological diversity preservation as well as the ecosystem equilibrium; and
  - g) Decrease of level of certain lakes (Cyohoha North, Burera, Ruhondo).
4. Energy      Lack of adequate, viable and sustainable energy policy, which resulted in:
- a) Very high energy deficit;
  - b) Deforestation and soil desertification;
  - c) Lack of aggressive government policies in alternative sources of energy; and
  - d) Lack of investment plans that include afforestation.
5. Health and sanitation      Absence of an ecologically viable management of household wastes (liquid, solid and gas) characterised by:
- a) Lack of a coherent system of household and industrial waste management for collection, transport, disposal and treatment of wastes;
  - b) Absence of wastewater treatment system;
  - c) Insufficient potable water distribution;
  - d) High risk of population contamination by industrial wastes and some organic pollutants

- used in agriculture;
- e) Absence of quality control of imported medicines and other chemical products; and
  - f) Lack of long term urban planning that includes housing development and other related infrastructural plans.
6. Education, training and environmental sensitisation
- Insufficient sense of personal and collective responsibilities regarding the environment as well as lack of commitment to ecological development explained by:
- a) Lack public sensitisation programmes on the problems of the environment and sustainable development; and
  - b) Absence of political awareness on the importance of environmental protection.
7. Institutional aspect
- a) Lack of qualified people in the field of environmental protection and management;
  - b) Absence of a comprehensive environmental law;
  - c) Absence of decentralised services that deal with environmental matters;
  - d) Lack of human, material and financial resources;
  - e) Lack of centralised database;
  - f) Lack of a coordinating body dealing with environmental issues; and
  - g) Lack of an institutional framework for implementation of environmental policies.
8. Gender and environment
- Insufficient participation of women in the environmental protection (despite women's involvement in most environmental activities in rural areas).

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SOURCE: Ministère de l'Environnement et du tourisme (MINETO 1996), Kigali, Rwanda.

### 3. NATIONAL CONSERVATION PLANS

#### 3.1 Evolution of Conservation Policies and Legislation

The efforts regarding environmental protection and conservation in Rwanda date back to the early 20<sup>th</sup> century. A reforestation programme was launched in 1920, followed by a law creating protected areas. In 1925, the area occupied by mountain gorillas (*Gorilla gorilla beringei*), in a limited range in Virunga Volcanoes of Eastern-Central Africa, was set aside as the first national park in Africa. Rising to heights of more than 4,500 meters, this 65 km chain forms part of international boundaries between Rwanda, Democratic Republic of Congo and Uganda. The park was then divided among these nations after independence. In 1933, Nyungwe Forest Reserve