

SUSTAINABLE ENVIRONMENT, A KEY OF SUSTAINABLE DEVELOPMENT A CASE STUDY OF RWANDA

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Abstract

Rapid population growth, Economic development and International economic integration have intensified resources use, in every region of the world, human actions have directly or indirectly increased pressure on natural environment. Rapidly diminishing forests and coral reefs, increased consumption of scarce water and energy resources, desertification, the spread of invasive alien species, the breakneck rate of biodiversity loss, and the rising threat of global climate change highlight the urgent need to address the complex dimension of environmental change. Mitigating and reversing environmental change will require an understanding of its drivers. Those drivers are classified into six major categories related to six major elements of environment such as Agricultural production systems, Forests, Freshwater resources and ecosystems, Fisheries and marine ecosystems, Air and Water pollution, and Global Climate change.

The World cannot achieve Sustainable Development without mitigating those drivers of environment change. It is in this context that the United Nations (UN) has established recommendations considered as pillars of Sustainable Environment.

Taking Rwanda as a case study, using Quantitative and Qualitative Methods, the present research aimed to describe Sustainable Environment through its pillars and by comparing it to the Goals of Millennium Development, especially the Goals 7, targeting the role of Sustainable Environment on Sustainable Development. The research found that Sustainable Environment is a key for Sustainable Development. Rwanda has progressed in development because it has implemented those recommendations of UN and now it is a Country appreciated at UN level.

Keywords: Development, Economics, Environment, Millennium Development Goals (MDGs), Sustainable Development, Sustainable Environment, Sustainability.

Introduction

Environment can be defined as is a set of physical, chemical and biological elements as well as socio-economic, cultural, aesthetic and intellectual factors likely to have a direct or indirect, immediate or long term impact on the development of environment, human beings and human activities. It is a cross-cutting field and must be integrated in economic growth and social development with which it constitutes the three pillars of sustainable development. The fight against poverty, long term planning and protection and management of natural resources constitute the essential objectives of the national environment policy for sustainable development.

In 1987, the Brundtland Commission published its report, Our Common Future, in an effort to link the issues of economic development and environmental stability. In doing so, this report provided the oft-cited definition of sustainable development as “development that meets the needs

of the present without compromising the ability of future generations to meet their own needs” (UN, 1987).

However, the degradation of environment continued to worsen as a result of the population pressure, serious erosion, pressure on natural resources, massive deforestation, pollution in its various forms, lack of a strong and coherent political, institutional and legal framework.

The pursuit of environmental sustainability is an essential part of the global effort to reduce poverty. This was confirmed at the turn of the millennium in two important declarations: In December 2000, world leaders agreed to eight Millennium Development Goals associated with 18 targets at the United Nations Millennium Summit; At the 2002 World Summit on Sustainable Development world leaders adopted the Johannesburg Declaration on Sustainable Development and Plan of implementation.

The present research aims to analyse the relationship between Sustainable Environment and Sustainable Development on the one hand; and on the other hand, the current situation of Rwanda toward Sustainable Environment, which is the sure way of achieving Sustainable Development.

1. The Concept of Sustainable Environment

1.1. Definition

The concept of Environmental Sustainability arose out of the growing recognition that human activity is affecting many of the Earth’s critical resources not only locally but now also at global scale, and with potential effects on human as well as ecological health. Among the many problems, there has been depletion of ocean fisheries, over-exploitation of the great aquifers, an unprecedented rate of species loss, increasing problems of waste disposal, and changes to the gaseous composition of the lower and middle atmosphere. Recognition of such problems led to the notion of sustainability, which implies development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In the 1980s a major initiative was established under the aegis of the United Nations to address issues of environmental sustainability. Its Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally. Principles of sustainable development are now intrinsic to the Millennium Development Goals (UN, 1992).

1.2. Pillars of Sustainable Environment

UN, 2005 list 10 pillars of Sustainable Environment that face drivers of degradation as summarized in the following table:

Table 1: Pillars of Sustainable Environment

Pillar of sustainability	Drivers of degradation
Improvement of Agricultural Production Systems	Agriculture production systems are vulnerable to overuse, inappropriate land use practice, altered weather patterns resulting from global climate change (MINAGRI, 2013).
Promotion of Forests Management	Land clearing for agriculture use and land scare for commercial logging, with effects of pollutions and global climate change, are transforming forests and other natural habitats at accelerated rates to the detriment of people, industry, and biodiversity in both terrestrial and aquatic habitats (NAFA, 2010).
Combat against threats to Freshwater resources and ecosystem	Increasing in water scarcity in dry areas and flooding in wet ones, exacerbated by climate change, threatens household subsistence needs, agriculture and aquatic ecosystems (Darwall, Smith, Lowe, Vié, 2005). Contamination from both natural and human-generated pollution and salinization of ground sources poses risk to human and wildlife health and irrigated agriculture (UNEP, n.d).
Addressing the threats to Fisheries and marine ecosystems	Human activities are depleting fish stocks and destroying coral reefs and other critical aquatic habitants. Increasing demand for marine products and services, coupled with degradation of inland watersheds and fishery habitants and excessive capture of fish in many inland waters, are resulting in irreversible losses of the productivity of fisheries and aquatic systems (Roach, Harris & Codur, 2015).
Addressing the drivers of Air and Water Pollution	Conservation of natural habitat and related patterns of overproduction, overconsumption and mismanagement have resulted in environmentally unsustainable levels of air and water pollutants (UN, 2015).
Mitigation of the Global Climate Change	Human activities are changing the Earth's climate and its viability. Accelerated tropical deforestation, continued reliance on biomass fuel, and increased combustion of fossil fuels have released significant quantity of greenhouse gases into the atmosphere. The results are extreme weather events, droughts, floods, heat waves, storms, and sea level rise (UNEP, 2015).
Strengthening institutions and Governance	Most of institutions and governments are weak because of lack of paid adequate experts, equipment and operating budget to design and implement effective environment strategies.
Correcting market failures and distortion	The major challenge for achieving environment sustainability is ensuring proper functioning of markets for environmental goods and services, removing market failures, and avoiding environmentally harmful market distortions (UNEP, 2009)

Mobilizing Science and Technology for Sustainable Development	Investment in science and technology can dramatically raise the efficiency of natural resources use for all economic activities. They can also complement noncoercive efforts to bring down fertility rates and population growth by moving toward sustainable consumption and production patterns (Alcock & University, 2002)
Building environmental sustainability into all development strategies and increasing funding for environmental management	This will fight against the weakness of lack of adequate experts able to design and orient the implementation of environmental strategies.

1.3. Environmental issues facing our planet

Table 2: Environmental Issues

Type of issue	Description of the issue
Over Population	Water pollution, resources crisis, gender imbalance, pollution, land pollution, urban sprawling, deforestation, over production are some common examples of dangerous effects cause by <u>overpopulation</u> (Eyo & Ogo, 2013).
Climate change	Climate change is not only changing the overall weather scenario, but has larger and harmful effects. Some of these include: melting of Polar Regions, occurrence of new diseases and permanent inhibition in growth of certain plants essential for human survival (UNEP, 2010).
Loss of Biodiversity	Humans have destroyed and continue to destroy the habitats of species on a daily basis. The current loss of biodiversity is also being named "The Sixth Extinction" (Barnosky et al., 2011)
Industrial and Household Waste	The presence of huge landfills sites across the city pose serious environmental concerns. It affects human health, degrades soil quality, effects wildlife, cause air pollution and results in climate change (Cardinale et al., 2012).
Water	Over population, demand and pollution from industry have serious effect of preventing human from clean water.
Acid Rain	The pollutants come in the atmosphere due to car or industrial processes. Acid rain can occur in form of rain, snow, fog or dry material that settle to earth. Acid rain may cause due to erupting volcanoes, rotting vegetation and sea sprays that produce sulfur dioxide and fires, bacterial decomposition and lightening generate nitrogen dioxide (Hill, 2004).
Pollution	Nowadays the world suffers from pollution of air, water and soil by chemical

	compounds that take many years to breakdown. Most of these chemicals are the bi-products of our modern lifestyle and are created by industry and motor vehicle exhaust.
Ozone Layer Depletion	Depletion of our ozone layer has been mainly attributed to the release of chemical pollution containing the chemicals Chlorine and Bromide. Once the chemicals reach the upper atmosphere, they cause ozone molecules to break apart causing a hole to form, the largest of which is over the Antarctic. According to the Environmental Protection Agency, one atom of chlorine can break down more than 100, 000 ozone molecules (UN, 2014).
Over fishing	The extinction of many fish species is due to humans over fishing the oceans to supply an ever increasing population's demand for sea food. It is estimated that by 2050 that there will be no fish left in the sea.
Deforestation	With population growing at a rapid pace, the demand for food, shelter and cloth has almost tripled in last few decades. Deforestation means, clearing of forests or green cover for means of agriculture, industrial or urban use (UN, 2011). It involves permanent end of forest cover to make that land available for residential, commercial or industrial purpose (KissinGer, Herold & De sy, 2012).

1.4. Sustainable Environment and Millennium Development Goals

In September 2000, at the United Nations Millennium Summit, world leaders agreed to a set eight Millennium Development Goals (MDGs) that aimed to make substantial progress in solving the problems of poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women. Those eight MDGs which are mirror for sustainable development are: Eradicate extreme poverty and hunger; Achieve universal primary education; Promote gender equality and empower women; Reduce child mortality; Improve maternal health; Combat HIV/AIDS, malaria and other diseases; Ensure environmental sustainability; Develop a global partnership for development (Birchall, 2003).

To overcome environmental issues and ensure Environmental Sustainability towards achieving Sustainable Development, the UN in MDG 7 has defined four major targets: (1). Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources; (2). Reduce biodiversity loss; (3). Have a 50% reduction, by 2015, of the proportion of people without sustainable access to safe drinking water and basic sanitation; and (4). Achieve, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.

2. Environmental Profile in Rwanda

2.1. Historical background

According to MINITERE, 2004, awareness of environmental issues in Rwanda goes back to the colonial period when actions aimed at the protection and conservation of environment were undertaken at different periods. Indeed, reforestation activities started in 1920. Thereafter were created respectively Albert Park (1925), the Natural Forest of Nyungwe as a reserve forest (1933) and the Akagera National Park (1935). These environment friendly initiatives were also supported by a vast campaign for soil conservation initiated by INEAC (later known as the Institut des Sciences Agronomiques du Rwanda (ISAR)) since 1937 first in research stations, before extending it to the whole country when, in 1947, soil conservation activities were made compulsory by colonial law. This policy was discontinued after independence because it was resented as drudgery. After independence and particularly since 1977, action programs of an environmental nature were

launched under annual themes such as: human settlement (1977), stockbreeding (1978), soil protection and conservation (1980), water supply in rural areas (1981), erosion control (1982), reforestation (1983). Also in 1983, a Division of Hygiene and Environment was created in the Ministry of Health and Social Affairs.

In 1989 was created the “Environment and Development Project” in the Ministry of Planning. In 1992, Rwanda took part in the Rio de Janeiro World Earth Summit and institutionalized the National Environment Week, which was in addition to other initiatives such as the establishment of the Office National de la Population (1981), the Tree Day (1980), the Water Day (22nd March), the Meteorology Day (23rd March), the Biodiversity Day (22nd May), etc. 1992 was marked by the drafting of the Law on Environment (UN, 1992).

After the 1994 genocide initiatives that had been launched, and they were revived by the Government of National Union. It is in this context that should be viewed the ratification of International Conventions such as: Convention on Biological Diversity (1995); United Nations Outline Convention on Climatic Changes (1998); United Nations Convention on Desertification (1998); Vienna Convention for the Protection of the Ozone Layer (2001); Stockholm Convention on Persistent Organic Polluting Agents (2002). Ramsar Convention on Wetlands (2003); Convention on the Conservation of Migratory Species of Wild Animals (2003); Convention on the Prior Informed Procedure for certain hazardous chemicals and pesticides in international trade (2003); Basel Convention on control of transboundary movements of hazardous wastes and their disposal; Kyoto Protocol to the United Nations Convention on Climate Change.

Following the Government reshuffles of 28th March 1997 and 8th February 1999, Environment was successively placed under the Ministry of Agriculture, Animal Breeding, Environment and Rural Development and the current Ministry of Lands, Resettlement and Environment, the principal mission of which was to formulate the policy and the law relating to the protection of Environment. Moreover, in 2001, the Ministry was strengthened by the establishment of a Ministry of State responsible for the Protection of Environment, which was operational from August 2001 till 15th November 2002. The establishment of Rwanda Environment Management Authority (REMA) is in the process of finalization. It will be the organ responsible for the execution of environment-related policies and laws.

2.2. Rwanda's Environmental State

In Rwanda, Environment is divided in natural and human environment, and is governed by a policy, institutional and legal framework with a view to ensuring its functioning and its protection and management. Natural environment comprises the soil and the subsoil, water resources, air, biological diversity and landscape, sites and monuments, while human environment concerns land-use management and living environment (Twagiramungu, 2006).

Table 3: Rwanda's Environmental State

Natural Environment	
Geophysical features	Location in the east of Central Africa between 1°04 and 2°51 latitude south, and between 28°45 and 31°15 longitude east. Stretching over a surface area of 26,338 km ²
Relief	From east to west, the altitude varies between 1000 and 4500m

<i>Climate</i>	Rwanda enjoys a temperate continental tropical climate. Temperatures vary between 16° and 17°C in the high altitude region, between 18° and 21°C in the Central Plateau, and between 20° and 24°C in the lowlands of the East and West. Annual rainfall varies between 700mm and 1400mm in the lowlands of the East and West, between 1200mm and 1400mm in the Central Plateau, and between 1400mm and 2000mm in the high altitude region.
<i>Hydrography</i>	Rwanda has an abundant water system situated on either side of two hydrographical basins, namely the Congo and the Nile basins.
<i>Vegetation</i>	The vegetation varies according to the relief and the distribution of the rainfall. There is whole plant diversity from the dense forests in the West to the semi-arid savannah of the East.
Natural resources and Biodiversity	
<i>Soil and subsoil</i>	Land occupies a first-rate place in the national economy since farming employs more than 90% of the working population and contributes about 93% of exports. Out of a surface area of 26,338 km ² , 52% only is usable
Wetlands	Rwanda's wetlands consist of marshes, lakes and rivers and water courses and represent about 14.9% of the national territory, including 6.3% for marshes and 8.6% for lakes, rivers and permanent or seasonal fresh water pools.
Forests and protected areas	Rwanda's natural ecosystems consisting of mountain rainforests, gallery forests, savannah, wetlands and aquatic areas and man-made reforestation. All these ecosystems host a wealth of flora and fauna. Rwanda's protected areas consist of the Natural Forest of Nyungwe, the Volcanoes National Park and the Akagera National Park, while natural reserves are the natural forest of Mukura and the forests of Cyamudongo, Busaga and the savannah of the east. It should be pointed out that the natural forest of Gishwati has virtually disappeared.
Biodiversity	Biodiversity in Rwanda is rich and varied. There is a variety of plant and animal species, some of which appear on the list of internationally protected species by the Washington Convention commonly known as CITES (Convention on International Trade of Endangered Species).
Energy resources	Biomass is the principal source of energy since it meets 94% of national needs. Wood fuel and plant residues are used for cooking and in industries and cottage industries as a source of primary energy. The country has numerous water courses favourable to the construction of micropower stations. The development of methane gas of lake Kivu represents a primary option because it will provide a substitution to traditional sources of energy, wood and charcoal, as well as the production of nitrogen fertilizers.
Human Environment	
<i>Socio-demographic</i>	In 2014, Rwanda has a population of 12,337,138, population growth rate is 2.63% <i>per annum</i> . Inhabitants on a surface area of 26 338 km ² , representing a physical density of 468 inhab/km ²

<i>Economic aspects</i>	Rwanda's economy is basically agricultural. More than 90% of the population depend on peasant subsistence agriculture which contributes 40% of GDP
<i>Human settlements</i>	In Rwanda, there are rural human settlements and urban human settlements, both of which are characterized by unplanned occupation of space (REMA, n.d.).
Institutional and legal framework	
<p>N° 04/2005 of 08/04/2005 Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda (Government of Rwanda, 2005).</p> <p>Ministries are involved such as the Ministry of Agriculture, Livestock and Forests (MINAGRI), the Ministry of Industry, Commerce, Public Investment Promotion, Tourism and Cooperatives (MINICOM), the Ministry of Infrastructure (MININFRA). There are also public institutions such as Rwanda Authority for Tourism and National Parks (ORTPN), Rwanda Bureau of Standards (RBS), as well as higher teaching and research institutes: National University of Rwanda (UNR), Kigali Institute for Science, Technology and Management (KIST), Rwanda Institute for Agricultural Science (ISAR), Institute for Scientific and Technological Research (IRST).</p> <p>Non-Governmental Organizations, both local and international, as well as Cooperating Agencies/Organizations are also involved. These are: Global Environment Facility (GEF), United Nations Environment Program (UNEP), United Nations Development Program (UNDP), United Nations Food and Agriculture Organization (FAO), United Nations Children's Fund (UNICEF), World Bank Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda.</p>	

2.3. Rwanda Environmental Issues

Rwanda's environmental problems are associated mainly with bad management of natural resources such as land, forests and water. There are also problems caused by industrial, commercial and human settlement activities and various pollutions. The production and management of waste constitute also a challenge to environment quality, particularly in urban areas.

2.3.1. Degradation of natural resources and biodiversity

The major environmental problem in Rwanda is the imbalance between the population and natural resources (land, water, flora, fauna and other non-renewable resources) which have been degrading over decades. This degradation is reflected through massive deforestation, the reduction of biodiversity, the cultivation of marginal areas, the erosion and unplanned cultivation of marshes. The degradation of land in Rwanda is due to several causes: Natural causes: Causes of a pedological nature; Causes of a geomorphological nature; Causes of a climatic nature; Population pressure due to agricultural land needs; Scattered settlements and excessive land parceling; Bad farming practices and overgrazing; Anarchical exploitation of mines and quarries;

Loss of biodiversity; Destruction of biotopes; Poaching, pirating and illicit trade; Uncontrolled introduction of exotic species; Overexploitation of biological resources and biomass; Reduction of water resources (Water is increasingly becoming rare in Rwanda. The regions of Umutara, Kibungo, Mayaga, Bugesera and the volcanoes are poor in water sources) (RoR, 2011).

2.3.2. Energy crisis

Wood is the most used source of energy in Rwanda This is detrimental to environment since the excessive use of wood and charcoal causes and/or accelerates deforestation and lays the soils bare, thus making them exposed to erosion (Rutagarama & Uhorakeye, 2010).

2.3.3. Various types of pollutions

Pollution comes from domestic and industrial solid waste, agro pastoral activities, uncoordinated mining and quarrying, as well as invading plants such the water jacinth and water lettuce (REMA, 2010; NUR-CB, 2011).

2.3.4. Disasters

There are two types of disasters which affect environment: natural disasters and man-made disasters. Bush fires (This phenomenon is responsible for land degradation, deforestation, loss of biodiversity); Deforestation; Other disasters (excessive use of toxic products, fires from various sources, particularly those linked to petrol stations, garages, industries and factories; road accidents and poor electrical installations (Kironde, n.d.).

2.3.5. Poor recognition of the environmental dimension by socio-economic sectors

Transport and communication (road construction, petroleum products used in transportation, maintenance and repairs and emission of gases with greenhouse effects); Trade (depots for the pharmaceutical products and other chemical by-products; Industry; Tourism; Environmental education (There is no platform or forum for dialogue or harmonization of environmental education activities.); Health (No precautions are taken to protect drinking water, and consumption of unfit water for human consumption is the cause of many water borne diseases) (REMA, 2011).

2.3.6. Environmental problems of an international scope

Climatic changes (Human activities, particularly industries and means of transport emit greenhouse gases which, in turn, cause the warming of the planet.) (REMA, 2010; Musana & Mutuyeyezu, 2011); Ozone layer depletion (The depletion of the ozone layer has been observed since 1980s. Polar Regions have been the most affected by this phenomenon. The depletion of the ozone layer results in increased intensity of ultraviolet radiation on the earth and threatens the health of living things. Ultraviolet radiation may cause skin cancer, blindness, reduction of body immunity and affects and/or destroys fauna and flora species) (UNEP, 2003).

3. Rwanda towards Sustainable Environment

The present section consists of an analysis of Rwanda's Actions in implementing pillars or recommendations of UN on Sustainable Environment.

Table 4: Rwanda's Actions towards Sustainable Environment

Pillar	Rwanda's Actions toward Sustainable Environment
Improvement of Agricultural Production Systems	<p>Rwanda's total arable land is about 1.4 million hectares, which is 52 per cent of the total surface area of the country (REMA, 2009).</p> <p>Establishment of the National Land Policy (MINIRENA, 2004): Very specifically, the land policy seeks to: procure security of land tenure, promote proper allocation of land and proper use of land resources, discourage land fragmentation, orient land management towards a more profitable and sustainable production, promote techniques that protect land resources from all forms of land degradation, establish institutional frameworks and regulatory instruments, promote research and public education concerning land tenure, management, and transactions, ensure the sustainable use of wetlands (MINAGRI, 2013). Rwanda targets to have a private sector-led economy and is actively improving its investment climate to attract foreign investment in Agriculture (BNR, 2011).</p>
Promotion of Forests Management	<p>Establishment of the National Forestry Policy (MINIFOM, 2010): The overall mission of this policy is to make forestry one of the bedrocks of economy and national ecological balance for sustainable benefits to all segments of the society. The forestry policy is broadly about improving livelihoods of Rwandans through job employment creation, increased forest revenues, value addition, and further balanced ecological benefits and a sustained yield (MINIRENA, 2013)</p>
Combat against threats to Freshwater resources and ecosystem	<p>Rwanda has established Water Resource Management Strategic Plan comprising several actions: An effective framework for water resources governance, Critical watersheds and catchments are rehabilitated and basic ecological functions restored, Efficient and equitable water allocation and utilization framework, An effective framework for water-related disaster management, climate change mitigation and adaptation in place and implemented, Basic Capacities installed and effective framework for sustained WRM capacity development and knowledge management developed (MINIRENA, 2011).</p>
Addressing the threats to Fisheries and marine ecosystems	<p>The Government of Rwanda is investing considerable resources in revitalizing and expanding the fisheries sector. Several aquaculture projects have been licensed, and in the next 10 years, aquaculture and capture fisheries development are expected to increase. This could exert more pressure on water resources and introduce pollutants (MINIRENA, 2011b).</p>
Addressing the drivers of Air and Water Pollution	<p>Industrial policy and Investment code: The main strategy is to develop the private sector and improving the operational environment for the business sector (MINICOM, 201).</p> <p>International Dialogue and Declaration on Sustainable Water Resources Management (MININFRA, 2010).</p>
Mitigation of the Global Climate Change	<p>Rwanda established the National Green Growth and Climate Resilience Strategy preparation was guided by the EAC policy on Climate Change. The policy is based on three pillars namely adaptation, mitigation and climate change research. Lake Victoria Environment Management Programme, Nile</p>

	Basin Initiative (NBI), Kagera Transboundary Agro-Ecosystems management are some of the initiatives in which Rwanda is taking part and meant to sustainably manage mainly the transboundary ecosystems, river basins and resources (MINIRENA, 2013).
Strengthening institutions and Governance	Financing for environment has increased tremendously even though it remains substantially low. Rwanda Environment Management Authority (REMA) has developed and operationalized tools and instruments for environmental management. Rwanda has established Environment Impact Assessment (EIA) which is a systematic, reproducible and multilevel process of identification, prediction and analysis of significant environmental impacts (positive or negative) of a proposed project or activity and its practical alternatives on the physical, biological, cultural and socio-economic characteristics of a particular geographic area in order to provide information necessary for enhancing decision making (REMA, 2006).
Correcting market failures and distortion and to align public and private incentives with the health and well-being of the poor	National Environmental Health Policy 2005: has elaborated an Environmental Health Policy which is an important recognition of the environment-health links, creating an opportunity for close cooperation between the ENR and health sectors. The technical input and support of MINIRENA and REMA will be paramount in the formulation and implementation of the environmental health policy (MINIRENA, 2013).
Mobilizing Science and Technology for Sustainable Development	VUP and IDP programs as an innovative approach to green and climate resilient villages (Imidugudu). In urban areas, a pilot 'green' city will be developed. Furthermore, other initiatives will be carried out such as; developing an Environment and Climate Change Innovation Centre, building a regulatory environment that incentivizes green technologies and innovation and developing pilot promising 'green' technologies (UNU-IAS,2006).
Building environmental sustainability into all development strategies and increasing funding for environmental management	International Cooperation and Regional Integration: Rwanda is actively involved in trans-boundary cooperation frameworks with significant implications for water resources management mainly with LVBC, NBI, and CPGEL regions, among others. These are shaped by geographical and ecosystem endowments (REMA, 2010).

4. Rwanda achievements in attaining Environmental Sustainability as per MDGs 7

According to the 2013 MDG Report prepared by the United Nations Development Program (UNDP) in Rwanda, Rwanda is doing well overall on MDG 7. The following table shows some government's achievements in implementing principles of MDG 7:

Table 5: Rwanda's Achievements in implementing MGD 7 Principles

Principle	Government's Actions
Principles of Sustainable Development integrated into country policies and programs	<p>The Government has put in place several policies and taken measures to ensure its sustainable development and the protection of its environment:</p> <p>REMA developed guidelines for Strategic Environmental Assessment (SEA) for Rwanda to ensure that environmental considerations are incorporated into the country's policies, plans and program. Published in 2010, the SEA guidelines played a key role in the mainstreaming of sustainable policy development and reform through training of relevant Government and private sector officials as well as representatives of civil society organizations (REMA, 2011).</p> <p>The Government of Rwanda established the Carbon-Friendly Energy Policy that is based on a commitment to using renewable sources of energy and aimed at reducing dependence on wood for fuel together with a programme of reforestation (MININFRA, 2008).</p>
Loss of Biodiversity and Environmental Resources Reduced	<p>The 1990-1994 conflict and Genocide caused significant environmental impacts due to massive population displacement and resettlement of returnees leading to potentially irreversible losses which include considerable reductions in the surface area of national parks, forests and other vegetation cover, such as encroachment on wetlands (UN, 2011).</p> <p>Together with accelerated tree planting programs, Rwanda has made consistent progress in regaining its forest cover in the last decade (MINIRENA, 2003).</p> <p>With a continuation of these policies and programs, Rwanda already achieved the MDG target of "25% on the Land area covered by forests by 2015", as currently 28.8 % of Rwanda's surface area is covered by forests, and contributes 5% of Rwanda's GDP (Rwanda's Natural Resources Outlook,2014).</p> <p>The restoration of Rugezi wetland is a clear example of the benefits of restoring and conserving biodiversity and ecosystem services.</p> <p>To contribute to the reduction of biodiversity loss, MINIRENA is also spearheading the creation of the Gishwati-Mukura National Park, in order to protect both forests from encroachment.</p>
Increased proportion of terrestrial and water body areas protected	<p>Rwanda's Environment and Climate Change policies, plans and programs have led to the increase and conservation of protected areas, from 8% to 10, 13 % of the total land mass by the end of 2012. Rwanda's protected areas include wetlands, islands and natural forests. These are all protected areas by law (Drakenberg & Cesar, 2013).</p>
Carbon emissions and consumption of ozonedepleting substances reduced	<p>As noted in the 2013 UNDP report on MDGs progress though not yet published According to the same report, Rwanda's carbon dioxide emissions per capita averaged at 0,07 between the year 2000 and 2010, far below the sub-Saharan Africa and world averages of 0,87 and 4,49 respectively within the same period (RoR, 2013).</p> <p>Rwanda is now working on phasing out Ozone depleting substances in the chemical family of HydroChlorofluorocarbons (HCFCs). This is in line with the Protocol's requirements of phasing-out these gases by 2040 (UNEP, 2014).</p>
Access to	Through the Performance Contracts (Imihigo) System, all Districts, both

water and sanitation increased	rural and urban, have since 2006 been planning and monitoring their own performance in regard to management and distribution of water as well as provision of sanitation facilities. These efforts, together with a strong community uptake of the efficient water resources management, hygiene and sanitation messages have increased penetration of safe drinking water and sanitation services to mostly rural areas.
Lives of slum dwellers improved	Rwanda is committed to improve lives of slum dwellers especially those living in high risk zones; through the provision of basic urban infrastructure such as inter zones roads, drainage systems and water & sanitation services; the relocation of people living in high risk zones and the promotion of climate proofed settlements. In Kigali, and other cities, the recently developed master plan helps the authorities to deal with the problem of slums (ACEP- EU, 2013)
Disaster risk reduction and management	The Government of Rwanda through the Ministry of Disaster Management (MIDIMAR) and the Ministry of Natural Resources (MINIRENA) with its technical institutions (Rwanda Environment Management Authority (REMA), Rwanda Natural Resources Authority (RNRA), Rwanda Meteorology Agency (RMA) and the Fund for Environment and Climate Change (FONERWA); is investing much efforts in tackling climate change impacts in order to enhance adaptive capacity and reduce vulnerability (MIDIMAR, 2013).

Conclusion

Rwanda is conscious that Sustainable Environment is a key Sustainable Development. Rwanda is facing environmental problems by several ways: Rwanda has established an environmental policy premised on the principles of sustainable growth, participation, decentralization, intergenerational equity and fairness, emphasis on prevention, polluter pays, and recognition of regional and international environmental interconnectedness. The Policy focuses on key specific objectives namely: Improve health and quality of life for every citizen and promote sustainable socioeconomic development through rational management and utilization of resources and environment; Integrate environmental aspects into all the development policies, in planning and in all activities carried out at the national, provincial and local level, with the full participation of the population; Conserve, preserve and restore ecosystems and maintain ecological and systems functioning, which are life supports, particularly the conservation of national biological diversity; Utilize resources at optimum and attain a sustainable level of consumption of resources; Create awareness among the public to understand and appreciate the relationship between environment and development; Ensure the participation of individuals and the community in the activities for the improvement of environment with special attention to women and the youth; and Ensure that the basic needs of today's population are met without jeopardizing the ability of future generations to meet their own needs.

By implementing that policy through several programs and strategies, Rwanda presents appreciable achievements in environmental sector that have been recognized by the United Nations.

Recommendations

✓ International Community

Environmental issues are seamless: they are very complex and involve the whole world. The context for their resolution goes beyond a single country, a single continent and extends on the whole planet. During the implementation of the policy, Rwanda will need a multiform and varied assistance from international and regional cooperation institutions; UN agencies and development partners.

✓ To Government

Increase the knowledge and awareness of the general public on environment laws and policies in order to facilitate public participation in the EIA public hearings in particular and in public decision making in general.

Strengthen the human resource capacity of environmental and related institutions at national and district levels for environment assessment, policy analysis, monitoring and enforcement.

✓ Private Sector

The private sector is required to take a more active part in the protection of environment by ensuring that the environmental dimension are taken into consideration in all its activities, particularly in business, industrial and crafts activities.

✓ Citizens

To participate actively to the Government's Programs related to Environment

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