

**RECONCILING BIODIVERSITY CONSERVATION AND AGRICULTURAL  
DEVELOPMENT IN THE CONTEXT OF INTERNATIONAL AND DOMESTIC  
LAW IN RWANDA**

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## DECLARATION

I declare that the thesis for the degree of Doctor of Philosophy at the University of Cape Town hereby submitted has not been previously submitted by me for a degree at this or any other university, that it is my original work, and that all the materials contained herein have been duly acknowledged.

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## ABSTRACT

This thesis explores the tensions between biodiversity conservation and agricultural development in a legal context in Rwanda, a small and poor African developing country. It does so against the backdrop of relevant international conventions, the relatively recent constitutional dispensation in the country as well as the land reform process which has been underway in the country over the last few decades. Partly based on the findings of an empirical study, the core of the work outlines, examines and critically assesses relevant domestic Rwandan policies, laws and institutions focusing on areas of particular concern namely the laws applicable to the conservation of soil, water and genetic resources in agriculture, including conservation of crop and livestock diversity. The conclusions and recommendations are embedded in the need for policies, laws and institutions to accommodate the increase in agricultural production to eradicate hunger, alleviate poverty as well as a recognition of the interlinkages between agricultural development and biodiversity conservation. The study concludes that Rwandan laws are inadequate in that they have been disparately and inefficiently developed, that agricultural development and biodiversity policies be revised to aim at sustainable agricultural development and that a coordinated institutional framework with full involvement of all concerned stakeholders and appreciation of local knowledge and sustainable agricultural practices is required. Specific legal, policy and institutional shortfalls are highlighted including lack of implementing regulations; omission of necessary legislative provisions on key areas in the biodiversity and agricultural sectors and others. The work concludes by making specific recommendations and proposals to reconcile the need to promote agricultural development while facilitating biodiversity conservation and ultimately sustainable development.

## **DEDICATION**

To God Almighty, my parents, brothers, sisters and friends.

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## ABBREVIATIONS

AfDB	African Development Bank
APEFA	Action pour la Protection de l'Environnement et la promotion des Filières Agricoles
ARCOS	Albertine Rift Conservation Society
ARECO-RWANDA NZIZA	Association Rwandaise des Ecologistes
AU	African Union
AWG LCA	Ad Hoc Working Group on Long-Term Cooperative Action
CAADP	Comprehensive Africa Agriculture Programme
CAP	COMESA Agricultural Policy
CASS	College of Arts and Social Sciences
CBD	Convention on Biological Diversity
CBDC	Community Biodiversity Development and Conservation
CGIAR	The Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical (Spanish: International Center for Tropical Agriculture, Colombia)
CIP	Crop Intensification Programme
CITES	Convention on International Trade in Endangered Species
COMACO	Community Markets for Conservation
COMESA	Common Market of Eastern and Southern Africa
COP	Conference of the Parties
DDT	Dichlorodiphenyltrichloroethane (insecticide)
EAC	East African Community
EC	European Commission
EIA	Environmental Impact Assessment
EPA	Environment Protection Agency
FAO	Food and Agriculture Organisation
FONERWA	National Fund for Environment
GCOS	Global Climate Observing System
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
GMOs	Genetically Modified Organisms

IAIA	International Association for Impact Assessment
IBA	Important Bird Area
<i>Ibid</i>	<i>Ibidem</i> (in the same place)
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
EDPRS	Economic Development and Poverty Reduction Strategy
IfoAM	International Federation of Organic Agriculture Movements
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
ILRI	International Livestock Research Institute
IPCC	Intergovernmental panel on Climate Change
IPCS	International Programme on Chemical Safety
IPEP	International POPs Elimination Project
IPGRI	International Plant Genetic resources Institute
IPNS	Integrated Plant Nutrition Systems
IRRI	International Rice Research Institute
IRST	Institute of Scientific and Technological Research
ISAE	Higher Institute of Agriculture and Animal Husbandry (Former)
<i>ISAR</i>	<i>Institut des Sciences Agronomiques du Rwanda</i> (current Rwanda Agriculture Board)
ITPGRFA	International Treaty of Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
KCTC	Kitabi Conservation Training Centre
LMOs	Living Modified Organisms
MDGs	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
MINAGRI	Ministry of Agriculture
MINIRENA	Ministry of Natural resources
MINITERE	Former Ministry of Lands, Water and Environment (Current Ministry of Natural Resources)
NAEB	National Agricultural Export Development Board

NAPA	National Adaptation Programme of Action
NEPAD	New Partnership for Africa's Development
NGOs	Non-Governmental Organisations
NISR	National Institute of Statistics in Rwanda
N°	Number
NUR	National University of Rwanda
OCIR-CAFÉ	Rwanda Coffee Development Authority
OCIR-THE	Rwanda Tea Development Authority
ODS	Ozone Depleting Substances
ODSR	Ozone Depleting Substances Regulations
OECD	Organisation for Economic Cooperation and Development
OECD	Organisation for Economic Cooperation and Development
OG	Official Gazette
OP CIT	<i>Opere Citato</i> (in the work cited)
PGRFA	Plant Genetic Resources for Food and Agriculture
PIC	Prior Informed Consent
POPs	Persistent Organic Pollutants
PSTA	<i>Plan Stratégique pour la Transformation de l'Agriculture</i> (Strategic Plan for Agriculture Transformation)
RAB	Rwanda Agriculture Board
RADA	Rwanda Agriculture Development Authority
RDB	Rwanda Development Board
RECOR	Rwanda Environment Conservation Organisation
REMA	Rwanda Environment Management Authority
RHODA	Rwanda Horticulture Development Authority
RNRA	Rwanda Natural resources Authority
RoR	Republic of Rwanda
RSB	Rwanda Standards Board
SANS	South African National Standards
SARD	Sustainable Agriculture and Rural development
SARE	Sustainable Agriculture Research and Education Programme
SBSTTA	Subsidiary Body on Scientific, Technical, and Technological Advice (of the Convention on Biodiversity)
SIDA	Swedish International Development Agency

UCT	University of Cape Town
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference of Environment and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations framework Convention on Climate Change
UR	University of Rwanda
USA	United States of America
USAID	United States Agency for International Development
USC	United States Code
USDA	United States Department of Agriculture
WB	World Bank
WMO	World Meteorological Organisation



## **CHAPTER ONE : INTRODUCTION**

### **1.1 BACKGROUND**

Rwanda is a country that has recently come out of long standing political turmoil, largely characterized by genocide and related atrocities. These atrocities heavily affected all Rwandan economic sectors, including agriculture. However, today Rwanda is seeking to revive its agricultural sector which is the backbone of its economy.

Over 70% of the 26,336km<sup>2</sup>, being the total surface area of Rwanda, is exploited for agriculture.<sup>1</sup> The agricultural sector has been given a high priority in the government's planning for development.<sup>2</sup> Due to high population density and the need to meet food security and poverty reduction, traditional subsistence practices are being abandoned in favour of the development of a modern agriculture, which is better adapted to markets. The sector is moving from subsistence to commercial mode of production. This aims to increase household income and reduce poverty, since this sector employs about 87% of the working population, produces around 33% of Gross Domestic Product (GDP) and generates about 71% of the total export revenue.<sup>3</sup>

During the process of agricultural development, Rwanda has to protect her rich natural and agricultural biodiversity for the future of agriculture and the economy of the country. As outlined in chapter two, Rwanda's natural biodiversity has a remarkable variety of ecosystems, flora and fauna due to being located in the Albertine Rift Valley eco-region, one of the Africa's most biologically diverse regions.<sup>4</sup> Rwanda's agricultural biodiversity is also diversified with a variety of crops and livestock consisting of a mix of native and non native species.<sup>5</sup> Rwanda's natural biodiversity provides a lot of goods and services contributing to the growth of national economy and population welfare, and the agricultural biodiversity is also important because, due to its utilisation, the agricultural sector contributes significantly to the growth of the country's economy.<sup>6</sup> The maintenance of natural and agricultural biodiversity is therefore essential for the production of food and other agricultural goods, for

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<sup>1</sup> REMA *Rwanda state of environment and outlook: Our environment for economic development* (2009) 28.

<sup>2</sup> RoR *Economic development and poverty reduction strategy* (2007).

<sup>3</sup> NISR *Gross Domestic Product (GDP) Quarter 4 2014* (2015); REMA op cit note 1 at 1.

<sup>4</sup> RoR *Fifth National Report to the Convention on Biological Diversity* (2014) 25-49.

<sup>5</sup> RoR *Deuxième rapport sur la Convention de la Diversité Biologique* (2005) 4.

<sup>6</sup> RoR op cit note 4 at 22-4.

the future of agriculture and the future of Rwandans.<sup>7</sup> During the process of agricultural development, biodiversity needs to be considered. The strategies identified to achieve agricultural transformation include the use of agrochemicals, the introduction of new crop and livestock varieties and the introduction of new agricultural practices. However, this agricultural transformation and the likely ineffectiveness of agricultural and environmental laws, which should control agricultural practices, has had negative impacts on biodiversity. The latter include pollution of soil and water resources due to use and mismanagement of agrochemicals; changes in ecological processes; the invasion of exotic species; soil erosion; loss of crop and livestock varieties; land salinization; loss of nutrients and land degradation.<sup>8</sup> As a consequence, agricultural development requires that biodiversity is conserved and sustainably used.

Accordingly a current major challenge is therefore to secure and increase agricultural yield while at the same time conserving biodiversity as well as maintaining a healthy base for those who rely on agriculture for their livelihoods. The point of departure of this thesis is that it is difficult to balance agricultural productivity with the needs of ecosystems and biodiversity to ensure that they all deliver their services sustainably.

As in most developing countries, reconciling the increase of agricultural yield and conservation of biological diversity is not given full recognition in Rwanda where the first priority is to achieve the maximum yield and feed the ever growing population. However, there is an increasing demand for reconciling the two competing interests.

It is recognized that the key to reconcile biodiversity and agricultural development lies in the implementation of sustainable agriculture, which integrates profitability, environmental protection and social equity;<sup>9</sup> utilises an ecosystem approach and takes actions against climate change.<sup>10</sup> This requires adoption of sustainable agricultural practices ; changes in agricultural policies, laws, regulations and institutions ; control negative environmental externalities from agriculture ; and address its positive externalities; all accompanied by

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<sup>7</sup> Secretariat of the Convention on Biological Diversity *Biodiversity and Agriculture: Safeguarding Biodiversity and Securing Food for the World* (2008) 6-7.

<sup>8</sup> REMA op cit note 1 at 33-7.

<sup>9</sup> Annick Dollacker & Juan Gonzalez-Valero 'Agriculture and Biodiversity : challenges and opportunities for agribusiness' (2008) 3 Business.2010 Newsletter : Agribusiness at 2 available at <http://www.cbd.int/doc/newsletters/news-biz-2008-02/?Articleid=8>, accessed 15 November 2010

<sup>10</sup> Secretariat of the Convention on Biological Diversity op cit note 7 at 20.

development of long-term strategies to guarantee food security.<sup>11</sup> However, Rwandan environmental legislation is inadequate and does not address the idea of reconciling biodiversity conservation and agricultural development. The focus appears to be to promote or protect agricultural development rather than regulating its negative effects on biodiversity. Very little attention is paid to the impacts of agriculture on biodiversity, as will be outlined below.

### **1.1.1 Impacts of agrochemicals' use**

Government subsidy has increased the use of fertilisers. In 2007, about 21,600 tonnes of mineral fertilisers were ordered; and 13,260 tonnes were received and distributed. The target of fertiliser use increased from 0.5% in 2000 to 8% in 2010 and aims at 15% by 2020.<sup>12</sup> All these agrochemicals are currently being used without effective legal and regulatory control and without attention paid to their impacts on biodiversity.<sup>13</sup> Despite the existence of some laws governing agrochemicals and pollution control in Rwanda, these do not effectively protect biodiversity against inappropriate and misuse of agrochemicals. The legal control of pollution from the use of agrochemicals in Rwanda appears to be ineffective as will be argued in chapters two and four.<sup>14</sup>

### **1.1.2 Impacts of monoculture promotion**

In Rwanda, monoculture is actively promoted. Due to the system of land consolidation<sup>15</sup> and regionalization of crops, citizens are required to plant homogeneous and new crop varieties, which are considered highly profitable. Citizens are using new seed varieties distributed by the Rwandan government and mixture with traditional varieties is prohibited. This led to abandonment of traditional crop varieties, (e.g. traditional varieties of rice,<sup>16</sup> nutritious small-sized potatoes, old corn-variety –Nyirakagoli- traditional taros, and so on), which could adapt to the changing conditions of their environment, resulting in their loss.<sup>17</sup>

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<sup>11</sup> Nico Schrijver & Friedl Weiss *International Law and Sustainable Development: Principles and Practice* (2004) 434-435.

<sup>12</sup> RoR *Rwanda Vision 2020* (2000) cited in REMA op cit note 1 at 125.

<sup>13</sup> REMA op cit note 1 at 33.

<sup>14</sup> Paragraphs 2.3.3 & 4.2.7.

<sup>15</sup> Land consolidation is a government program that aims to cultivate only one crop over large areas (neighbours exploit their lands together) in order to move from subsistence farming to commercial cultivation.

<sup>16</sup> RoR *The Rwanda's Fourth National Report to the Convention on Biological Diversity* (2009) 19.

<sup>17</sup> Grands lacs Hebdo of Monday 14 September 2009 available at

In addition to loss of traditional crop varieties, traditional livestock species too are disappearing due to the marginalization of traditional production systems and associated local breeds (e.g. Ankole, a traditional variety of cattle) driven by the growing spread of intensive livestock production.<sup>18</sup> This constitutes a great threat to animal genetic diversity resources.<sup>19</sup> The promotion of monoculture is happening without effective legal measures to control its impacts on biodiversity. The legal protection of crop and livestock diversity is ineffective as will be argued in chapters two, four and six.<sup>20</sup>

### 1.1.3 Impacts of the use of soil, water and genetic resources

Soil, water and genetic resources are three main biodiversity components that need special protection in agriculture. Effective protection of soil is critical for future food security and conservation of biodiversity, as well as to secure other important ecosystem services (carbon sequestration, water-holding capacity, and flood prevention).<sup>21</sup>

In Rwanda, current agricultural practices such as soil overcultivation, abandonment of mixed cropping systems, reduction in number of used species and varieties, conversion of wetlands to agriculture and unsustainable use of agrochemicals damage its soil and biodiversity.

In addition to soil, water too has to be conserved as a biodiversity component especially since agriculture is the largest consumer of the fresh water resource.<sup>22</sup> In Rwanda, the total national water withdrawal for agriculture was estimated at 150 million m<sup>3</sup>/year in 2006, with the possibility of increasing every year to 68% of the total national water withdrawal.<sup>23</sup> In addition to irrigation, intensive cultivation of some crop varieties like

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[http://www.rnanews.com/index.php?option=com\\_content&task=view&id=1923&Itemid=34](http://www.rnanews.com/index.php?option=com_content&task=view&id=1923&Itemid=34), accessed 11 March 2014.

<sup>18</sup> RoR op cit note 16 at 19.

<sup>19</sup> The Secretariat of the Convention on Biological Diversity *Sustainable Agriculture and Sustainable use of Agricultural Biodiversity: Concepts, Trends and Challenges* (2010) 64.

<sup>20</sup> Paragraphs 2.3.4, 2.3.5 4.2.8 & 6.2.

<sup>21</sup> Mark G Kibblewhite, Ladislav Miko & Luca Montarella 'Legal frameworks for soil protection: current development and technical information requirements' (2012) 4 *Current Opinion in Environmental Sustainability* 573 at 573.

<sup>22</sup> World Resource Institute *World Resources* (1994) cited by David E Adelman & John H Barton 'Environmental Regulation for Agriculture: Towards a Framework to Promote Sustainable Intensive Agriculture' (2002) 21 *Stanford Environmental Law Journal* 3 at 4; Drummond Lucie 'Managing the Environmental Effects of Agriculture under the Resource Management Act: Non-point Source Discharges' (2006) 10 *New Zealand Journal of Environmental Law* 255 at 255.

<sup>23</sup> REMA op cit note 1 at 71.

sugarcane, rice, flowers and sweet potatoes in wetlands affected the chemical, physical and hydrological nature of these wetlands, which also affected other hydrologically-connected water resources.<sup>24</sup>

Besides, there cannot be conservation of biodiversity, regardless of genetic resources conservation. Many species of plants, animals (terrestrial and aquatic), trees, micro-organisms and invertebrates, all constitute genetic resources that make up the web of biodiversity in ecosystems upon which the world's food production depends.<sup>25</sup> If we lose the diversity of plant and animal genetic resources, the future of biodiversity and agriculture could be threatened.<sup>26</sup> There is therefore an increasing demand for the protection and conservation of genetic resources in different sectors, including agriculture. However, attention paid to the protection of genetic resources in rwandan agricultural development is little.

It will be argued in chapters two, four and five that in Rwanda, soil, water and genetic resources are insufficiently regulated by the laws of general nature which do not contain the main principles and tools of soil, water and genetic resources legislation, especially with regard to the impacts of agriculture.

#### **1.1.4 Impacts of climate change**

A serious consideration that has surfaced in the last few decades is that of climate change. There cannot be biodiversity conservation and agricultural development regardless of consideration of climate change adaptation.<sup>27</sup> Climate change threatens both biodiversity and agriculture. However, proper management of biodiversity and sustainable agricultural practices can assist in climate change adaptation.<sup>28</sup> In Rwanda, although the meteorological stations currently operational are not sufficiently representative to give a true picture of

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<sup>24</sup> Ibid at 78.

<sup>25</sup> FAO Commission on Genetic Resources for Food and Agriculture 'Biodiversity for a World without hunger' available at <http://www.fao.org/fileadmin/templates/nr/documents/CGRFA/commissionfactsheet.pdf> 9, accessed 15 December 2012.

<sup>26</sup> FAO 'Plant genetic resources: use them or lose them' available at [http://www.fao.org/fileadmin/templates/nr/documents/CGRFA/factsheets\\_plant\\_en.pdf](http://www.fao.org/fileadmin/templates/nr/documents/CGRFA/factsheets_plant_en.pdf), accessed 15 December 2012.

<sup>27</sup> Secretariat of the Convention on Biological Diversity *Biodiversity and Climate Change* (2007) 8; IPCC Climate change and biodiversity (2002) IPCC technical Paper V at 37-42.

<sup>28</sup> Secretariat of the Convention on Biological Diversity op cit note 7 at 17-18.

climate changes, analysis from existing data shows that, over the last 30 years, the country has experienced unusual and irregular climate patterns.<sup>29</sup> Climate change impacts, including occurrence of floods, landslides, droughts episodes, and reduction in water resources have been observed.<sup>30</sup> All these have caused reduction in agricultural productivity and pressured the population to adopt unsustainable farming practices in order to survive, which in turn has negative impacts on biodiversity. Rwanda has therefore to take measures to mitigate and adapt to climate change. However, as will be outlined in chapters two and six, the Rwandan legislation does not provide for adaptation measures.<sup>31</sup> However, mitigation measures alone having proven to be insufficient.<sup>32</sup>

## **1.2 SUMMARY OF THE CURRENT RWANDAN LEGAL TRENDS**

Rwanda has ratified different Multilateral Environmental Conventions listed in appendix 1. As discussed in chapter three, they directly or indirectly, require parties to address the issue of conservation of biological diversity in harmony with agricultural development. However, the Multilateral Environmental Conventions that Rwanda has ratified are framework conventions and very general; their functionality is reliant on national measures. It will be argued in chapter three that the implementation of international obligations on reconciling biodiversity and agriculture in Rwanda seems to be ineffective. Besides, Rwanda has adopted the agriculture and biodiversity-related laws listed in appendix 2. It will be argued in chapter four that these domestic laws also appear to be insufficient and inadequate. They do not effectively control the negative effects of agricultural development on biodiversity. In sum, despite different international and domestic laws set out in the two appendices, agricultural development continues to threaten Rwandan biodiversity.

## **1.3 PROBLEM STATEMENT**

The point of departure of the thesis is that Rwanda is embarking on much needed agricultural development but this is happening at the expense of biodiversity. The thesis accordingly

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<sup>29</sup> REMA op cit note 1 at 98.

<sup>30</sup> RoR *National Adaptation Programmes of Action to Climate Change* (2006) 29-33.

<sup>31</sup> Paragraphs 2.3.6 & 6.4.

<sup>32</sup> Robin Kundis Craig 'Stationarity is dead'-Long Live Transformation: Five Principles for Climate Change Adaptation Law' (2008) 34 *Harvard Environmental Law Review* 9 at 14.

explores how the agricultural development imperative can be reconciled with the need to conserve biodiversity in Rwanda.

In the light of the above problem statement, this thesis aims to answer the following key question: Are legal measures needed to reconcile biodiversity conservation and agricultural development in Rwanda, and if so, how and to what extent could such measures be effective tools to reconcile biodiversity conservation and agricultural development?<sup>33</sup>

The thesis aims to answer the following specific questions:

1. What is the current community-based understanding of the conflict between biodiversity conservation and agricultural development in Rwanda?
2. How has international environmental regime attempted to reconcile biodiversity conservation and agricultural development?
3. How effective and sustainable are the legal measures adopted in Rwanda towards reconciling biodiversity conservation and agricultural development?
4. How can those legal measures be more effective and promote agricultural productivity together with biodiversity conservation in Rwanda and what other effective legal mechanisms may be adopted to reconcile biodiversity conservation and agriculture?

#### **1.4 OBJECTIVE OF THE THESIS**

The main objective of the thesis is to examine how agricultural development is affecting biodiversity and the legal and regulatory approach of Rwanda in seeking to reconcile biodiversity conservation and agricultural development. From the main objective, specific objectives of the thesis are :

1. To analyse how agriculture is affecting biodiversity in Rwanda and the community-based understanding thereof. This intends to show the relationship between agriculture and biodiversity and the need to legally reconcile biodiversity conservation and agricultural development in Rwanda.
2. To examine the international regime that attempts to reconcile biodiversity conservation and agricultural development and to find out to what extent Rwanda implements its related international obligations.

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<sup>33</sup> 'Effective' is used in this research to encompass content sufficiency, implementation, enforcement, fitness for use of Rwandan laws and their conformity to international norms and standards.

3. To analyse legal measures adopted in Rwanda in relation to agriculture and biodiversity. The study intends to assess their effectiveness in reconciling biodiversity conservation and agricultural development.
4. To propose effective legal mechanisms to be adopted in Rwanda for reconciling biodiversity conservation and agricultural development.

## **1.5 IMPORTANCE OF THE THESIS**

How to reconcile biodiversity conservation and agricultural development in Rwanda using legal and regulatory measures is important for four reasons :

First, the Rwandan government is keen to revive an economy long negatively affected by severe political turmoil and genocide, by seeking to improve agricultural production. Unfortunately, increased agricultural production negatively impacts on biological diversity conservation. This thesis is therefore important as it addresses problems that are currently at the top of government agenda. The recommendations of the thesis will be useful in formulating new policies and legislation or improving the existing ones.

Second, the field of environmental law is still in its infancy in Rwanda. Therefore, contributing to its development, especially in relation to reconciling agricultural development and biodiversity conservation is of high value to the Rwandan legal system.

Third, I am acutely aware that biological resources have been utilised in agriculture without concern for their future conservation, but that raising awareness of the relationship between biodiversity conservation and agriculture is now of paramount concern to the society. Conserving biological diversity without compromising the livelihoods of Rwandans, who depend largely on agriculture, is crucial and thus contributing to the development of this field is of great significance to the country.

Fourth, the importance of adequately conserving biodiversity for the survival of humanity and agriculture makes the issue of reconciling biodiversity conservation and agricultural development a vital issue.



## **1.6 RESEARCH METHODOLOGY**

### **1.6.1 Literature and content analysis**

To conduct this research, an incremental approach was used building on literature analysis, content analysis and qualitative field work. Literature analysis was used with regards to the relationship between biodiversity conservation and agricultural development to acquire an in depth understanding of mechanisms used for biodiversity conservation reconciled with agricultural development. For this purpose, existing literature from books, periodicals, unpublished materials and internet sources were intensively consulted. Authoritative texts and data compiled by the Secretariat of the CBD and international organisations, including International Union Conservation of Nature (IUCN), United Nations Environment Program (UNEP), Food and Agriculture Organisation (FAO) and Biodiversity International and others were consulted.

Content analysis of Rwandan environmental and agricultural legal texts and policies, implementation of which affects biodiversity and agriculture, were analysed to assess their effectiveness with a view to proposing how they can be changed into more effective instruments. The study also examined some international environmental conventions that offer relatively better guidance and better legal mechanisms to assist in fighting for biodiversity conservation in harmony with agricultural development. The aim here was to examine whether Rwandan laws comply with these international legal mechanisms. It is important to note that reference is made throughout this work to Rwandan laws as published in the Official Gazette in the three languages (Kinyarwanda, French and English). No attempt is made to correct the translation where it appears faulty. Besides, it is important to note that the literature review reveals that there is a dearth of academic literature on the Rwandan environmental and biodiversity law, and a paucity of hard data in relation to degradation of biodiversity components.

### **1.6.2 Qualitative field work research**

To supplement the desk-top research, qualitative fieldwork research was also used after the necessary ethical clearance was obtained. It is known that the qualitative research has the ability to provide complex textual descriptions of how people experience a certain research

issue.<sup>34</sup> In this research, the qualitative research was therefore used to investigate people's experiences about the tensions between biodiversity conservation and agricultural development. The research methods used are face-to-face and focus group interviews. The two methods were appropriate as face-to-face interviews helped to get the in-depth data, participants' thoughts, beliefs, knowledge and experiences,<sup>35</sup> while focus group interviews helped to obtain very insightful information from the discussions and interactions among group members and discover consensus over a relatively short period of time and helped accessing a broad range of views on the research topic.<sup>36</sup>

The interviews were in-depth and semi structured, consisting of both closed and open-ended questions compiled in a predetermined questionnaire containing questions and topics to be covered.<sup>37</sup> Closed-ended questions were used where the respondents were asked to answer from a set of possible answers pre-established by the researcher. This format of questionnaire design was chosen due to the background characteristics of some research participants who are less educated. Due to their education level, answering complex questions in writing which require a certain familiarity with the topic of this research was cumbersome and could lead to inaccurate answers. Open-ended questions were used where the researcher did not suggest answers rather leaving it to the respondents to answer in their own words.<sup>38</sup> Given the nature of this research, open-ended questions allowed the participants to provide as much detailed information as they desire and it allowed the researcher to ask probing questions as a means of follow-up.<sup>39</sup> Open-ended questions were therefore used where the full expression of participants' viewpoints and experiences was needed. The compliment of the two methods, face-to-face and focus group interviews, helped to compare and contrast and helped achieve data completeness. They helped to use the strengths of one method to offset the weaknesses of the other, by cross-checking data obtained through one method against the other (validity check or verifying). Questions were framed in two languages: English and Kinyarwanda (See Appendix 3). English is the language used in this research, whilst Kinyarwanda was the communication language between the researcher and research

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<sup>34</sup> Natasha Mack et al *Qualitative Research Methods: A data collector's field guide* (2005) 1.

<sup>35</sup> Ibid at 30.

<sup>36</sup> Ibid at 51.

<sup>37</sup> Margaret C Harrell & Melissa A Bradley *Data collection methods : semi-structured interviews and focus groups* (2009) 27.

<sup>38</sup> Ian Brace *Questionnaire Design: How to plan, structure and write survey material for effective market research* (2004) 55, 61.

<sup>39</sup> Daniel W Turner 'Qualitative Interview Design: A Practical Guide for Novice Investigators' (2010) 15 *The Qualitative Report* 756 available at <http://www.nova.edu/ssss/QR/QR15-3/qid.pdf>, accessed 29 September 2012.

participants. While some participants could not communicate in English, they could all communicate in Kinyarwanda, which is the only native language spoken in Rwanda.

#### *1.6.2.1 Site selection*

The interviews were conducted in the four agricultural provinces of the country (East, West, North and South Provinces).<sup>40</sup> In each province, one district was visited (total: 4 districts). To respect the principles of objectivity and representativeness, four districts were chosen based on their population density, the number of their agrarian population, and their biodiversity status.

In the Southern Province, the researcher visited Nyaruguru District which has a surface area of 884 square kilometers and a population of more than 300,000. The population density is estimated at 339 per square kilometer and 98% of that population rely on agriculture and animal husbandry. Nyaruguru is hilly with a chain of high mountains, which constitute a branch of the Congo-Nile Peaks. It has diverse flora and fauna, but soil erosion and over-cultivation have progressively degraded its environment and biodiversity, which has even intruded upon the Nyungwe National Park.<sup>41</sup>

In the Northern province, the researcher visited Gicumbi, an area of 867square kilometres and a population of 362,331. It has a population density of 437 people per square kilometer, which places it among the most densely populated districts in Rwanda. It has a predominantly agrarian population – more than 95% - and this has resulted in a decline of landholding and productivity. In Gicumbi, there has been over-tilling of the ecological fragile landscape, which has intensified soil erosion.<sup>42</sup> The biodiversity of the district has progressively disappeared due to uncontrolled destruction of natural habitat by very dense human occupation.<sup>43</sup>

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<sup>40</sup> Rwanda has five provinces (Eastern Province, Western Province, Northern Province, Southern Province and the City of Kigali). The City of Kigali is excluded because it is 70% urban. Not much agricultural activity is practiced in the city.

<sup>41</sup> Available at <http://www.nyaruguru.gov.rw>.

<sup>42</sup> RoR *Integrated Approach to Mainstreaming Environment into Economic Development and Poverty Reduction Programmes, projects and Plans at local Level* (2008) 3.

<sup>43</sup> Available at <http://www.gicumbi.gov.rw>.

In the Western Province, interviews were conducted in Nyamasheke, a District of a size of 1,175 square kilometres and a population of 381,804. It has a population density of 425 people per square kilometer and has a high percentage of agrarian people - more than 90%. Nyamasheke is surrounded by Nyungwe National Park and Lake of Kivu. It has diversified biological resources, but experiences soil erosion, landslides and floods, which affect its biodiversity. Agricultural practices are reported to contribute to further loss of biodiversity.<sup>44</sup>

In the Eastern Province, the researcher visited Bugesera District, which covers a surface area of 1,337 square kilometers and its agriculture population is estimated to be 94,2%. The climate of Bugesera is very hot due to relatively low altitude, the rarity of rains and periods of drought. Bugesera is part of Kagera, Lake Victoria and whole Nile river basin, thus comprising a number of aquatic ecosystems.<sup>45</sup> With increasing population, most of Bugesera natural vegetation has disappeared due to conversion into agricultural lands.<sup>46</sup>

These four districts represent all three agro-ecological zones of Rwanda: the agro-ecological zone of lowlands represented by Bugesera district,<sup>47</sup> the agro-ecological zone of midlands represented by Nyamasheke district<sup>48</sup> and the agro-ecological zone of highlands represented by Nyaruguru and Gicumbi districts.<sup>49</sup>

#### *1.6.2.2 Participant selection and sampling*

To select participants, the convenience sampling method was used, where the sample was obtained on the basis of snowball samples; previously identified members of a group

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<sup>44</sup> This information is available at <http://www.nyamasheke.gov.rw>.

<sup>45</sup> This information is available at <http://www.bugesera.gov.rw>. See also Rwanda Water Partnership *Eastern Africa Report of the consultative meeting of stakeholders on Bugesera transboundary project* (2012) 1.

<sup>46</sup> RoR *Impacts assessment and evaluation of the pilot project for introduction of rainwater harvesting and utilisation techniques in Bugesera district* (2011) 19.

<sup>47</sup> This is an area of below 1,500 metres in altitude, receiving rainfall below 900 mm. The main ecosystems found in Bugesera, like in the whole lowland agro-ecological zone, are wetlands, water bodies, agricultural landscapes, savannah woodlands and conserved rangelands. These ecosystems provide a range of services for the population. The lakes and rivers are, for instance the source of water for both humans and animals; See also Republic of Rwanda *Pilot Integrated Ecosystem Assessment of Bugesera* Final Report (2007) at 15.

<sup>48</sup> This area is at an altitude of 1500-1900 metres, receives 1000-1500mm of rainfall and is characterized by ecosystems of wetlands, landscapes, water bodies and woodlands.

<sup>49</sup> This area has more than 1900 metre of altitude and a rainfall which is above 1500mm with ecosystems composed of wetlands, mountainous landscapes and woodlands.

identified further participants.<sup>50</sup> The sampling was purposeful through identification of “information-rich” participants who have certain characteristics, detailed knowledge, or direct experience relevant to the research question.<sup>51</sup> A purposive and representative sample of eighty research informants was invited to take part in the study. There appears to be no general agreement about sample size in qualitative studies as the sample sizes in qualitative research vary depending on the breadth and complexity of the inquiry. Also, in qualitative research samples are small but studied intensively.<sup>52</sup> In this research, the researcher identified information-rich informants and it was felt that eighty research informants should be able to provide varied, rich and detailed information for the purpose of this study.

Twenty research informants were invited to take part in the study through face-to-face interviews. The researcher chose to interview administrative authorities of governmental departments in charge of environment and agriculture; coordinators of environmental NGOs; individuals from environmental and agricultural research institutions; and farmers’ representatives. The use of face-to-face interviews was appropriate because the researcher expected to obtain high-quality information from them as these groups of people are believed to have more expertise and much information in relation to agriculture promotion and biodiversity conservation. However, they were not likely to participate in focus groups due to their responsibilities.<sup>53</sup>

Regarding focus groups, sixty research informants were invited to participate in six focus groups: four of community farmers, and two of participants from academic institutions.<sup>54</sup> The target number for each focus group was ten people and fortunately this number was always achieved. This choice was motivated by the likelihood that these participants were likely to participate in focus groups, share their views and ideas and

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<sup>50</sup> Arlene G Fink *How to conduct surveys: A Step-by-Step Guide* 4 ed (2009) 56; Margaret C Harrell, Melissa A Bradley op cit note 37 at 40.

<sup>51</sup> Leslie A Curry et al *Qualitative and mixed methods provide unique contributions to outcomes research* at 1445 available at <http://circ.ahajournals.org/content/119/10/1442.full.pdf+html>, accessed 18 March 2015.

<sup>52</sup> Ibid.

<sup>53</sup> Carolyn Boyce & Palena Neale *Conducting in-depth interviews: a guide for designing and conducting in-depth interviews for evaluation input* Pathfinder International Tool Series (2006) 3.

<sup>54</sup> The interviews in focus groups of community farmers were conducted in four agricultural provinces of the country (East, West, North and South). In each province, one district was visited (Total: 4 districts).

motivate each other. Moreover, they are located in the same place, share beliefs and knowledge, and they could therefore discuss and debate issues.<sup>55</sup>

The choice of community farmers was motivated by the fact that in Rwanda farmers form the biggest group of natural resource managers who are always in contact with biodiversity. They have developed their ways of wild species domestication, plant and animal breeding and socio-economic organization for sustainable use of biodiversity and have knowledge about practices that benefit or harm biodiversity. Their actions can hence enhance or degrade biodiversity. Therefore, working with community farmers was an opportunity to learn from them and find entry points for improvements on existing biodiversity management practices in agricultural activities, and developing more sustainable management techniques that conserve biodiversity.

The choice of research participants from academic institutions was motivated by their formal educational knowledge. Two groups of students studying biology and biodiversity conservation course and environmental law course, respectively, were invited to take part in the study. These were suitable to give insightful views and ideas on how to achieve both biodiversity conservation and agriculture development.

#### *1.6.2.3 Data collection method*

The data was collected from 10 June to 12 July 2013 and was conducted in accordance with the research protocol developed by the researcher. This protocol complied with the UCT Faculty of Law Research Ethics Guidelines for Research involving Human Participants and was approved by the Faculty of Law Research Ethics Committee on 31 October 2012. Different ethical issues, such as obtaining informed consent from research participants, protecting their confidentiality, respecting cultural values, using a language adapted to local realities and creating a relaxed environment were all considered during data collection.<sup>56</sup> The researcher had briefed all the research informants on the purpose of the research and presented to them the required documents including an information letter, the consent form and the questionnaires.

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<sup>55</sup> Jane Ritchie & Jane Lewis *Qualitative research practice: A guide for social science students and researchers* (2003) 37, 58.

<sup>56</sup> *Ibid* at 65-71.

#### *1.6.2.4 Data capturing and analysis*

All research participants were interviewed by the researcher once only, for between 45 minutes and one hour. Face-to-face interviews were personally transcribed by the researcher while focus groups' interviews were recorded by the researcher, mainly using a digital audio camera, once the consent and permission of research participants was obtained.

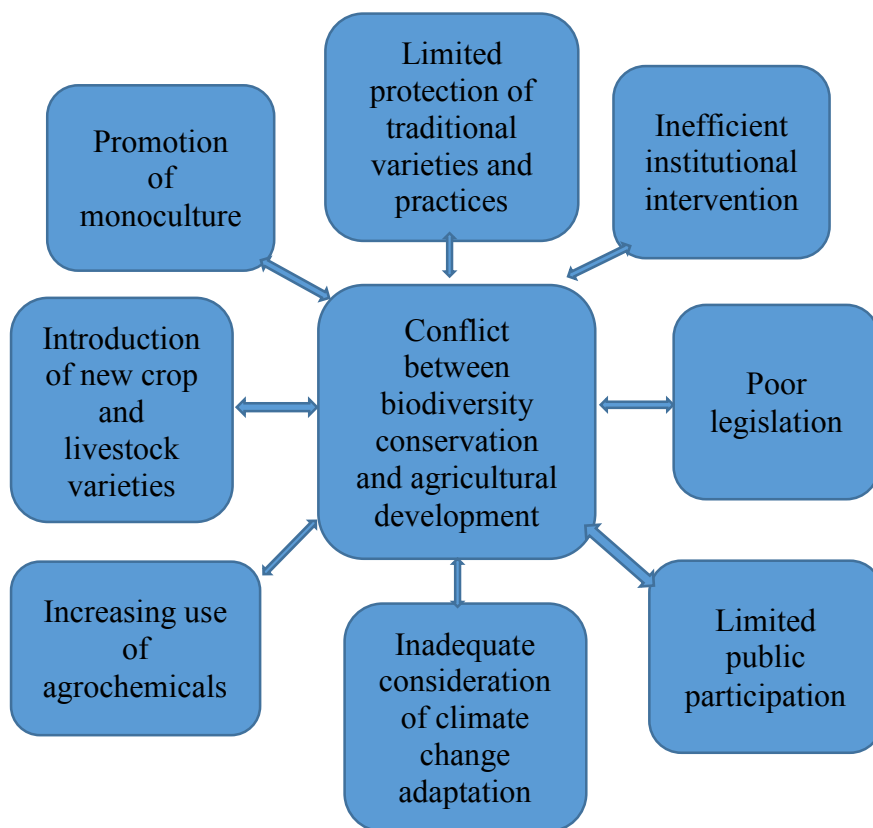
Data analysis started with the transcription of the recorded materials in Kinyarwanda. This stage was followed by translation of Kinyarwanda materials into English. Both versions were analysed with awareness of the fact that it is the Kinyarwanda version that contained the deeper meaning of the views and ideas. The researcher took care to protect confidentiality. For example, the names of research participants are withheld. Once the final report of the research is done, all materials used in data collection will be destroyed. Kinyarwanda and English texts were analysed using the Atlas.Ti qualitative computer data analysis software. In data analysis, the researcher further took into consideration the interactions between members of focus groups, by examining the negotiations, agreements, disagreements and accounts that were used in discussions and arrived at the preferred responses and non-preferred responses.<sup>57</sup>

The analysis of the data revealed the general and main theme, being the existence of the conflict between biodiversity conservation and agricultural development in Rwanda. Data analysis revealed eight related themes, as factors driving to the conflict, as illustrated by the following figure:

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<sup>57</sup> P Jonathan *Representing reality. Discourse, rhetoric and social construction* (1996).

**Figure 1 : Factors driving conflict between biodiversity conservation and agricultural development**



The detailed findings of the qualitative study are integrated in relevant parts of the thesis.

## 1.7 THEORETICAL FRAMEWORK

### Biodiversity

The Rwandan Biodiversity Law and the Environmental Framework Law define biodiversity as:

The variability of the living organisms of all types including the human beings, animals of all species, plants of all types, be it on land or underground, in water as well as in the atmosphere and the interactions among them.<sup>58</sup>

The Convention on Biological Diversity (CBD) broadly defines the term biodiversity to include wild and domesticated animals and wild and cultivated plants found on land and seas in the following terms:

Biological diversity means the variability among living organisms from all sources

<sup>58</sup> Article 2 (25) Biodiversity Law and Article 4 Environmental Framework Law.



including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.<sup>59</sup>

It is worth mentioning that biological diversity is mostly but not exclusively described in terms of three conceptual levels of genetic, species and ecosystem diversity. Glazewski defines genetic diversity as ‘variation of genes within species, making it possible to develop new breeds of crop plants and domestic animals, and allowing species in the wild to adapt to changing conditions’.<sup>60</sup> Species diversity refers to the variety and abundance of different types of organisms, able to interbreed freely under natural conditions, and which occupy a geographic area.<sup>61</sup> Ecosystem diversity means the variety of ecosystems found within a particular political or geographical boundary.<sup>62</sup>

### **Biodiversity conservation**

Before defining ‘biodiversity conservation’ it is important to explain ‘conservation’. Birnie and Boyle say that the ordinary meaning of ‘conservation’ is:

keeping in safety or from harm, decay or loss, preserving in being, keeping alive, or now, more usually, preserving something in its existing state from destruction or change, or from destructive influences, decay or waste, or in being and health.<sup>63</sup>

According to the Legal Experts Group of the World Commission on Environment and Development (WCED), ‘conservation’ means:

the management of human use of a natural resource or the environment in such a manner that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. It embraces the preservation, maintenance, sustainable utilisation, restoration, and enhancement of natural resource or the environment.<sup>64</sup>

Referring to the definitions of ‘biodiversity’ and ‘conservation’ given above, ‘biodiversity conservation’ is consequently defined as the use of biodiversity components at gene, species and ecosystem levels in ways that they serve for the benefit of present generations without

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<sup>59</sup> Article 2 CBD.

<sup>60</sup> Jan Glazewski *Environmental Law in South Africa* (2013) (Issue 1) 13-5.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid at 13-6

<sup>63</sup> Patricia Birnie & Alan Boyle *International Law and the Environment* 2<sup>nd</sup> ed (2002) 550.

<sup>64</sup> Munro & Lammers *Environmental protection and sustainable development* (1986) cited in Patricia Birnie & Alan Boyle *International Law and the Environment* 2<sup>nd</sup> ed (2002) 553-554.

compromising the ability of future generations to meet their own needs. In biodiversity conservation, where-in the interest of both present and future generations- there is a need to avoid any change to biodiversity components, preservation strategies have to apply. Besides, some biodiversity components must be utilised for the benefit of human beings. However, conservation requires that such utilisation be carried out in sustainable way to avoid destruction, damage or extinction. Additionally, biodiversity conservation requires to rehabilitate or recover the components of biodiversity that have been degraded as argued by Mutia who defines ‘biodiversity conservation’ as preservation, maintenance, sustainable use, recovery and enhancement of the components of biodiversity. .<sup>65</sup>

### **Agriculture**

Agriculture is the science or practice of cultivating the soils and rearing animals. It is also defined as the utilisation of natural resource systems to produce commodities which maintain life, including food, fiber, horticultural crops, and their related services.<sup>66</sup>

A court ruling defined agriculture as follows:

Agriculture includes farming in all its branches and among other things includes the cultivation and tillage of the soil, dairying, the production, cultivation, growing, and harvesting of any agricultural or horticultural commodities, the raising of livestock or poultry, and any practices performed by a farmer on a farm as an incident to or in conjunction with some farming operations.<sup>67</sup>

The Rwandan laws do not define the term agriculture. In this research, the term ‘agriculture’ is used in the sense given by the definition directly above.

### **Agricultural biodiversity**

The Conference of the Parties to the CBD defined agricultural biodiversity or agrobiodiversity as a broad term that includes all components of biodiversity of relevance to food and agriculture, and all components of biodiversity that constitute the agro-ecosystem:

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<sup>65</sup> Tecla M Mutia *Biodiversity conservation* Paper presented at Short Course IV on Exploration for Geothermal Resources organized by UNU-GTP KenGen and GDC (Lake Naivasha, Kenya, November 1-22, 2009) available at <http://www.os.is/gogn/unu-gtp-sc/UNU-GTP-SC-10-0805b.pdf>, accessed on 25 November 2015.

<sup>66</sup> Annie Patricia Kameri-Mbote & Philippe Cullet ‘Agrobiodiversity and International Law: A conceptual framework’ (1999) II *Journal of Environmental Law* at 257.

<sup>67</sup> This is the definition given by the Supreme Court of the Republic of Philippines in *Rileco, Inc. v. Mindanao Congress of Labor-Ramie United Workers’ Assn.* 26 SCRA 224 (1968) available at [http://www.lawphil.net/judjuris/juri1968/nov1968/gr\\_1-22243\\_1968.html](http://www.lawphil.net/judjuris/juri1968/nov1968/gr_1-22243_1968.html), accessed on 19 October 2011.

the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes.<sup>68</sup>

Agrobiodiversity also includes the many ways in which farmers can exploit biological diversity to produce and manage crops, land, water, insects and biota, and habitats and species outside farming systems that benefit agriculture and enhance ecosystem functions.<sup>69</sup>

Thrupp asserts that agrobiodiversity encompasses many types of biological resources tied to agriculture, including:

- genetic resources ;
- edible plants and crops, including traditional varieties, cultivars, hybrids and other genetic material developed by breeders;
- livestock and freshwater fish;
- soil organisms vital to soil fertility, structure, quality and health;
- naturally occurring insects, bacteria and fungi that control insect pests and diseases of domesticated plants and animals;
- agroecosystem components and types indispensable for nutrient cycling, stability and productivity; and
- wild resources of natural habitats and landscapes that can provide ecosystem functions and services (for example, pest control) to agriculture.<sup>70</sup>

This concept of agrobiodiversity was developed after realizing that conflicts between agriculture and biodiversity are by no means inevitable, but that the two can be reconciled if farming practices and agricultural policies and institutions are changed<sup>71</sup> with a clear understanding that each one of them cannot be developed and protected on its own. Instead, as biodiversity and agriculture are strongly interrelated, their complementarities need to be

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<sup>68</sup> COP 5 Decision V/5 ; Annex I of Decision III/11 of the COP which details impacts of biodiversity on agriculture (positive and negative) and impacts of agriculture on biodiversity (negative and positive).

<sup>69</sup> Harold Brookfield & Christine Padoch 'Appreciating agrobiodiversity: a look at the dynamism and diversity of indigenous farming practices' (1994) *36 Environment* 5 at 7-44 Cited in Lori Ann Thrupp 'Linking agricultural biodiversity and food security: the valuable role of agrobiodiversity for sustainable agriculture' (2000) 76 *International Affairs* 265 at 266 ; H Brookfield 'Postscript: the population-environment nexus' (1995) 5 *Global Environmental Change* 4 at 381-93 cited in Lori Ann Thrupp op cit note 69 at 266.

<sup>70</sup> Lori Ann Thrupp op cit note 69 at 266.

<sup>71</sup> Ibid at 265.

enhanced: biodiversity is critical for agriculture and agriculture can contribute to biodiversity conservation.<sup>72</sup>

### **Sustainable agriculture**

Sustainable agriculture is defined as a profitable way of producing high quality food and fiber that protects and renews the natural environment, builds local economies, and enhances the quality of life of farmers and farm workers.<sup>73</sup>

It is also defined as :

an integrated system of plant and animal production practices having a site-specific application that will, over the longer term-

- A) satisfy human food and fiber needs ;
- B) enhance environmental quality and the natural resource base upon which the agricultural economy depends ;
- C) make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls ;
- D) sustain the economic viability of farm operations ; and
- E) enhance the quality of life for farmers and society as a whole.<sup>74</sup>

Biodiversity International defined sustainable agriculture as the ability of farmland to produce food and other agricultural products to satisfy human needs indefinitely as well as having sustainable impacts on the broader environment.<sup>75</sup>

Sustainable agriculture implies the use of resources in agriculture in a way and at rates that do not exceed the capacity of ecosystems to replace them,<sup>76</sup> and it is for human societies to negotiate and decide the nature of the trade-offs involved in reaching agricultural sustainability.<sup>77</sup>

CBD texts and commentaries use the terms “sustainable agriculture” and “sustainable use of agricultural biodiversity” interchangeably, suggesting the same meaning of the two

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<sup>72</sup> Annex I of COP 3 Decision III/11.

<sup>73</sup> Cooperative development Institute ‘Together we prosper’ available at <http://www.cooplife.coop/sustag/agcoop.ppt>, accessed on 19 October 2011.

<sup>74</sup> 7 USC § 3103-19.

<sup>75</sup> Secretariat of the Convention on Biological Diversity op cit note 19 at 10.

<sup>76</sup> The definition of « Sustainable use » given by the CBD implies that sustainable agriculture should use resources in a way and at a rate that does not lead to their long-term decline, thereby maintaining their potential to meet the needs and aspirations of present and future generations.

<sup>77</sup> Secretariat of the Convention on Biological Diversity op cit note 19 at 11.

concepts. However, they are different, as sustainable agriculture is so broad as to include considerations of productivity goals, environmental stewardship, farm profitability and rural welfare objectives, as well as consumer health. Agricultural biodiversity is a component of agriculture, and as such it cannot be equated with sustainable agriculture.<sup>78</sup>

### **Agricultural development**

In a broad sense, agricultural development is the overall increase in the use of inputs and higher returns (income) from land. From this definition, agricultural development is characterised by the higher yield or income per unit of land, as a result of the introduction of new production technologies or practices such as the use of irrigation techniques, introduction of agrochemicals, and so on.<sup>79</sup>

Agricultural development also means the process that creates conditions for the fulfilment of agricultural potential such as accumulation of knowledge, availability of technology and allocation of inputs and output.<sup>80</sup> It has different outcomes of interest reflected by various intermediate and final indicators. Intermediate indicators are output production, output composition and technology use. The most intermediate indicator of agricultural development in most African countries including Rwanda is crop production per capita. The final indicators of agricultural development are the level of composition of production (food versus cash crops), the sustainability of production processes and agricultural growth and efficiency in the allocation of agricultural products.<sup>81</sup>

Agricultural development again means that process in the development of agricultural industry which promotes the proper conditions for farming so that planting, livestock rearing, harvesting and processing of agricultural products can be done effectively, which consequently can reduce poverty. It goes beyond physical conditions of farming and incorporate research, technology and political policy. For an effective agricultural development, crops must be protected from disease and other threats, they must be easily

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<sup>78</sup> Ibid.

<sup>79</sup> D N Basu, Raghu Roy & Pallavi Nikhil *Impact of agricultural development on demographic behaviour* (1979) 15.

<sup>80</sup> Juan R Laiglesia *Institutional Bottlenecks for Agricultural Development: A Stock-Taking Exercise Based on Evidence from Sub-Saharan Africa* OECD Development Centre Working Paper No 248 (2006) 10.

<sup>81</sup> Ibid.

transported to the markets and farmers must be provided with any related agricultural information.<sup>82</sup>

### **The relationship between biodiversity conservation, agricultural development and sustainable agriculture**

With reference to the above discussions of what is biodiversity conservation, agricultural development and sustainable agriculture, it is argued that biodiversity conservation has to be considered throughout the process of agricultural development. While agricultural development is important to reduce poverty and improve the life of those who depend on agriculture, it should be envisaged with long-term or sustainability objectives. In the process of improving the conditions of farming by accumulating agricultural knowledge, availing agricultural technology and allocating agricultural inputs and output to achieve agricultural development, its sustainability should be envisaged. Omer, Pascual and Russel argued that biodiversity conservation is one among the strategies that lead to sustainable agriculture and sustainable agricultural development. The same authors state that the productivity, sustainability and development of agriculture rely greatly on the ecosystem services provided and supported by biodiversity as discussed in chapter two.<sup>83</sup> Biodiversity helps in agriculture improvement through :

- allowing domestication of new plant species adapted to harsh conditions;
- possibility of exchanging existing crops which enrich biodiversity in managed landscape;
- allowing upgrading of the existing crops (genetic improvement) to enable them combat emerging pests and diseases and adapt to shifting market conditions;
- ensuring long-term productivity of agriculture due to numerous microorganisms that perform functions which prime fuel metabolism of soils, plants and animals
- nitrogen fixation by certain bacteria;
- plant nutrients uptaking performed by certain fungi and

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<sup>82</sup> 'What is agricultural development?' available at <http://www.wisegeek.com/what-is-agricultural-development.htm>, accessed on 27 November 2015.

<sup>83</sup> Aman A Omer Unai Pascual & Noel P Russel 'The contribution of biodiversity to modern intensive farming systems' in Stewart Lockie & David Carpenter (ed) *Agriculture, biodiversity and markets: Livelihood and agroecology in comparative perspective* (2010) 117 at 117, See also paragraph 2.5.

- reduction of reliance on agrochemicals.<sup>84</sup>

Some components of biodiversity exploited in agriculture such as land, water and genetic resources should be put aside and left unchanged if their conservation highly requires that. However, such biodiversity components have also to serve for the survival of human beings. They can also be used for agricultural purposes but in a sustainable way, meaning in a way and at a rate that does not lead to their long-term decline.<sup>85</sup> In so doing, they will be able to meet the needs of present and future generations.<sup>86</sup> In case land, water and genetic resources have been damaged, during agricultural development process, their restoration should be considered. On the contrary, failure to ensure biodiversity conservation in the process of agricultural development leads to unsustainability of agriculture and its intended development.

In Rwanda agricultural development is needed to reduce poverty and ensure food security for the big majority of Rwandans who live by agriculture. However, agricultural development tends to be pursued without consideration of biodiversity conservation. In Rwanda, agricultural development tends to simplify ecosystems, utilise biodiversity unsustainably and reduce species diversity with the great focus on adopting new technologies, allocating new inputs and output but ignoring the role of biodiversity in ensuring sustainability of agricultural production processes and growth. This affects negatively the ecosystems services and species as discussed above.<sup>87</sup> Once species are extinct, for example, they are irreplaceable. The loss of plant and animal species therefore limit options for agricultural improvements in the future and affect future generations. This therefore compromises sustainable agriculture, agricultural development and sustainable development.<sup>88</sup> Biodiversity conservation, agricultural development and agricultural sustainability are interdependent and this interdependence has to be considered in different agricultural and biodiversity policies, laws and institutions.

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<sup>84</sup> Jitendra Strastava, Nigel J H Smith & Douglas Forno *Biodiversity and agriculture: Implications for conservation and development* World Bank technical papers (1996) 4-5.

<sup>85</sup> Patricia Birnie & Alan Boyle *International Law and the Environment* 2<sup>nd</sup> ed op cit note 63 at 576.

<sup>86</sup> Ibid.

<sup>87</sup> Paragraphs 1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.2.3 and 2.3

<sup>88</sup> Report of the World Commission on Environment and Development: Our Common Future

## 1.8 STRUCTURE OF THE THESIS

The thesis comprises eight chapters. This chapter one introduces the study. Chapter two provides a background on the conservation of biodiversity in agriculture in Rwanda. It provides the current state of biodiversity and its conservation in Rwanda and the background of agricultural development in Rwanda and how it affected biodiversity. The chapter also examines factors underlying tensions between biodiversity conservation and agricultural development and discusses the importance of establishing legal measures that prevent such tensions.

Chapter three discusses the international conventions, which attempt to reconcile biodiversity conservation and agricultural development in the context of examining their relevance to Rwanda. Besides, international institutions intervening in biodiversity conservation in harmony with agricultural development are discussed to stress the importance attached to this matter internationally.

Chapter four analyses Rwandan domestic policies, laws and regulations applicable to biodiversity conservation and agricultural development to assess their effectiveness. Also national institutions that intervene in the areas of biodiversity conservation and agriculture are discussed to examine their contribution.

Chapter five discusses conservation of soil, water and genetic resources in harmony with agricultural development. The chapter examines how international law integrates their conservation in agriculture and discusses how national law has to be framed to ensure conservation of such biodiversity components in agriculture. Rwandan law is examined to assess its effectiveness.

Chapter six examines the importance of conserving crop and livestock diversity to ensure harmony between agricultural development and biodiversity conservation, and contribute to climate change adaptation. Along with examination of how international environmental law integrates crop and livestock diversity conservation, applicable Rwandan laws are discussed to examine their support to crop and livestock diversity conservation in agriculture.



Chapter seven discusses the necessity of public participation in reconciling biodiversity conservation and agricultural development. It discusses its incorporation in international environmental law and in Rwandan laws and regulations. Regulatory mechanisms contributing to the protection of traditional knowledge are discussed, stressing the necessity of its protection in ensuring participation of all categories of stakeholders involved in biodiversity conservation and agriculture. Also incentives encouraging the public to adopt sustainable agricultural practices and participate in biodiversity conservation are discussed.

Chapter eight comprises the summary, conclusions and recommendations of the study.



## 2.2 BACKGROUND ON THE CURRENT STATE OF BIODIVERSITY IN RWANDA

### 2.2.1 Natural biodiversity

The natural biodiversity of Rwanda has a remarkable variety of ecosystems, flora and fauna, primarily due to being located in the Albertine Rift Valley eco-region, one of Africa's most biologically diverse regions. It is home to some 40% of the continent's mammal species (402 species), a huge diversity of birds (1,061 species), reptiles and amphibians (293 species), and higher plants (5,793 species).<sup>5</sup>

Rwanda has varied habitats, including afro-montane ecosystems;<sup>6</sup> lowland forests, savannah woodlands and savannah grasslands;<sup>7</sup> other habitats around volcanic hot springs and old lava flows;<sup>8</sup> and several lakes and wetlands. Though not yet well surveyed, all these ecosystems host a rich variety of fauna and flora and micro-organisms.<sup>9</sup>

Regarding flora, Rwanda has around 3000 species of vascular plants.<sup>10</sup> About 280 species of flowering plants from Rwanda are considered to be endemic to the Albertine Rift. Of these endemic species, about 20 are restricted to Rwanda, 50 species confined to Rwanda and Eastern Congo and 20 species found only in Rwanda and Burundi. Rwanda has 56 local endemic flowering plants. It is noted that the number of known plant species in Rwanda is limited.<sup>11</sup> In addition, Rwanda has different tree species.<sup>12</sup>

With regards to fauna, Rwanda is a home of 151 different types of mammal species, 11 of which are currently threatened. Among them are the primates (14 to 16), with half of the remaining world population of mountain gorillas (*Gorilla gorilla berengei*) found in the

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<sup>5</sup> RoR *Fifth National Report to the Convention on Biological Diversity* (2014) 25-49; RoR *Fourth National Report to the Convention on Biological Diversity* (2009) 15.

<sup>6</sup> Afro-montane ecosystems are situated in the northern and western regions.

<sup>7</sup> Grasslands are found in the southern and eastern regions.

<sup>8</sup> Old lava flows are located especially in the northern and western part of the country.

<sup>9</sup> RoR op cit note 5 at 25-49.

<sup>10</sup> Eberhard Fischer & Dorothee Killmann *Illustrated Field Guide to the Plants of Nyungwe National Park* (2008) cited in REMA op cit note 3 at 51.

<sup>11</sup> REMA op cit note 3.

<sup>12</sup> RoR *National Strategy and Action Plan for the Conservation of Biodiversity in Rwanda* (2003) 32-33.

Volcanoes National Park. There are also 15 species of antelope, and a wide diversity of wild animal species.<sup>13</sup>

Rwanda is one of the top birding countries, with 670 different birds, some of which are threatened with extinction: the shoebill (*Balaeniceps rex*), Grauer's rush warbler (*Bradypterus graueri*), the Kungwe apalis (*Apalis argentea*), and the African or Congo barn owl (*Phodilus prigoginei*).<sup>14</sup>

### 2.2.2 Agricultural biodiversity

Rwanda has a diversified agrobiodiversity. A variety of crops categorized in two types are cultivated. The first category comprises food crops, which include *Sorghum*, *Phaseolus vulgaris*, *Eulisine corocan*, *Colocasia antigonum*, *Zea mays*, *Oryza sativa*, *Triticum sp.*, *Hordeum vulgare*, *Pisum sativum*, *Soja hispada*, *Arachis hypogea*, *Ipomea durcis*, *solanum tuberosum* (Irish potatoes), *Manihot esculenta* and the banana (*Musa*). The second category comprises industrial crops: coffee, tea and pyrethrum.<sup>15</sup> In addition, the agricultural production systems accommodate many related wild species such as *Eragrostis sp.*, *Bidens pilosa*, *Digitaria sp.*, *Conyza sumatrensis*, *Cyperus sp.*<sup>16</sup> There are also plant forage crops, including *Tripsacum laxum*, *Setaria sp*, *Desmodeum sp*, *Pennisetum purpureum*, *Mucuna pruriensis*, *Cajanus cajan* *Calliandra calothyris*, *Leucaena diverifolia*, and *Sesbania sesban*.<sup>17</sup>

Concerning livestock, animal species bred in Rwanda are a mix of native and non-native. These include cattle (*Ankole*, *Sahiwal*, *Frison*, *Alps brown* and the *Australian Milk Zebu*), goat (*Alpine* and *Anglonubian*), sheep (*Karakul*, *Merinos* and *Dorper*), pig (*Large white* and *Landrace*, *Piétrain*), and poultry (*Leghorn*, *Rhodes Island Red*, *Derco*, *Sykes* and *Anak*).<sup>18</sup>

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<sup>13</sup> Chemonics International Inc 'Rwanda Environmental Threats And Opportunities Assessment' (2003) 108-109 available at [http://www. encapafrika.org/documents/biofor/Rwanda\\_2003.pdf](http://www. encapafrika.org/documents/biofor/Rwanda_2003.pdf), accessed on 29 July 2012; ROR *Deuxième Rapport National sur la Convention de la Diversité Biologique* (2005) 4.

<sup>14</sup> Ibid at 108.

<sup>15</sup> RoR op cit note 13 at 18.

<sup>16</sup> Ibid.

<sup>17</sup> Ibid at 19.

<sup>18</sup> Ibid.

### 2.2.3 The status of biodiversity conservation

The Rwandan biodiversity is conserved *in situ* and *ex situ*. It is mainly conserved in protected areas of three national parks (Volcanoes, Nyungwe and Akagera National Parks), natural Forest reserves and wetlands covering almost 10% of the national territory.<sup>19</sup>

#### 2.2.3.1 In-situ conservation

##### *Natural biodiversity*

##### National Parks

The *Volcanoes National Park* is home to about 30% of the global population of Mountain Gorilla, 115 mammal species, 187 bird species, 27 species of reptiles and amphibians and 33 arthropod species. Some species found there are endangered under the Convention on International Trade in Endangered Species (CITES).<sup>20</sup> The Park also has 245 plant species, 17 of which are threatened, and 13 species of orchids that are internationally protected.<sup>21</sup>

*Nyungwe National Park* has 75 mammal species, including 13 species of primates some of which are on the International Union for Conservation of Nature (IUCN) Red list.<sup>22</sup> This national park is also considered an African Important Bird Area (IBA), with 285 bird species, comprising 25 endemic to the Albertine Rift.<sup>23</sup> Nyungwe hosts 1,200 plant species including 148 species of orchids, of which 19 are endemic.<sup>24</sup>

The *Akagera National Park* shelters 90 mammal species, of which 47 are big mammals, 530 bird species, 9 species of amphibians, 23 species of reptiles and 35 fish species. Some of these species, like rhinoceros and lions, are threatened, whilst others are

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<sup>19</sup> REMA op cit note 3 at 53.

<sup>20</sup> Such species are *Rana anolensis*, *Chameleo rudi* and *Leptosiphos grauer*. See Chemonics International Inc op cit note 13 at 86.

<sup>21</sup> Ibid at 8.

<sup>22</sup> These include the Eastern Chimpanzee, owl-faced guenons and the Angolan Colobus monkey.

<sup>23</sup> USAID *Rwanda Environmental Threats and Opportunities Assessment* (ETOA) (2008) 26.

<sup>24</sup> RoR op cit note 13 at 131.

protected by CITES.<sup>25</sup> The Akagera National Park also has a diverse flora of more than 900 plant species with 6 species of orchids.<sup>26</sup>

### Natural forests

The natural forests of Gishwati, Mukura and Buhanga are rich in fauna species. The Gishwati forest has many species, such as *Pan troglodytes schewinfurthii*, *Colobus angolensis ruwenzorii*, and others. The Mukura<sup>27</sup> forest is home to about 59 bird species and many fauna species, such as the tree squirrel and Rwenzori sun squirrel.<sup>28</sup> Buhanga forest is home to different fauna, flora and tree species some of them like the jackal, the partridge and leopard being threaten with extinction.<sup>29</sup>

### Wetlands

Different wetlands such as Rugezi and Rweru-Mugesera wetland complex host a rich biodiversity.<sup>30</sup> The Rugezi wetland is home to an endangered bird and shelters 60% of the global population of Grauer's swap-warbler.<sup>31</sup> It is also habitat to 37 bird species, some of which, like *Threskiornithidae*, being protected by CITES,<sup>32</sup> as is the orchid, *disa stairsii*.<sup>33</sup>

Parks and natural reserves have been protected against fires, encroachments and poaching. Some crop wild relatives have been found in natural reserves such as for sorghum, sweet potato and strawberry.<sup>34</sup>

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<sup>25</sup> Such species are for example the African elephant, buffalo, leopard and sitatunga: See Republic of Rwanda op cit note 13 at 131.

<sup>26</sup> Fabien Twagiramungu *Environmental profile of Rwanda* (2006) 18; see also Republic of Rwanda op cit note 5 at 13.

<sup>27</sup> Mukura forest is in the process of being established as a national park.

<sup>28</sup> Ian Munanura et al *Report of Biodiversity Survey of Mukura Forest* (2006) cited in RoR op cit note 9 at 54.

<sup>29</sup> RoR op cit note 5 at 36.

<sup>30</sup> *Ibid* at 37

<sup>31</sup> The Grauer's swap-warbler is known under the scientific name of *Bradypterus graueri*.

<sup>32</sup> RoR op cit note 13 at 72.

<sup>33</sup> *Ibid* at 70.

<sup>34</sup> RoR *The state of plant genetic resources for food and agriculture in Rwanda: country report* (2013) 17.

### *Agricultural biodiversity*

It is noted that about 47% of the conservation of plant genetic resources for food and agriculture (PGRFA) is done through *in situ*/on-farm. A number of species such as finger millet, yam, finger potato, *colocasia spp* are mainly kept at farmers' level. However, on-farm management of PGRFA is still not yet formally organized at county level and farmers are largely encouraged to use improved varieties, instead of landraces which leads to genetic erosion.<sup>35</sup>

#### *2.2.3.2 Ex-situ conservation*

*Ex-situ* conservation of agricultural biodiversity is also observed in Rwanda, mainly for flora. Herbaria such as the Institute of Scientific and Technological Research (IRST),<sup>36</sup> the Karisoke Research Centre and the Arboretum of Rwanda Agriculture Board (RAB) have been established and contains 205 mainly indigenous and other introduced species. It is considered the best arboretum in Africa. RAB (former ISAR) also introduced a seed bank in 1978.<sup>37</sup> It is the national genebank and maintains *ex-situ* collections of plants, fodder and germplasm.<sup>38</sup>

#### *2.2.3.3 Challenges to current in-situ and ex-situ biodiversity conservation in Rwanda*

Rwanda's biodiversity is mainly conserved in protected areas which cover 10% of the biodiversity biome; a strategy that is no longer successful. In Rwanda like anywhere else, protected areas not only cover a very small proportion of the biome, but also do not adequately represent endemism in biodiversity species, particularly where there is high species turnover across the landscape.<sup>39</sup> In addition, ecological functioning of protected areas is affected by human activities including agricultural activities taking place in the surrounding landscape.<sup>40</sup> Further, agricultural productivity, both in terms of sustainable yields and genetic

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<sup>35</sup> Ibid.

<sup>36</sup> The national herbarium at IRST is supposed to include all plants species in Rwanda.

<sup>37</sup> REMA op cit note 3 at 53-54.

<sup>38</sup> RoR op cit note 33 at 22.

<sup>39</sup> Mathieu Rouget, David M Richardson & Richard C Cowling 'The current configuration of protected areas in the Cape Floristic Region, South Africa - reservation bias and representation of biodiversity patterns and processes' 112 *Biological Conservation* (2003) at 129–145; Marcello F Tognelli, Pablo Ramirez de Arellano & Pablo A Marquet 'How well do the existing and proposed reserve networks represent vertebrate species in Chile?' (2008) 14 *Diversity and Distributions* 148–158.

<sup>40</sup> Mattia Cai & Davide Pettenella 'Protection outside protected areas: How are farming systems influencing biodiversity conservation in Natura 2000 areas?' (2009) available at [http://www.bioecon.ucl.ac.uk/11th\\_2009/Cai.pdf](http://www.bioecon.ucl.ac.uk/11th_2009/Cai.pdf), accessed on 29 July 2012.

resilience, is being lost and the ecological services on which agriculture depends are being degraded due to a focus on biodiversity conservation in protected areas alone.<sup>41</sup> Considering the role that agriculture plays in the country and the surface it occupies, there is therefore a need to legally establish a regime of biodiversity conservation in agricultural landscapes, both to protect biodiversity and support agricultural development and farmers.<sup>42</sup>

#### **2.2.4 Rwanda's biodiversity and agricultural threats**

With 500 people per 1km<sup>2</sup> on arable land, there is an increase in agricultural pressure on natural ecosystems and species, resulting in loss, fragmentation and degradation of habitats and species. Habitats, such as forests and wetlands have been converted into farms. 30% of Rwanda's wetlands are approximately under intensive agriculture, causing water loss, overexploitation of natural plant and animal species and the modification of the chemical composition of wetlands through agrochemical use. In addition, agriculture caused forest fragmentation and led to the isolation of plant and animal populations, which restricts their natural dispersal, and consequently increases their vulnerability to genetic erosion. Further, the introduction of high-productivity varieties caused the loss of traditional crop and livestock varieties.<sup>43</sup> Moreover, introduction of alien and invasive species, such as the water hyacinth *Eichhornea crassipes* and *Lantana camara* affected biodiversity negatively.<sup>44</sup> It is important to note that there is not sufficient research about impacts of new introduced species on native species in Rwanda.

The developments given above about the status, protection and threats of biodiversity in Rwanda brings us to examine the background of agricultural development, its relationships with biodiversity degradation and the role played by different laws.

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<sup>41</sup> 'Agriculture, biodiversity conservation and protected areas' available at <http://www.mekong-protected-areas.org/mekong/docs/tp-10.pdf>, accessed on 30 July 2012.

<sup>42</sup> Ibid.

<sup>43</sup> REMA op cit note 3 at 53-55.

<sup>44</sup> RoR op cit note 5 at 56; Freddy R Gashamura *Effects of manure from water hyacinth on soil fertility and maize performance under controlled conditions in Rwanda* (2009) 7.



## 2.3 BACKGROUND OF AGRICULTURAL DEVELOPMENT IN RWANDA

### 2.3.1 Land tenure and use system

Land tenure and use system in Rwandan agriculture and its consequences on biodiversity can be traced back to three distinct periods: the pre-colonial period, the colonial period and the post-independence period.

#### 2.3.1.1 Pre-colonial Period (before 1899)

Before the arrival of Belgian and German colonialists in Rwanda, i.e. before 1899, land was collectively owned in family groups under Rwandan customary law. Land rights were respected and passed on from generation to generation and were enjoyed under the supreme protection of the King. Family groups were divided into clans and headed by a chief, who had the power to manage the land on their behalf. Besides, land ownership relations were based on free land use and complementarity between crops and livestock.<sup>45</sup>

The chief was the person who first entered and settled a region, thus opening it for occupation and development by others. He could own vast areas and had the right to reallocate the land to other families under the regime of *Ubukonde*.<sup>46</sup> This was a system by which a person, especially from a powerful lineage, entered, cleared and developed wooded land. Its first occupation and development conferred permanent land ownership to that person's lineage. That lineage controlled land access and occupation and had power to grant plots of land to other people, called clients, in exchange for rights and obligations (fees, duties). However, that lineage had the right to evict and withdraw the land from the clients.<sup>47</sup>

In addition, the king or his chiefs had the right over the land and the power to grant grazing land to any family that reared livestock under the regime of *Igikingi*. Here, initially common grazing land was granted to some families for their exclusive use in return for fees and duties. The King or his chiefs retained usufruct and other land rights. They could expel clients and take away, confiscate or appropriate granted lands if they were abandoned. Also, the king or his chiefs could grant the abandoned land to anybody who needed it under the

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<sup>45</sup> RoR *National Land Policy* (2004) 10.

<sup>46</sup> Ibid.

<sup>47</sup> Catherine André *Rwandan Land: Access, Policy & Land Reform* (1998) 3.

system called *inkungu*, where the abandoning person could not reclaim the land. This shows that the king, his chiefs and the land pioneers could allocate the land to other people, but retained withdrawal, expulsion and some other rights.<sup>48</sup>

As the socio-political and administrative structure became stronger and better organised, the land became more important, to the point where a system was established, with a chief in charge of land, called *Umutware w'ubutaka*, and a chief in charge of livestock, called *Umutware w'umukenke*.<sup>49</sup>

Under the pre-colonial period, the main crops in Rwanda were sorghum, finger millet, taro, peas, cowpeas and bananas. Some farmers had also explored the cultivation of beans, sweet potatoes and maize on a small scale. Cropping took place mainly on small plots on the hilltops and upper slopes, while the valleys were mainly utilised for grazing, especially in the dry season.<sup>50</sup> The land could be exploited according to the capabilities of the family, and land conservation was not a concern. Due to lack of private ownership rights, the land could be exploited for cropping and grazing to the maximum possible under the regime of free land use.<sup>51</sup> Land ownership acquired through pioneering triggered the expansion of cropping lands. People, especially from powerful lineages, cleared more and more grasslands or natural forests to become land owners with the power to reallocate lands to others in exchange of fees and duties. Therefore, grasslands and forested lands diminished gradually and started degrading as a result of grazing and frequent burning for agriculture, which affected biodiversity.<sup>52</sup>

### 2.3.1.2 Colonial period (1916-1962)

With the arrival of colonialists, deep changes emerged. The first Catholic and Protestant missionaries bought land and became landowners.<sup>53</sup> A new written land-use regulation was

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<sup>48</sup> Ibid.

<sup>49</sup> RoR op cit note 44.

<sup>50</sup> Jean Niyongabo *Where Sustainable Agriculture means Agricultural Productivity? The case study of Gikongoro in Southwestern Rwanda* (Unpublished Masters' thesis, Lund University, 2004) 11.

<sup>51</sup> Catherine André op cit note 46.

<sup>52</sup> Andre Guichaoua *Destins paysans et politiques agraires en Afrique Centrale T 1 'L'ordre paysans des hautes terres centrales du Burundi et du Rwanda'* (1989) ; Jaakko Kangasniemi *People and Bananas on steep slopes: Agricultural intensification and Food security under demographic pressure and environmental degradation in Rwanda* (Unpublished PhD thesis, Michigan State University, 1998) 16.

<sup>53</sup> RoR op cit note 43 at 11.

introduced to guarantee land tenure security for settlers and foreigners wishing to invest in Rwanda. They had to apply to the colonial administration, follow the rules, conclude settlement agreements and get a land ownership certificate. Therefore, the land occupied by Rwandans remained subject to customary law, while lands acquired by missionaries and other foreigners were regulated by written law.<sup>54</sup> The written regulations granted land possession (not ownership) to native citizens over the occupied lands and all unoccupied lands belonged to the state. Selling or donating the land had to be approved by the Minister of Agriculture.<sup>55</sup> This lack of protected ownership rights from written laws continued to have negative impacts on land and biodiversity conservation. It is argued that uncertain land use rights decreases conservation due to fearing the risk of appropriation.<sup>56</sup>

During the colonial period, Rwanda was hit by many famines and droughts, prompting the colonialists to develop different policies to combat such calamities. They introduced new crops, such as cassava, Irish potato and maize, in addition to the main crops cultivated in the pre-colonial period.<sup>57</sup> Also, a new Land Decree was enacted in 1924, obliging farmers to plant these new crops on an area of 15 acres, besides 35 acres of other crops. In 1931, under the Belgian administrators another land decree was enacted and obliged farmers to plant a certain number of coffee trees, other cash crops and other trees to constitute communal forests.<sup>58</sup> The population therefore needed big plots of land compared to what they were cultivating in the pre-colonial period.<sup>59</sup> As a result, new policies gave rights to farmers to cultivate in the valleys and other unexploited lands; forests were cleared and more wetlands were exploited for agriculture.<sup>60</sup>

The 1950s was marked by a rapid population growth, which caused rapid agricultural expansion in uncultivated or natural areas. The colonial administration introduced the system of grouped homesteads, called *paysannats*, in regions with more grazing land and other land

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<sup>54</sup> Ibid.

<sup>55</sup> Herman Musahara *Improving tenure security for the rural poor: Rwanda-Country case study* (2006) LEP Working Paper 7 at 4-5.

<sup>56</sup> Daniel C Clay & Thomas Reardon *Determinants of far I-Level of Conservation Investments in Rwanda* (1994) IAAE Occasional Paper 7 at 9.

<sup>57</sup> Paragraph 2.3.1.1.

<sup>58</sup> Jean Niyongabo op cit note 49.

<sup>59</sup> Ibid.

<sup>60</sup> Jaakko Kangasniemi op cit note 51 at 17-18.

reserves, which promoted agricultural expansion.<sup>61</sup> This obviously had detrimental effects on environment and biodiversity. As different wetlands and other natural ecosystems were cleared for agriculture, the unique and special plants and animal species they accommodated were lost.

### *2.3.1.3 The post-independence period (1962 to present)*

Rwanda obtained its independence in 1962. The post-independence period can be divided into three distinct phases: before 1994, after the 1994 genocide perpetrated against the Tutsi to 2004 when a first land policy was adopted, and from 2004 till present.

#### *The pre-Genocide period (1962-1994)*

Before the 1994 genocide, districts had an important role in land administration. At the beginning of the 60s, the government put grazing areas under the authority of the districts. Thereafter, the 1970-1980 decade was characterized by intensive internal migration from the densely populated regions of Gikongoro, Ruhengeri, Gisenyi and Kibuye to the semi-arid savannas of the East (Umutara, Kibungo and Bugesera) in search of vacant land.<sup>62</sup> People migrated towards areas with new cultivation and exploitation opportunities. This migration was critical for local conservation efforts and protected areas because it resulted in substantial deforestation as well as habitat and biodiversity loss.<sup>63</sup> During this period, the government strengthened the grouped homesteads introduced by colonialists to rationalise the land use and occupation.<sup>64</sup> In addition, a statutory order, n°09/76 of 4/03/1976 on land transactions in rural areas was enacted. It authorised people to sell and buy land with the condition of retaining at least two hectares, an area below which cultivation becomes untenable.<sup>65</sup> However, this statutory order was repealed later.

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<sup>61</sup> RoR op cit note 44 at 12. Paysannat was a system of giving each household two hectares mainly to grow cash crops like coffee.

<sup>62</sup> Ibid.

<sup>63</sup> FAB Meyerson 'Population, biodiversity and changing climate' (2003) 4 *Advanced Applied Biodiversity Science* in FAB Meyerson et al 'Migration and Environment in the Context of Globalization' (2007) 4 *Frontiers in Ecology and the Environment* at 184.

<sup>64</sup> RoR op cit note 43 at 12-13.

<sup>65</sup> Catherine André op cit note 46.

At the beginning of the 80s, there were no more new lands to exploit for agriculture. Problems of land size and soil fertility reduction, food shortage and others began to appear. From the onset of the 90s the country started experiencing insufficient agricultural production, increased population pressure on natural resources, growing numbers of landless people, and conflict between agriculture, livestock and natural reserves. Additionally, the lack of proper and effective legislation, non-implementation of existing laws, and institutional land managerial failures accompanied this series of problems and contributed to unsustainable land use with inherent consequences for biodiversity.<sup>66</sup>

*The post- genocide period (1994 -2004)*

Rwanda experienced violent hostilities committed against Tutsi since 1959. Many Tutsis were killed and others left their lands and fled to neighboring countries, especially Congo, Burundi, Uganda and Tanzania. A climax to such hostilities was reached in 1994 when the Genocide against the Tutsi took place. The Genocide was stopped in July 1994 by the Rwanda Patriotic Front. Rwanda thereafter experienced the biggest refugee returns of roughly 700,000 Tutsis from different neighboring countries.<sup>67</sup> The returnees had rights to land where they could resettle and produce. The Arusha Peace Accords recognized that the right to property is a fundamental right for all Rwandans. Consequently, the returnees had the right to repossess their properties. However, it was recommended that to promote social harmony and national reconciliation, refugees who fled the country more than 10 years previously should not reclaim their properties subsequently occupied by other individuals.<sup>68</sup> The government was required to release all unoccupied land identified by the Repatriation Commission and resettle the repatriated persons.<sup>69</sup> Besides, every returnee had a right to settle in any area of his/her choice in the country, as long as he/she does not infringe others' rights.<sup>70</sup>

In the first place, some returnees provisionally occupied abandoned land and others received plots of land on public and vacant lands for resettlement and production. These lands included Umutara Game Reserve (two thirds of the Akagera National Park); the

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<sup>66</sup> RoR op cit note 44 at 14; Catherine André op cit note 46.

<sup>67</sup> John W Bruce *Returnee land access: lessons from Rwanda* (2007) *Humanitarian Policy Group* at 1.

<sup>68</sup> Article 4 Arusha Peace Accords.

<sup>69</sup> Article 3 Arusha Peace Accords; See also Republic of Rwanda op cit note 48 at 13.

<sup>70</sup> Article 2 Arusha Peace Accords.

Gishwati Mountain Forest; land belonging to certain state-owned projects; communal lands, woody areas, pastures and areas near marshlands.<sup>71</sup> This massive loss of habitat had devastating effects on biodiversity. As examples, the Akagera National Park lost 15% of the tree and shrub species, 20% of the herbaceous species and unnumbered wildlife species due to different factors, but mainly to overgrazing and agriculture encroachment.<sup>72</sup> Gishwati lost most of its different species of primates (Chimpanzees, Golden monkeys, and so on).<sup>73</sup> Population pressure on biodiversity resources was accompanied by lack of adequate land legislation, which became real impediments to rational land use and soil conservation. The land-related laws of that period neither specified the standards of land use nor gave economic or monetary value to the land.<sup>74</sup>

*2004 till present: The 2004 land policy, 2005 and 2013 land laws*

In 2004, a national land policy was adopted with the main objective of establishing a system that guarantees land tenure security for all Rwandans. The policy gives guidance to the necessary land reforms in order to achieve rational land management and use.<sup>75</sup> One year later in 2005, the Organic Law n°08/2005 of 14/05/2005 determining the use and management of land in Rwanda was adopted.

The 2005 land law had the main objective of establishing rules governing land ownership rights and had initiated the concept of land consolidation in agriculture in order to improve land management and productivity.<sup>76</sup> It required land owners to exploit their lands in accordance with land conservation laws and regulations, with implications for agriculture.<sup>77</sup> However, laws and regulations of this type were very few, which hindered good land management and conservation. It also established land administration institutions, which was a good step in land management.

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<sup>71</sup> Ibid. Akagera National Park was 2677, 41 square km before 1994 and is currently 1021,29 square km.

<sup>72</sup> Chemonics International op cit note 13 at 6.

<sup>73</sup> Elias Nyandwi & Adria Mukashema *Participatory Geographic Information Systems (P-GIS) for natural resource management and food security in Africa* (2011) at 1.

<sup>74</sup> RoR op cit note 44 at 14.

<sup>75</sup> Ibid at 20.

<sup>76</sup> Article 20 of 2005 Land Law.

<sup>77</sup> Article 61 of 2005 Land law.

The 2005 land law was repealed in 2013 and replaced by a new land law. The new land law regulates the modalities of allocation, acquisition, transfer, use and management of land in Rwanda.<sup>78</sup> Like the 2005 land law, the 2013 land law provides for land consolidation in agriculture, establishes land administration institutions, and obliges land owners to conserve their lands in accordance with contracts made between them and the state. However, the law is much concerned with land rights' protection and land use for productivity; conservation is not provided in details to facilitate land use and soil conservation in agriculture.

These developments in land tenure and use system clearly indicate the continuous increase of the land under cultivation, which was not adequately controlled by the law. This resulted in land fragmentation, reduction of farm sizes and continued intensive land cultivation.<sup>79</sup> Currently, the land is intensively and unsustainably exploited, which causes land degradation marked by soil erosion, soil infertility and biodiversity loss.<sup>80</sup> This too necessitated changes in crop species, cropping systems and livestock species to achieve high productivity.<sup>81</sup> However, these changes were not coupled with effective regulatory measures to control their effects on biodiversity.

### **2.3.2 Water use system**

From the colonial period, there were very few water-related laws. The first is the 1914 ordinance determining the protection of lakes and streams against pollution. It obliged local authorities to create protected areas around lakes and streams used or which can be used to supply drinking water.<sup>82</sup> Different activities, including agriculture, were prohibited in those protected areas.<sup>83</sup> However, the 1914 ordinance was much concerned with the drinking water supply not with water conservation. The second is the regulation of 21/12/1952 establishing measures to protect underground aquifers, lakes and rivers against pollution. It regulated water mismanagement and controlled the exercise of use and occupancy rights. This ordinance obliged any person intending to carry out activities likely to affect underground aquifers, lakes and rivers, or activities of water withdrawal and water distribution for different

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<sup>78</sup> Article 1 of law n°43/2013 of 16/06/2013 governing land in Rwanda *O G* n° Special of 16/06/2013.

<sup>79</sup> RoR *Building capacity for sustainable land use and management in Rwanda* (2007) 9.

<sup>80</sup> *Ibid* at 13.

<sup>81</sup> RoR *Statistical Yearbook* (2011) 94.

<sup>82</sup> Article 1 of the regulation of 1914 on the protection of lakes, streams and parts of streams against pollution.

<sup>83</sup> Article 2 and 3 of regulation of 1914 on the protection of lakes, streams and parts of streams against pollution.

purposes, including agriculture, to acquire authorisation.<sup>84</sup> However, this has not been effectively implemented.

Today, the laws that apply to water conservation include the 2005 Environmental Framework Law and the 2008 Water Law. The Environmental Framework Law contains few provisions on the general protection of water which are not effectively implemented as will be outlined in chapter four. A specific water Law was adopted in 2008. It establishes the principles applicable to water protection and establishes three regimes of water management, which are discussed in chapter four.<sup>85</sup> There is no express list of activities subject to the three regimes; the law considers their impacts on the water flow, quality, quantity, wetlands, health, public security and aquatic environment diversity. Such activities obviously include agricultural activities, like irrigation, unsustainable use of agrochemicals in areas adjacent to water bodies, wetlands drainage and so on. The water law is supplemented by different regulations that facilitate its implementation.<sup>86</sup>

Despite the existing water legislation, Rwandan water resources are under pressure due to the speedy population growth and the agricultural intensification.<sup>87</sup> Most of research participants reported that wetlands are under intensive exploitation for agriculture and drainage; and consequently water and biodiversity are affected quantitatively and qualitatively.<sup>88</sup> In addition, as Rwandan agriculture is mainly rain-fed, it is exposed to climate fluctuation problems. The government is currently making efforts to promote irrigation, including hillside irrigation, especially in the dry lands of the Eastern Province, to increase food security.<sup>89</sup> However, such efforts are not accompanied by changes in water use management patterns.<sup>90</sup>

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<sup>84</sup> Article 1 of Regulation of 1952.

<sup>85</sup> Article 5, 32-47 of the law n° 62/2008 of 10/09/2008 putting in place the use, conservation, protection and management of water resources regulations *O G* n° 17 of 27/04/2009.

<sup>86</sup> These regulations are the Prime Minister's Order n° 143/03 of 24/05/2013 determining the organisation, functioning and composition of the National Water Consultative Commission, the Ministerial Order n°002/16.01 of 24/05/2013 determining the procedure for declaration, authorisation and concession for the utilisation of water, the Ministerial Order n° 004/16.01 of 24/05/2013 determining the list of water pollutants, the Ministerial Order n° 005/16.01 of 24/05/2013 determining the organisation and functioning of hydrographic basin committees, the Ministerial Order n° 007/16.01 of 24/05/2013 determining the main management visions of water resources in the main hydrographic basins in Rwanda and the Ministerial Order n° 007/16.01 of 15/07/2010 determining the length of land on shores of lakes and rivers transferred to public property *O G* n° Special of 30/05/2013 and *O G* n° 37 of 13/09/2010.

<sup>87</sup> REMA *op cit* note 3 at 2.

<sup>88</sup> Interviews with respondents 1, 3, 9 and 18.

<sup>89</sup> REMA *op cit* note 3 at 6.

<sup>90</sup> *Ibid* at 16.



In sum, agriculture affected and is affecting water resources and aquatic biodiversity, added to which water legislation mainly attempts to ensure more water supply than water conservation as explored more in chapter four.

### 2.3.3 Dynamics of agrochemicals' use

In the past, the level of agrochemicals use was low. Between 1984 and 2005 the quantities of imported agrochemicals never exceeded 8,000 tons per year, except in 1993.<sup>91</sup> In 1999, agrochemicals' imports were liberalized and private companies became more active in this sector. In 2000 the government took measures to promote private sector investment in distributing agrochemicals to farmers and customs fees for their imports were abolished.<sup>92</sup> With funding assistance from the World Bank, a credit line for agrochemicals' imports with subsidized interest rates in the context of the Rural Agricultural Markets Development Project was established. However, it was found that some agrochemicals imported by private importers were ineffective products. The government therefore reassumed responsibility for their importation. Today, existing arrangements require farmers' cooperatives and other users to commit themselves in advance of the cropping period to purchase agrochemicals, and on that basis the government plans the importation.<sup>93</sup>

As mentioned in chapter one, with the objective of pursuing agricultural development, the use of agrochemicals is increasing with the likely increase of their impacts on biodiversity. This was revealed by the highest majority of respondents who reported that the use of agrochemicals is increasing in Rwanda as a requirement to growing modern crop varieties and to increase productivity of most arable land that is no longer fertile. The respondents acknowledge that agrochemicals' use has the advantage of increasing productivity. However, they acknowledge that their use constitutes one of the causes of tensions between biodiversity conservation and agricultural development in Rwanda as expressed in the following quotes :

The use of inorganic fertilisers and pesticides has long-term negative effects on soil and water system because they not only degrade the soil but also cause pollution. Pesticides kill useful species such as bees and other pollinators.<sup>94</sup>

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<sup>91</sup> Valerie Kelly et al 'Fertiliser Consumption in Rwanda: Past Trends, Future Potential, and Determinants' (Paper presented in the Fertiliser Use and Marketing Policy Workshop held in Kigali, 2001) 2.

<sup>92</sup> RoR *Strategic Plan for the Transformation of Agriculture in Rwanda – Phase II (PSTA II)* (2009) 35-37.

<sup>93</sup> Ibid.

<sup>94</sup> Interview with respondent 1.

Such agrochemicals have the advantage of increasing productivity but they destroy the soils and biodiversity (example: in some places, the honey bees have died because of agrochemicals sprayed on crops).<sup>95</sup>

Given the continuous increase and changes in agrochemicals' use and management in Rwanda, lack of effective legal control contributed and is still contributing to biodiversity degradation.

Up to August 2012, there was no law which explicitly regulated agrochemicals. Most traders and farmers lacked enough skills in the transport, distribution and use of fertilisers, which caused negative impacts on biodiversity. It is only in August 2012 that the Agrochemicals Law n° 30/2012 of 1/08/2012 was enacted. It is also backed by different regulations that facilitate its implementation.<sup>96</sup> This law and its implementing regulations contain some provisions that are important in the protection of biodiversity against negative effects of agrochemicals' use. However, it will be argued, in chapter four, that some shortcomings still exist. In addition, there is insufficient capacity of many Rwandans, especially farmers, to handle different agrochemicals. Further, adequate facilities to transport and store agrochemicals are also not sufficient though the application of agrochemicals is continuously increasing in Rwanda. This constituted a big threat to biodiversity conservation in agricultural development activities.

### **2.3.4 Dynamics of the introduction of new seeds and livestock breeds**

The Rwandan seed sector is diverse, having both formal and informal seed systems. While the dominant informal seed system focuses on local varieties, the formal seed system focuses on improved varieties. It is the Rwanda Agricultural Board which has responsibilities for new seed multiplication and certification activities in the formal seed system. Rwanda started producing certified seeds in 1961, but this decreased in 2009 due to lack of support to private seed producers, obliging the government to rely heavily on seed imports.<sup>97</sup> Also, the

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<sup>95</sup> Interview with respondent 9.

<sup>96</sup> Prime Minister's Order n° 92/03 of 07/03/2013 determining the members of the Advisory Council on the use of agrochemicals and their responsibilities, Ministerial Order n°001/11.30 of 15/02/2013 determining the duties of the registrar of agrochemicals, Ministerial Order n°002/11.30 of 15/02/2013 determining powers and responsibilities of an inspector of Agrochemicals, Ministerial Order n° 003/11.30 of 15/2/2013 determining confidential data that are not recorded and non-confidential data to be recorded in the register of agrochemicals, Ministerial Order n° 004/11.30 of 15/02/2013 determining the requirements for obtaining business license of agrochemicals and Ministerial Order n°005/11.30 of 15/02/2013 determining fees for registration of agrochemical *O G* n° 9 of 04 March 2013 and *O G* n° 12 of 25/03/2013.

<sup>97</sup> J V Den Broek & J M Byakweli *Exploratory study on Rwanda's seed sector: options for Dutch support* (2014) 14.

government introduced the system of seed vouchers to assist farmers in obtaining seeds of improved varieties of major crops, such as maize, Irish potatoes, beans, rice and others to meet the goals of the Crop Intensification program (CIP).<sup>98</sup> But it is only in 2003 that a law on production, quality control and commercialization of plant quality seeds was enacted. As outlined in chapter four, the main concern of the 2003 seed law provisions is not conservation of biodiversity. Rather, the concern is encouraging increased private investment in the seed industry and increase improved seed varieties. This law is supplemented by some implementing regulations.<sup>99</sup> However, the rwandan seed system reveals an increased reliance on seed imports, accompanied by agrochemicals use to increase the desired outputs of imported and improved seeds. Also livestock breeding activities focus on improved and imported varieties. All this was confirmed by most of interviewees who reported that they experience an increasing reliance on imported and improved seeds and breeds of :

maize, potatoes, bananas, cassava, beans, wheat, rice, passion fruits, pineapples, soybeans, cows, pigs, goats, chickens, rabbits, among others. It is like in every type of crop and livestock variety.<sup>100</sup>

They report that the introduction of such new varieties has the advantage of increasing productivity because they grow very fast, they are more productive, and constitute the source of income generation. However, the respondents reported that such introduction is harmful to biodiversity which is declining due to replacement of local varieties by new improved and modern varieties. In addition, the use of new crop and livestock varieties relies heavily on the use of agrochemicals because they cannot resist to pests or diseases. However, agrochemicals harm biodiversity. Further, some of the new varieties cannot produce seeds to be used in future. This is a challenge to farmers who have to continually purchase new varieties, which continually replace the traditional ones. The respondents confirmed that in the process of introducing new varieties, the priority is to achieve productivity and food security; biodiversity conservation is not a concern.<sup>101</sup> Coupled with lack of conservation-oriented seed and livestock regulatory regime, the current Rwandan system of introduction of new varieties contributes to the increased loss of local or traditional varieties and biodiversity degradation as will be discussed in chapter six.

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<sup>98</sup> Ibid.

<sup>99</sup> Ministerial Order n°002/11.30 of 18/08/2010 determining regulations on quality seeds production and control of seeds produced and marketed, Ministerial Order n°003/11.30 of 18/08/2010 setting forth conditions required for marketing quality seeds, Ministerial Order n°005/11.30 of 18/08/2010 setting forth standards for processing quality seeds and Ministerial Order n°004/11.30 of 18/08/2010 determining prices for services rendered in seed quality control *O G* n°40 of 04/10/2010.

<sup>100</sup> Respondent 7.

<sup>101</sup> Respondents 4, 5, 7 and 9.

### 2.3.5 Dynamics of cropping and livestock rearing practices

Past cropping practices affected Rwanda's biodiversity negatively.<sup>102</sup> Rwandans used to grow a range of crop varieties of cereals, roots and tubers, pulses, oil crops, vegetables and fruits; all of traditional origin.<sup>103</sup> Most farmers supplemented their crops with livestock, mainly traditional cattle, goat and poultry. Crops were intercropped and this had been repeatedly shown to have multiple beneficial effects, including atmospheric nitrogen fixation, lower pest pressure, reduced erosion and efficient use of space, all of which benefited biodiversity.<sup>104</sup> A new challenge arose from the so-called 'Green Revolution for Africa', which started in 2003-2004. The green revolution concept received the African Union's approval with the adoption of Comprehensive Africa Agriculture Development Programme (CAADP).<sup>105</sup> CAADP has the goal of eliminating hunger and reducing poverty and was reinforced in 2006 by the Abuja Declaration, emerging from the Africa Fertiliser Summit.<sup>106</sup> Rwanda was the first country to sign a CAADP compact in 2007. In implementation of the 'green revolution' concept, the Rwandan government initiated a Crop Intensification Program (CIP) in 2007 to increase national food self-sufficiency and reduce food imports. The CIP establishes compulsory regional crop specialization, monoculture, and cooperativization in agriculture.<sup>107</sup>

Currently, farmers are not allowed to intercrop on individual farms, and across different regions they are asked to have uniform plantings. Marshes are under intensive cultivation and a program of land consolidation, which is also provided in the land law, was established. With land consolidation, farmers are obliged to plant the same monocultures over vast, formerly heterogeneous areas. The CIP therefore replaces native crop diversity with one or two 'improved' varieties per species over large areas.<sup>108</sup> Also, crop associations and crop rotation is being ignored. All this was confirmed by all research participants who reported that monoculture is promoted whereby specific crops are designated to be grown in specific regions and any kind of multiculture is discouraged especially where the land is consolidated. In addition, farmers are encouraged to rear few modern animal varieties and

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<sup>102</sup> REMA op cit note 3 at 29.

<sup>103</sup> NISR *National Agricultural Survey 2008 (NAS 2008)* (2010) 41.

<sup>104</sup> Manuel Milz *The Authoritarian Face of the "Green Revolution": Rwanda Capitulates to Agribusiness* (2010) 3.

<sup>105</sup> Ibid at 1.

<sup>106</sup> Abuja Declaration on Fertiliser for the African Green Revolution.

<sup>107</sup> RoR op cit note 91.

<sup>108</sup> Manuel Milz op cit note 103 at 4.

traditional livestock species are disappearing due to the introduction and focus on new species recognized to be more productive. Consequently, Rwandan crop and livestock diversity, related farmers' knowledge, food security and nutrition are endangered.<sup>109</sup> It is argued that these practices that are performed to achieve agricultural development are not governed by legal measures which should assist in controlling their effects on biodiversity, which is detrimental to biodiversity conservation in Rwanda.

### 2.3.6 Climate change issues

Although the current meteorological stations are not adequate to give full information on climate change in Rwanda, Rwanda is experiencing climate change patterns, such as changes in rainfall. Some areas experience heavy rains while others experience rain deficits.<sup>110</sup> These climate change patterns result in floods, drought, landslides, soil erosion and other disasters, which most of the research participants reported to experience in their various regions.<sup>111</sup> Rwanda is highly vulnerable to climate change as it affects agriculture and biodiversity. Climate change has caused a decrease in agricultural production, in plant and animal species and caused human displacement in search of food and pasture.<sup>112</sup> As a country that relies heavily on rain-fed agriculture, strategies to reduce vulnerability and cope with existing impacts of climate change are important.

Rwanda has ratified the UNFCCC and Kyoto Protocol and has an obligation to mitigate and adapt to climate change.<sup>113</sup> It has therefore adopted a National Adaptation Programme of Action (NAPA), which contains different priorities, objectives and targets and adaptation should be carried out in different sectors including agriculture.<sup>114</sup> Although Rwanda has adopted NAPA aiming at adaptation to climate change, adaptation merely based on policy is likely to be unsuccessful if it is not supported by legal measures that are enforced. Rwanda does not have a specific law dedicated to climate change adaptation.

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<sup>109</sup> Ibid; D Binart *Le programme d'intensification des cultures de maïs au Rwanda face au développement durable: enjeux, pratiques et perspectives. Le cas du district de Bugesera* (2009) 54 cited in Manuel Milz op cit note 103 at 5.

<sup>110</sup> REMA op cit note 3 at 98.

<sup>111</sup> Respondents 1, 5, 9, 11, 12, 14, 15, 16 18 ; Republic of Rwanda *National Adaptation Programmes of Action to Climate Change (NAPA)* (2006) 17, 29-30.

<sup>112</sup> Ibid.

<sup>113</sup> Rwanda ratified the United Nations Framework Convention on Climate Change in 1995 by the Presidential Order n° 021/01 of 30/05/1995. The Kyoto Protocol was ratified by the Law n° 36/ 2003 of 29/12/2003.

<sup>114</sup> RoR op cit note 110.

Only disparate provisions of environment-related laws can apply but in a very limited way because they do not contain necessary legal measures to facilitate adaptation to climate change as argued in chapter six. This continues to exacerbate the problem of biodiversity loss resulting from agriculture, which is recognized to contribute 78% of the total greenhouse gas emissions of Rwanda.<sup>115</sup>

### **2.3.7 Summary**

The background to Rwandan agricultural development reveals that most of the developments initiated in agriculture, and policies or laws adopted in that field were much concerned with agricultural production to ensure food security, eradicate poverty and contribute to economic growth. The consideration of biodiversity conservation in agricultural development was very limited, which gave rise to the existing tensions between biodiversity conservation and agriculture development. Further other factors that contributed to the existing tensions between these two competing sectors in Rwanda are examined below.

## **2.4 OTHER UNDERLYING FACTORS OF CONFLICT BETWEEN BIODIVERSITY CONSERVATION AND AGRICULTURAL DEVELOPMENT IN RWANDA**

### **2.4.1 Socio-economic factors**

As mentioned in chapter one, Rwanda has primarily an agricultural economy; approximately 91% of the population depends on it and 8 of 10 people are employed in agriculture.<sup>116</sup> Arable land covers about 1,385,000 hectares (52% of the total area). Due to demographic pressure, per capita land holdings are very small, averaging only about 0.6 ha per family. This has caused land overexploitation with the possibility of encroaching on the rest of unexploited natural areas as a means of survival.<sup>117</sup>

In Rwanda the majority of the population lives far below the poverty line.<sup>118</sup>

However, it is known that the prevalence of poverty has important consequences for natural

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<sup>115</sup> REMA *Guidelines to mainstream climate change adaptation and mitigation in the energy and infrastructure sector: Building a Climate Resilient Infrastructure and Energy Sector for Rwanda* (2011) 10-11; B Byamukama et al *National strategy on climate change and low carbon development for Rwanda baseline report* (2011) 6.

<sup>116</sup> NISR *Rwanda Demographic and Health Survey* (2010) 2.

<sup>117</sup> Ibid.

<sup>118</sup> NISR *The evolution of poverty in Rwanda from 2000 to 2011: Results from the household surveys (EICV)* (2012) 17.

resources or biodiversity management.<sup>119</sup> Though this relationship may be overcome in some circumstances, poor individuals depend much on biodiversity resources as their source of income, food, shelter, building materials and so on.<sup>120</sup> Thus, socio-economic factors contribute to the tensions between biodiversity conservation and agricultural development in Rwanda.

#### **2.4.2. Regional treaty and policy requirements**

Rwanda is a member of African Union and had accessed to the Agreement of Common Market for Eastern and Southern Africa (COMESA) on 1 January 2004. As a member State of COMESA, Rwanda has to recognize a critical role that agriculture plays in its national economy.<sup>121</sup> In order to raise the competitiveness of the COMESA region's agricultural sector, a number of initiatives have been put in place in line with the COMESA agricultural strategy. The latter stresses the importance of, among others, co-operation and co-ordination of regional agricultural policies, food security responses, research and development, plant and animal disease and pest control, training and irrigation development. The strategy also recognizes the need for a holistic approach that deals with key elements of agricultural development: markets, inputs, institutions and infrastructure.<sup>122</sup>

The objectives of the COMESA Treaty and the COMESA Agricultural Policy (CAP) are in line with the Comprehensive African Agricultural Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD) under the African Union (AU). CAADP was launched in 2003 in an effort to accelerate agricultural growth in the region.<sup>123</sup> CAADP is a framework for the restoration of agricultural growth, food security and rural development within an integrated and coordinated approach to alleviate poverty and eradicate hunger.<sup>124</sup>

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<sup>119</sup> C A Harvey et al *Assessing linkages and biodiversity in Central America: Historical overview and future perspectives* (2004) A report submitted to The Nature Conservancy at 36.

<sup>120</sup> Ibid.

<sup>121</sup> Available at

[http://programmes.comesa.int/index.php?option=com\\_content&view=Article&id=94&Itemid=111](http://programmes.comesa.int/index.php?option=com_content&view=Article&id=94&Itemid=111), accessed on 28 July 2012.

<sup>122</sup> Ibid.

<sup>123</sup> NEPAD-CAADP *CAADP Review: Renewing the commitment to African Agriculture* (2010) 1.

<sup>124</sup> NEPAD Secretariat *Implementing the Comprehensive Africa Agriculture Development Programme and Restoring Food Security in Africa "The Roadmap"* at 1.

Rwanda signed the CAADP compact in 2007 as the first country<sup>125</sup> and initiated a program known as the Crop Intensification Program (CIP) to increase national food self sufficiency and reduce food imports. CIP obliges compulsory regional specialization, monoculture, and grouping farmers into associations. To respond to this, the government instituted the system of land use consolidation, monoculture and rearing of modern livestock varieties.<sup>126</sup> All this, accompanied by a lack of effective agricultural and environmental laws, contribute to loss of biodiversity.

Additionally, Rwanda has been a member of the East African Community (EAC) since 12 June 2007 and has to comply with EAC laws and regulations. Chapter 18 of the EAC Treaty requires parties to cooperate in agricultural and food security matters. To this end, the parties undertake to cooperate and rationalise agricultural production with a view to promoting complementarity and specialisation in agriculture and the sustainability of national agricultural programmes.<sup>127</sup>

To implement EAC Treaty provisions as set out in Chapter 18, the EAC adopted an initial step and developed a Food Security Action Plan to address food insecurity in the region. The Action Plan aims for agricultural production and increased food availability in sufficient quantity and quality to make East Africa region a net exporter of food.<sup>128</sup> To implement the action plan, partner states have to use improved/appropriate technologies/ and inputs that are adaptive to climate change impacts (fertilisers, chemicals, farm machinery, high yielding, drought tolerant and disease resistant varieties and planting materials, feeds, animal husbandry inputs, organic manure) among others. They have also to increase veterinary materials in production systems and to use water for agricultural production increase and optimisation.<sup>129</sup> Rwanda is therefore under obligation to implement what is provided by the EAC Treaty under the guidance of the Action Plan. It has to use agrochemical inputs and regional crop specialization.

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<sup>125</sup> IFPRI *Equipping Farmer of the Future in East Africa* (2013) 7.

<sup>126</sup> Ministry of Agriculture and Animal Resources *Strategies for Sustainable Crop Intensification in Rwanda: Shifting focus from producing enough to producing surplus* (2011) 13-16.

<sup>127</sup> Article 105 (a-d), 106-110 EAC Treaty.

<sup>128</sup> East African Community *EAC food security action plan (2011 – 2015)* (2011) 27.

<sup>129</sup> *Ibid* at 31.



The problem is that implementation of these regional laws and policies have not been governed by effective national laws to control their effects on biodiversity.

Having provided the background of the development of tensions between biodiversity conservation and agricultural development in Rwanda, the following section explores why the two competing interests need to exist in harmony.

## **2.5 RATIONALE OF ESTABLISHING LEGAL MEASURES RECONCILING BIODIVERSITY CONSERVATION AND AGRICULTURAL DEVELOPMENT**

Agriculture and biodiversity are inter-linked. Without biodiversity agriculture cannot progress. Biodiversity in both wild and managed habitats is a vital resource for crop and livestock improvement. And without improved agriculture, most of the remaining habitats for wild life will be destroyed to acquire more farms, plantations, and ranches.<sup>130</sup> According to the Millenium Ecosystem Assessment Report, biodiversity plays an important role in ecosystem functions that provide supporting, provisioning, regulating, and cultural services; all important for agriculture.<sup>131</sup>

### **2.5.1 Biodiversity production services**

Biodiversity and detailed knowledge about it have allowed farming systems to evolve since agriculture began some 12,000 years ago. Agriculture is actually based on richly diverse biological resources and all domestic crop and livestock species and the variety within them originate from biodiversity.<sup>132</sup> It is recognized beyond any doubt that humans have relied on ecosystems to meet their basic food and water needs and other needs provided by natural resources.<sup>133</sup> Its maintenance is then essential for the sustainable production of food and

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<sup>130</sup> Jitendra Srivastava et al *Biodiversity and Agriculture: Implications for conservation and development* (1996) World Bank Technical Paper at vii.

<sup>131</sup> Millennium Ecosystem Assessment *Ecosystems and human well-being: biodiversity synthesis* (2005) 22.

<sup>132</sup> Genetic Resources Action International 'Biodiversity in agriculture: some policy issues' (1994) *IFOAM Ecology and Farming* at 14; Lori Ann Thrupp *Linking agricultural biodiversity and food security: the valuable role of agrobiodiversity for sustainable agriculture* (2000) 76 *International Affairs* 2 at 262.

<sup>133</sup> Manfred O Hinz & Olivier C Ruppel *Biodiversity and the ancestors: Challenges to customary and environmental law: Case studies from Namibia* (2008) 3.

other agricultural products, which ensures food security, healthy nutrition and human well-being.<sup>134</sup>

Biodiversity sustains production of goods by ensuring that the ecosystems which support production are resilient and experimental research has shown that productivity increases with high biodiversity.<sup>135</sup>

### 2.5.2 Biodiversity supporting and regulating services

Biodiversity supports other different ecosystem services, which are provided free-of-charge as a gift of nature. They include soil formation and maintenance, pests and disease control, plant pollination, water regulation, air purification, waste detoxification, climate stabilisation and climate change adaptation.<sup>136</sup> All these ecosystem services are essential to agriculture; it is therefore understood that, despite the use of modern technology, agricultural development would be impossible without the maintenance these ecosystem services render, which implies biodiversity conservation,<sup>137</sup> and thus its conservation in agricultural development is internationally advocated, as examined below.

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<sup>134</sup> COP Programme of Work on Agricultural Biodiversity: Options for a cross-cutting initiative on biodiversity for food and nutrition (2006) 2; FAO 'Climate Change and Human Health' available at <http://www.who.int/globalchange/ecosystems/biodiversity/en/index.html>, accessed on 22 September 2011; IIED Hidden harvest project overview: sustainable agriculture programme (1995) cited in Lori Ann Thrupp op cit note 131 at 273; Secretariat of the Convention on Biological Diversity *Biodiversity and Agriculture: Safeguarding Biodiversity and Securing Food for the World* (2008) 13; Shiva *The Green Revolution in the Punjab* (1991) 21 *The Ecologist* 2.

<sup>135</sup> Levin et al 'Resilience in natural and socio-economic systems' (1998) 3 *Environment and Development Economics* 2 at 222-234 cited by Marcello Basili, Maurizio Franzini & Alessandro Vercelli *Environment, inequality and collective action* (2006) 140-143 (Resilience is measured by the capacity of a system to retain the productivity after disturbance).

<sup>136</sup> Craig Bullock, Carol Kretsch & Enda Candon *The economic and social aspects of biodiversity benefits and costs of biodiversity in Ireland* (2008) Governmental Report at 7; F Stuart Chapin III et al *Consequences of changing biodiversity* (2000) 105 *Nature* at 438; Gardiner MM et al 'Landscape diversity enhances biological control of an introduced crop pest in the north-central USA' (2009) 19 *Ecological Applications* 1 at 143; FAO 'Pollination in Agriculture' available at <ftp://ftp.fao.org/docrep/fao/010/ai759e/ai759e02.pdf>, accessed on 23 September 2011; M J Swift et al 'Biodiversity and ecosystem services in agricultural landscapes—are we asking the right questions?' (2004) 104 *Agriculture Ecosystems and Environment* 113 at 123; H Rashid Hassan, S Robert & A Neville *Ecosystems and human well-being: Current state and trends: Findings of the condition and trends Working Group of the Millennium Ecosystem Assessment* (2005) 425.

<sup>137</sup> Craig Bullock, Conor Kretsch & Enda Candon op cit note 135 at 7; Secretariat of the Convention on Biological Diversity op cit note 133 at 26.

## **2.6 DEVELOPMENTS ON RECONCILING BIODIVERSITY CONSERVATION AND AGRICULTURAL DEVELOPMENT AT INTERNATIONAL LEVEL**

Conservation of biodiversity in harmony with agricultural development was addressed several times by the international community, mainly through the activities of the Food and Agriculture Organization (FAO) and under implementation of the Convention on Biological Diversity (CBD).

### **2.6.1 Agriculture, biodiversity conservation and the FAO**

FAO is a specialised United Nations agency with the mandate to raise levels of nutrition, improve agricultural productivity, improve the lives of rural populations and contribute to the growth of the world economy. To meet growing needs for food, FAO supports agricultural programs and projects and encourages a balance between increased production and environmental and sustainability concerns, which implies biodiversity conservation. FAO plays an important role in the use of biodiversity components such as water, land and genetic resources in agricultural activities.

In 1991, FAO and the Netherlands Ministry of Agriculture held a Conference on Sustainable Agriculture and Rural Development in Den Bosch, the Netherlands.<sup>138</sup> The Conference recognized the challenge for agriculture to feed the growing number of people from a natural resource base that was already seriously threatened by unsustainable farming practices. At the conference, a number of fundamental changes considered necessary were discussed and the following essentials were recognised:

- active involvement of rural people in the research and development of integrated farm management systems maintaining the essential biological processes;
- improved land-use rights;
- investments in enhancing and conserving natural resources;
- encouraging demand and promoting production of indigenous crops and animals that can be produced and processed sustainably; and
- promoting practices that safeguard human health and environmental quality.<sup>139</sup>

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<sup>138</sup> C Van Beuningen & B Haverkort 'FAO moves into sustainable agriculture' available at <http://www.agriculturesnetwork.org/>, accessed on 26 March 2015.

<sup>139</sup> Ibid.

The conference launched the International Cooperative Framework for Sustainable Agriculture and Rural Development (SARD), which is known to support the integration of sustainability criteria in the programs and activities of the FAO.<sup>140</sup>

Between 1991 and 2001, FAO undertook different activities aiming at the fight against hunger, but also taking into consideration the issue of environment (and biodiversity) conservation.<sup>141</sup> In 2001, FAO Conference adopted the legally binding International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), which entered into force in 2004.<sup>142</sup> As discussed in chapter three, the ITPGRFA encourages sustainable agriculture through the equitable sharing of genetic material and its benefits among plant breeders, farmers and public and private research institutions.

In addition, FAO intervenes in the development of methods suitable to use in soil conservation, such as soil reclamation, improved management of arid and semi-arid soils and others. It also helps member states to manage water resources in a sustainable way, through the International Action Plan on Water and Sustainable Agricultural Development.<sup>143</sup>

Further, FAO intervenes in the sustainable use of agrochemicals. In 1993, it launched its renamed Fertiliser Programme and the Plant Nutrition Programme, which focuses on the application of Integrated Plant Nutrition Systems (IPNS). FAO encourages IPNS activities at the farm level, by encouraging farmers to use manure, crop residues, mineral, and naturally occurring (soil) nutrients.<sup>144</sup> It has also adopted the International Code of Conduct on the Distribution and Use of Pesticides, which determines possible hazards and establishes standards to be respected in the regulation, distribution, and use of pesticides.<sup>145</sup> All these above-mentioned and other initiatives of FAO aim to increase agricultural productivity and eradicate hunger, applying the sustainability concept, which implies conservation of biodiversity.

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<sup>140</sup> FAO *Sustainable development and the environment: FAO policies and actions Stockholm 1972 - Rio 1992* (1994).

<sup>141</sup> Ibid.

<sup>142</sup> Available at <http://www.fao.org/AG/cgrfa/itpgr.htm>, accessed on 30 July 2012.

<sup>143</sup> FAO 'Water resources, development and management service' available at <http://www.fao.org/landandwater/aglw/mandate.stm#wasad>, accessed on 24 October 2011.

<sup>144</sup> Ibid.

<sup>145</sup> Ibid.

## 2.6.2 Biodiversity conservation, agriculture and CBD implementation

The Conference of the Parties (COPs) to the CBD, in its different meetings, considered different issues related to interlinkages between biodiversity conservation and agriculture under the Agricultural Biodiversity programme.

### 2.6.2.1 COP 1 and 2

The 1994 first COP recommended considering conservation and sustainable use of agricultural biodiversity at its third meeting.<sup>146</sup> At its second meeting, the COP considered the Global System for the Conservation and Utilisation of Plant Genetic Resources for Food and Agriculture developed by country members of the FAO and recommended strengthening that system.<sup>147</sup>

### 2.6.2.2 COP 3

COP 3 addressed the issue of conservation and sustainable use of agrobiodiversity. It established a related multi-year programme of activities with different goals, including promotion of best agricultural practices, identification and conservation of key biodiversity components found in agro-ecosystems responsible for maintaining ecological functions and discouragement of destructive agricultural practices in agro-ecosystems.<sup>148</sup> Besides, COP 3 called for building the capacity of indigenous and local communities in *in situ* conservation of agrobiodiversity, promotion of the use of indigenous knowledge, and research and development partnerships between indigenous or local communities, researchers, extension workers and farmers. Further, it called for introduction of necessary measures, including legislation for appropriate use of agrochemicals and discouraged excessive dependence on them.<sup>149</sup>

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<sup>146</sup> Decision I/9 of COP 1.

<sup>147</sup> Decision II/15 of COP 2.

<sup>148</sup> Decision III/11 of COP 3.

<sup>149</sup> Ibid.

### 2.6.2.3 COP 4 and 5

COP 4 emphasised the need for a worldwide reorientation towards sustainable agriculture that balances production and conservation objectives to meet the needs of expanding populations, while maintaining an ecological balance.<sup>150</sup>

COP 5 adopted a programme of work to further implement COP 3 decision on agricultural biodiversity and emphasised the need to promote best agricultural practices and reduce negative impacts of agriculture on biodiversity in agro-ecosystems. Cop 5 also encouraged promotion of and support to conservation and sustainable use of genetic resources of actual and potential value for food and agriculture and farm animal genetic resources.<sup>151</sup>

### 2.6.2.4 COP 6, 7 and 8

COP 6 called for the implementation of the agrobiodiversity programme of work, the International Pollinator Initiative, soil biodiversity, animal genetic resources, trade liberalization and genetic use restriction technologies.<sup>152</sup>

COP 7 noted the progress made in the implementation of the work programme on agrobiodiversity. A number of ongoing and related initiatives were welcomed, and COP 7 called for further implementation of provisions of the work programme on agrobiodiversity. It recognised the importance of the International Treaty on Plant Genetic Resources for Food and Agriculture.<sup>153</sup>

COP 8 adopted the framework for a cross-cutting initiative on biodiversity for food and nutrition and on the conservation and sustainable use of soil biodiversity. It called for identification of research activities and addressing knowledge gaps on soil biodiversity and their implications for land use practices.<sup>154</sup>

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<sup>150</sup> Decision IV/6 of the COP 4.

<sup>151</sup> Decision V/5 of COP 5.

<sup>152</sup> Decision VI/5 of COP 6.

<sup>153</sup> Decision VII/ 3 of COP 7.

<sup>154</sup> Decision VIII/23 of COP 8.

### 2.6.2.5 COP 9 and 10

COP 9 supported the implementation of the work programme on agrobiodiversity and requested parties to establish and use methods for assessing and monitoring status and trends of agrobiodiversity. It invited FAO and other relevant organizations to compile and disseminate information related to the positive and negative impacts of agricultural practices and policies on biodiversity and best practices for sustainable use of ecosystem goods and services in agriculture. It also recommended the use of the ecosystem approach in agriculture and called for effective public participation. COP 9 further called for consideration of conservation and sustainable use of agrobiodiversity in climate change adaptation and mitigation planning in agricultural areas.<sup>155</sup>

COP 10 called for studies on the valuation of the biodiversity and ecosystem services provided by agricultural ecosystems, consistent in harmony with the CBD and other important international obligations. It called for support of farmers in *in-situ* conservation of traditional and local varieties, races, breeds and their efforts in conserving crop wild relatives.<sup>156</sup>

As a member to the FAO and party to the CBD, Rwanda can refer to the guidance provided by the above outlined different COP decisions and FAO initiatives.

## 2.7 CONCLUSION

This chapter provided a historical background of the development of tensions between biodiversity conservation and agricultural development in Rwanda. It was found that despite the existence of a rich natural and agricultural biodiversity in Rwanda, the latter has been continuously being negatively impacted by agricultural development. The analysis and findings from conducted interviews revealed that this resulted in the historical development of the land tenure system, water use system, dynamics in agrochemicals's application, introduction of new crop and livestock varieties, adoption of new agricultural practices and consideration of climate change; all coupled with a lack of effective regulatory environmental framework to control the impacts of these agricultural practices on biodiversity. The chapter

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<sup>155</sup> Decision IX/1 of COP 9.

<sup>156</sup> Decision X/34 of COP 10.

highlighted other factors -socio-economic, regional treaty and policy requirements- underlying the tensions between biodiversity conservation and agricultural development in Rwanda. However, it was argued that without biodiversity, agriculture cannot survive. In Rwanda, biodiversity needs to be conserved in agricultural activities and the effective legal measures that contribute to the reconciling of these two competing interests are necessary. It was found that the international community recognises the importance of aiming at both agricultural production and biodiversity conservation as reflected in different FAO programmes and activities and in the implementation of the CBD's agrobiodiversity programme.

The following chapter examines the role that different international environmental conventions, which Rwanda has ratified, play with regards to agricultural development in harmony with conservation of biodiversity and the way Rwanda adheres to its obligations from such conventions.



**CHAPTER THREE:**  
**THE INTERNATIONAL LEGAL AND INSTITUTIONAL FRAMEWORK FOR THE**  
**REGULATION OF BIODIVERSITY CONSERVATION IN THE AGRICULTURAL**  
**SECTOR**

### **3.1 INTRODUCTION**

The international legal framework for biodiversity conservation in agriculture is laid down in different multilateral environmental agreements, which seek to reconcile exploitation and conservation of biodiversity. These contain provisions that directly or indirectly contribute to the conservation of biodiversity in harmony with development of agriculture. This chapter discusses such obligations and their level of implementation in Rwanda as Article 190 of the Rwandan Constitution gives ratified international agreements a high status in the legal hierarchy.<sup>1</sup> Their implementation requires the efforts of individual countries but such efforts alone are not sufficient. They are mostly supplemented by efforts of some international institutions collaborating with national partners. This chapter also discusses those international institutions supporting efforts of individual countries and contributing to the prevention of tensions between agriculture and biodiversity conservation.

### **3.2 BIODIVERSITY CONSERVATION AND AGRICULTURE UNDER INTERNATIONAL ENVIRONMENTAL AGREEMENTS**

#### **3.2.1 The Convention on Biological Diversity (CBD)**

The CBD was adopted at the 1992 United Nations Conference on Environment and entered into force on 29 December 1993. Rwanda signed the CBD on 10 June 1992 and ratified it on 29 May 1996. Rwanda also ratified the Cartagena Protocol on Biosafety (Cartagena Protocol) to the CBD on 29 December 2003.

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<sup>1</sup> Article 190 of the Constitution states:

Upon their publication in the official gazette, international treaties and agreements which have been conclusively adopted in accordance with the provisions of law shall be more binding than organic laws and ordinary laws except in the case of non compliance by one of parties.

### 3.2.1.1 Objectives

The CBD has three main objectives as stated in its first Article: conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

### 3.2.1.2 The CBD and agriculture

There is no direct reference to agriculture in the CBD text. Despite this, there is currently a emphasis on agriculture and agricultural biodiversity in its ongoing implementation process,<sup>2</sup> because biodiversity conservation that focuses on protected areas was criticised for being incomplete. Such a narrow focus fails to incorporate all perspectives, particularly those of local people and of the agricultural sector.<sup>3</sup> Also, the way some obligations are formulated lead to the inclusion of agriculture in the CBD's implementation, as examined in the following discussions.

#### *Sustainable use of biodiversity*

Sustainable use is one of the three objectives of the CBD and is set out in Article 10.<sup>4</sup> Sustainable use of biodiversity means the use of biodiversity components in a way and at a rate that prevents the long-term decline of biodiversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.<sup>5</sup>

Thus, the CBD requests country parties to:

- consider both conservation and sustainable use of biological resources in their decision-making;
- adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biodiversity;

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<sup>2</sup> David Wood & J M Lenn 'Received wisdom' in agricultural land use policy: 10 years on from Rio (2005) 22 *Land Use Policy* 75 at 78.

<sup>3</sup> Seth Shames and Sara J Scherr *Agriculture and the Convention on Biological Diversity: guidelines for applying the ecosystem approach, eco agriculture* Discussion Paper Number 4 (2009) 6.

<sup>4</sup> Alexandre Kiss and Dinah Shelton *International environmental law* 3 ed (2003) 359.

<sup>5</sup> Article 2 CBD.

- protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements;
- support local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced; and
- encourage cooperation between governmental authorities and the private sector in developing methods for sustainable use of biological resources.<sup>6</sup>

The way the obligations of ‘sustainable use’ are formulated leads to its automatic application to agriculture. The biological resources exploited by agriculture, such as soil, water, crops and animal species thus have to be considered in national decision-making. This influences the actions of all groups of society involved in the agricultural sector, including government, industries and individuals, and has implications for the efficiency and sustainability of use.<sup>7</sup> Also, as unsustainable agricultural practices cause harmful impacts, like soil, water and air pollution, countries have to adopt measures avoiding or minimizing their impacts on biodiversity. For example, they can adopt measures on the reduction of agrochemicals’ use, revegetation, and so on.<sup>8</sup> Besides, the CBD recognises the close link between customary practices, including agricultural practices, and sustainable use of biodiversity. For a long time, local populations have developed agricultural practices that are compatible with the conservation and sustainable use of biodiversity and these should be protected and encouraged.<sup>9</sup> Further, where degradation of ecosystems has been caused by agricultural activities, parties have to encourage local populations to adopt remedial measures in their agricultural activities as an inherent necessity.

As set out in chapter four, in Rwanda, the obligation to sustainably use biodiversity is not effectively regulated, despite biological resources being impacted by agriculture as demonstrated in chapter two.<sup>10</sup>

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<sup>6</sup> Article 10 (a-e) CBD.

<sup>7</sup> Secretariat of the Convention on Biological Diversity *Agricultural biological diversity* (UNEP/CBD/SBSTTA/10 (1996) 19.

<sup>8</sup> *Ibid* at 20.

<sup>9</sup> *Ibid*. The consideration of traditional practices is also recognized in article 8 (j), 18 (4) and 17 (2) CBD.

<sup>10</sup> See section 2.3.

*Adoption of conservation measures (in-situ and ex-situ)*

In-situ conservation measures

*In-situ* conservation is defined by the CBD as the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surrounding where they have developed their distinctive properties.<sup>11</sup>

Article 8 of the CBD provides for a wide range of *in-situ* conservation measures to be taken to conserve biodiversity. They include the:

- establishment of protected areas;
- protection of ecosystems and natural habitats and populations of species;
- regulation and management of biological resources both inside and outside protected areas;
- rehabilitation of degraded areas;
- recovery of species;
- prevention of introduction of invasive and alien species into the natural environment, which is of particular value for biodiversity *in-situ* conservation;
- protection of threatened species and populations; and
- regulation or management of processes and activities that threaten biodiversity.<sup>12</sup>

Though Article 8 of the CBD is largely devoted to conservation outside agricultural areas, its provisions apply to considerations of the conservation of agricultural biodiversity. Biodiversity should be integrated into agriculture as a way towards sustainable agricultural production.<sup>13</sup> The conservation of agricultural biodiversity involves the conservation of species on-farm and maintaining viable populations of crops and livestock breeds in the farming landscapes where they have been selected and developed by farmers.<sup>14</sup>

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<sup>11</sup> Article 2 CBD.

<sup>12</sup> Article 8 (a, c, d, f, h and l) CBD.

<sup>13</sup> Secretariat of the Convention on Biological Diversity op cit note 7 at 15.

<sup>14</sup> Secretariat of the Convention on Biological Diversity *Biodiversity and agriculture: safeguarding biodiversity and securing food for the world* (2008) 32; The Secretariat of the Convention on Biological Diversity *Agricultural biological diversity: on-farm management of crop genetic diversity* (2001) 4.

Furthermore, Article 8(j) provides for the recognition of the traditional or indigenous practices used by farmers for a long time and which have contributed to the conservation of biodiversity on their farms. Modern farming practices too have to be considered as part of *in-situ* conservation measures. Such practices are characterized by the introduction of genetically modified organisms and alien species into the environment and the heavy use of agrochemicals.

In Rwanda, the *in-situ* conservation obligation is implemented in a limited way as mentioned in chapter two. First, Rwandan protected areas have been established by law, but these have been encroached by different activities, mainly agricultural ones.<sup>15</sup> Second, there is no legal support for diversity of plants and animals on-farm. Instead, promotion of monoculture and introduction of modern seeds and breeds contributes to the reduction of diversity of crops and animals on-farm. This may be aggravated by the land consolidation system. Third, the Rwandan legislation does not ensure effective conservation of local varieties and local farming practices.

#### Ex-situ conservation measures

The CBD requires *ex-situ* conservation, which is defined as the conservation of components of biological diversity outside their natural habitats.<sup>16</sup> It is the process of protecting an endangered plant or animal species by removing it from a threatened habitat and placing it in a new location, either in a wild area or within the care of humans.<sup>17</sup> In agriculture, *ex-situ* conservation measures help maintain domesticated plants that cannot survive in nature without human intervention.

In Rwanda, the institution in charge of carrying out *ex-situ* conservation measures in relation to agricultural biological resources is the Rwanda Agricultural Board. However, local crops and animal breeds of less interest to food security are not given priority compared to the main crops for food security, resulting in the disappearance of threatened local varieties as discussed in chapters four and six.<sup>18</sup>

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<sup>15</sup> See paragraph 2.2.3.1.

<sup>16</sup> Articles 2 and 9 (d) CBD.

<sup>17</sup> Lyle Glowka et al A Guide to the Convention on Biological Diversity Environmental Policy and Law Paper no. 30 (1994) at 25.

<sup>18</sup> RoR *Fifth National report to the Convention on Biological Diversity* (2014) 58; Paragraphs 4.2.8 & 6.3.

### *Creation of incentives*

The CBD explicitly acknowledges the importance of using incentive measures to promote biodiversity conservation,<sup>19</sup> while allowing for the economic viability of individual stakeholders.<sup>20</sup> Incentives for biodiversity conservation in agriculture are used in attempts to reduce conflicts between agriculture and biodiversity conservation.<sup>21</sup> They can help to prevent over-production, increase, or at least maintain, on-farm biodiversity with less financial strain on landowners.<sup>22</sup> Incentives have also proved successful at creating new jobs and increasing farm income.<sup>23</sup>

In agriculture, incentive measures may include grants to land-owners to maintain land in ways that allow rare plants to survive, tax deductions or donations for conservation reasons, subsidies, compensation payments and so on.<sup>24</sup> Conversely, the CBD also envisages disincentives, e.g. user fees and a high rate of charges for activities that are damaging to biodiversity. In agriculture, this could be aimed at irrigation activities, introduction of harmful agrochemicals, and so forth.

In Rwanda, the legislation limitedly provide for incentives encouraging farmers to conserve biodiversity in their agricultural activities. Instead, some agricultural policies provide for perverse incentives, which hinder biodiversity conservation in agricultural activities, as discussed in chapter two and seven.<sup>25</sup>

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<sup>19</sup> Article 11 CBD.

<sup>20</sup> Klaus Henle et al 'Identifying and managing the conflicts between agriculture and biodiversity conservation in Europe-A Review' (2008) 124 *Agriculture, Ecosystem & Environment* 60 at 66.

<sup>21</sup> Juliette Young 'Towards sustainable land use: identifying and managing the conflicts between human activities and biodiversity conservation in Europe' (2005) 14 *Biodiversity and Conservation* 1641 at 1652.

<sup>22</sup> Ibid.

<sup>23</sup> Morris & Young 'Towards Environmentally Beneficial Farming? An evaluation of the Countryside Stewardship Scheme'(1997) 82 *Geography* 305-316.

<sup>24</sup> Charles Perrings & Madhav Hagdil *Conserving Biodiversity: Reconciling local and Global Public Benefits* Case Studies at 542.

<sup>25</sup> Paragraph 2.3.5 & 7.4.

### *Public education and awareness*

CBD State parties have to promote and encourage the understanding of the importance of, and the measures required for, the conservation of biodiversity.<sup>26</sup> A number of approaches, such as integrating biodiversity into school curricula, and tools, such as videos, advertisements, games and computer programmes can work in this context.<sup>27</sup> Therefore, the public needs to be educated about the importance of conserving biological diversity in agricultural activities, made aware of the multi-functionality of agriculture, and the connectedness of biodiversity, ecosystem functioning and agriculture.<sup>28</sup>

In Rwanda, the obligation of public education and awareness can be fulfilled nationally through a combination of formal and informal education. In the Rwandan formal education, biodiversity conservation is raised only at a limited level in higher educational and research institutions, and little research on the topic is conducted. At primary and secondary school levels, awareness about biodiversity and the introduction of environmental courses in educational curricula are still in their early stages and has no legislative basis.

With regards to informal education, institutions like the Rwanda Environment Management Authority (REMA), the Rwanda Natural Resources Authority (RNRA), the Rwanda Development Board (RDB) and the Rwanda Standards Board (RSB), discussed in chapter four, conduct informal public education and awareness about conservation of the environment and biodiversity in all sectors, including agriculture as required by the establishing laws.<sup>29</sup> In addition, the national media tends to provide, albeit limited, coverage of environmental issues, including biodiversity conservation in different sectors, including agriculture. Some transmissions on radios and televisions are organized by the Ministry of Natural Resources (MINIRENA), REMA and RDB. However, lack of information about biodiversity-related issues, especially those related to the conflict between biodiversity conservation and agricultural development, limits these debates.

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<sup>26</sup> Article 13 CBD.

<sup>27</sup> Peter Herkenrath 'The Implementation of the Convention on Biological Diversity-A non-government perspective ten years on' (2002) 11 *Review of European Community International Environmental Law* 1 at 35.

<sup>28</sup> FAO *Biodiversity for food and agriculture: contributing to food security and sustainability in a changing world* (Outcomes of an Expert Workshop held by FAO and the Platform on Agrobiodiversity Research (14–16 April 2010, Rome, Italy) 48.

<sup>29</sup> Article 3 of the Law creating REMA, Article 4 of the Law establishing Rwanda Development Board; Article 4 of the Law establishing Rwanda Natural Resources Authority; Article 4 of the Law establishing Rwanda Standards Board.

Besides, education, awareness and research about environmental and biodiversity conservation in all sectors are performed, facilitated and supported by local and regional NGOs, such as Rwanda Environment Conservation Organisation (RECOR),<sup>30</sup> the *Association Rwandaise des Ecologistes* “ARECO-RWANDA NZIZA”,<sup>31</sup> *Action pour la Protection de l’Environnement et la promotion des Filières Agricoles* (APEFA)<sup>32</sup> and the Albertine Rift Conservation Society (ARCOS). The interviewees reported that environment conservation NGOs advocate for sustainable use of natural resources - soil, water, plants and animal species - and encourage conservation-oriented activities. They reported that they encourage sustainable agriculture.<sup>33</sup>

### *Impact Assessment*

The CBD requires state parties to introduce procedures that require impact assessments of proposed projects likely to have significant adverse impacts on biodiversity.<sup>34</sup> They are also required to introduce appropriate arrangements to ensure that the environmental consequences of programmes and policies likely to have significant adverse impacts on biodiversity are duly taken into account.<sup>35</sup> This obviously applies to agriculture-related projects, activities, programmes and policies, such as those aiming at homogenization of cultures and livestock, heavy use of agrochemicals, agriculture intensification in marginal lands and the spread of uniform modern varieties.<sup>36</sup> Before undertaking all these agricultural practices, their likely impacts on biodiversity have to be evaluated.

In Rwanda, EIA is provided for in the Environmental Framework Law and two implementing ministerial regulations.<sup>37</sup> These are the Ministerial Order n° 003/2008 of 15/08/2008 and the Ministerial Order n° 004/2008 of 15/08/2008.<sup>38</sup> Agriculture and animal

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<sup>30</sup> RECOR is registered with civil personality, Ministerial Order n° 126/11 of Oct 2004 modified by the Ministerial order n° 63/11 of 18/04/2008.

<sup>31</sup> Association Rwandaise des Ecologistes means Rwandan Association of Ecologists.

<sup>32</sup> This is translated in English as: Action for Environment Protection and Promotion of Agricultural Activities.

<sup>33</sup> Respondents 1, 2 and 18.

<sup>34</sup> Article 14 (1) (a) CBD.

<sup>35</sup> Article 14 (1) (b) CBD.

<sup>36</sup> Lori Ann Thrupp ‘Linking agricultural biodiversity and food security: the valuable role of agrobiodiversity for sustainable agriculture’ (2000) 76 *International Affairs* 265 at 275.

<sup>37</sup> Article 67 and 68 Environmental Framework Law.

<sup>38</sup> Ministerial Order n° 003/2008 of 15/08/2008 relating to the requirements and procedure for environmental impact assessment *O G* n° 22 of 15 /11/ 2008; Ministerial Order N°004/2008 of 15/08/2008 establishing the list of works, activities and projects that have to undertake an Environmental Impact Assessment *O G* N°22 of 15/11/2008.



husbandry are one of the listed activities and projects.<sup>39</sup> However, as discussed in chapter four, the obligation of EIA is not fully implemented especially as regards agricultural activities, projects and policies likely to affect biodiversity.<sup>40</sup>

### *Recognition of indigenous knowledge*

The Preamble of the CBD and its Article 8 (j) recognise that many indigenous communities depend on biodiversity, have indigenous knowledge and have developed certain practices and innovations relevant to biodiversity conservation and the sustainable use of its components. Parties to the Convention must respect, preserve and maintain such knowledge, innovations and practices, adopt related laws and cooperate in developing traditional knowledge and ensure that the prior informed consent of the community or individuals that hold that knowledge has been obtained.<sup>41</sup>

In agriculture, the first development of crops and cropping systems occurred through traditional knowledge long before the recent discoveries of agricultural chemistry and crop biology, and most of the world's farmers still rely on traditional agricultural knowledge. The latter comprises numerous substantive domains, such as soil types, pests, pathogens, environmental conditions, such as rainfall and temperature patterns, and crop genotypes, as well as management domains, which include irrigation techniques, soil amendments, planting patterns, pest and weed control, crop selection and others.<sup>42</sup> All these aspects of agricultural traditional knowledge must be protected in national laws.

In Rwanda, as revealed by the fieldwork data, farmers have traditional knowledge about different plant varieties, mulching, using animal and green manure, traditional extensive fallow systems, practices of selecting best seeds and breeds to be used in the future, and practices of nurturing plant and animal genetic resources, among others.<sup>43</sup> Notwithstanding the CBD's provisions, Rwanda does not have a proper legal and policy framework for the protection of indigenous knowledge, which provides an opportunity for the

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<sup>39</sup> Annex to the Ministerial Order N°004/2008 of 15/08/2008.

<sup>40</sup> Paragraph 4.2.2.4.

<sup>41</sup> Articles 17 (2) & 18 (4) CBD; L Glowka et al op cit note 10 at 13

<sup>42</sup> Steven B Brush 'Farmers' rights and protection of traditional agricultural knowledge' (2005) 10.

<sup>43</sup> Respondents 1, 6, 7, 8, 12, 16, 17, 18.

exploitation of the indigenous knowledge.<sup>44</sup> More details on legal protection of indigenous agricultural knowledge in Rwanda are provided in chapter seven.<sup>45</sup>

### *Handling biotechnology*

Although modern biotechnology has demonstrated its actual and potential utility, there are safety and ethical concerns about the potential risks to the environment, biodiversity, and human health, posed by genetically modified organisms (GMOs).<sup>46</sup> Country parties to the CBD have an obligation to establish and maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms (LMOs) resulting from biotechnology, which are likely to have adverse impacts on biodiversity, taking also into account the risks to human health.<sup>47</sup>

The CBD does not detail rules on GMOs. It simply requires parties to provide, to the country into which such organisms are to be introduced, any available information on its use, safety regulations of handling such organisms, and the potential adverse impact of the specific organism.<sup>48</sup> More details were left to the Cartagena Protocol on Biosafety to the Convention on Biodiversity (Cartagena Protocol) adopted on 28 January 2000 and entered into force on 11/09/2003. The Protocol's objective is to contribute to ensuring an adequate level of protection in the field of safe transfer, handling and use of LMOs and specifically focusing on their trans-boundary movements.<sup>49</sup>

As far as agriculture is concerned, for thousands of years agricultural development focused on selective breeding.<sup>50</sup> To produce crops that were stronger, healthier, and higher yielding, farmers would choose for replanting (selectively breed) seeds from plants that had the most desirable traits.<sup>51</sup> In 1865, new changed seeds were planted after the discovery of

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<sup>44</sup> RoR *Fourth National Report to the Convention on Biological Diversity* (2009) 26.

<sup>45</sup> See paragraph 7.3.3.

<sup>46</sup> Jan Glazewski *Environmental law in South Africa* (2013) (Issue 1) 13-13.

<sup>47</sup> Article 8 (g) CBD.

<sup>48</sup> Article 19 (4) CBD.

<sup>49</sup> Article 1 Cartagena Biosafety Protocol.

<sup>50</sup> Debra L Blair 'Intellectual property protection and its impact on the U.S. seed industry' (1999) 4 *Drake Journal of Agricultural Law* 297 at 297.

<sup>51</sup> Lara E Ewens 'Seed wars: biotechnology, intellectual property, and the quest for high yield seeds' (2000) 23 *Boston College International and Comparative Law Review* 285 at 286; See also David R Nicholson 'Agricultural biotechnology and genetically-modified foods: will the developing world bite?' (2003) 8 *Virginia Journal of Law and Technology* 1 at 2.

hybridization<sup>52</sup> and farmers depended on it until approximately 1980, when plant scientists began to engage in a more specific form of crop development through biotechnology.<sup>53</sup> It is feared that a handful of selected GMOs may replace diverse traditional cultures, causing increased genetic vulnerability.<sup>54</sup> The CBD<sup>55</sup> and its Biosafety Protocol have to be considered in agricultural activities as both guide country parties on how biotechnology can be used sustainably.

In Rwanda, the laws that can apply to biotechnology issues include the Biodiversity Law, the Environmental Framework Law, the Seed Law and the Ministerial Order N° 004/16.01 governing the importation and exportation of wild animals. These regulate a few biotechnology aspects, like:

- requiring authorisation before importing GMOs, commercializing seeds and importing plant and animal species;<sup>56</sup>
- establishment of standards for seeds to be used in Rwanda;<sup>57</sup>
- the requirement to control and declare imported plants, plant products and seeds;<sup>58</sup> and
- the prohibition of introduction, possession and transportation of organisms harmful to animal specimen.<sup>59</sup>

However, biotechnology is still a new concept to Rwanda and these laws lack certain substantive elements.

### **3.2.2 The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)**

The ITPGRFA was adopted in November 2001 and came into force in June 2004. Rwanda ratified it on 14 October 2010. The ITPGRFA is particularly relevant to developing countries

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<sup>52</sup> Hybridization occurs when there is a cross between two inbred lines and an inbred plant is produced by repeated inbreeding through self-pollination of a single plant line so that a genetically-uniform plant is developed.

<sup>53</sup> J C Forbes & R D Watson 'Plants in agriculture' 78 (1992) at 68-69 Cited in David R Nicholson op cit note 51.

<sup>54</sup> R B Singh 'Biotechnology, biodiversity and sustainable agriculture: a contradiction?' at 2.

<sup>55</sup> Article 19 (4) CBD.

<sup>56</sup> Article 26 Biodiversity Law; Articles 7-9 Seed Law and Article 20 & 24 Environmental framework Law

<sup>57</sup> Article 10 Seed Law.

<sup>58</sup> Articles 6-8 Plants and Plant Products Law.

<sup>59</sup> Article 3 Ministerial Order N°004/16.01 of 15 July 2010 governing the importation and exportation of wild animals *O G* no 35 *bis* of 30/08/2010.

like Rwanda that rely heavily on agriculture and are not self-sufficient in plant genetic resources for food and agriculture.<sup>60</sup>

### 3.2.2.1 Objectives

The ITPGRFA aims at the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security.<sup>61</sup>

### 3.2.2.2 Obligations relevant to biodiversity and agriculture

#### *Promotion of integrated approach to the exploration, conservation and sustainable use of PGRFA*

Country Parties to the ITPGRFA have an obligation to promote an integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture (PGRFA).<sup>62</sup> To comply with this obligation, they have to:

- conduct surveys and compile inventories of PGRFA;
- promote their collection and relevant associated information;
- support farmers and local communities' efforts for PGRFA on-farm management and conservation;
- promote *in-situ* conservation of wild crop relatives and wild plants;
- promote *ex-situ* conservation; and
- monitor the maintenance of the viability, degree of variation, and the genetic integrity of collections of PGRFA.<sup>63</sup>

The ITPGRFA works through a multilateral system of facilitated access and benefit sharing for plant genetic resources that are very important for food security and on which parties are greatly interdependent. It establishes a list of 64 plant genetic resources that are

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<sup>60</sup> David H Cooper 'The International Treaty on Plant Genetic Resources for Food and Agriculture' (2002) 1 *RECIEL* at 1.

<sup>61</sup> Article 1 (1) ITPGRFA.

<sup>62</sup> Article 5.1 ITPGRFA.

<sup>63</sup> Article 5.1 (a, b, c, d, e, f) ITPGRFA.

the most important crops and which are accessible to everyone. Country parties to the Treaty are obliged to avail all their genetic diversity and any information related to the listed crops stored in their gene banks. In 2013, Rwanda included the following PGRFA in the multilateral system, listed in Annex 1 of the Treaty: the collections held by the Rwanda Agriculture Board (RAB) in its various agriculture research centres throughout the country, and the bean, Irish potatoes and rice collections held by the former Higher Institute of Agriculture and Animal Husbandry (ISAE) located in Musanze, Rwanda.<sup>64</sup> However, the conservation of PGRFA is still limited in Rwanda, as is promoting an integrated approach to the exploration, conservation and sustainable use of PGRFA. No surveys or inventories of PGRFA have been conducted. Their collection and the associated knowledge are not regulated and no clear legal support of farmers' efforts to conserve PGRFA on-farm is provided. In addition, *ex-situ* conservation is not promoted much and no effective monitoring of the maintenance, viability, degree of variation and genetic integrity is being conducted.

#### *Elimination and/ or minimization of threats to PGRFA*

Article 5.2 of the ITPGRFA obliges country parties to minimize or, if possible, eliminate threats to PGRFA. Major causes of loss of diversity of PGRFA include changing agricultural practices, loss of agricultural land, and the use of GMOs in centres of diversity. Country parties have different ways to minimize or eliminate such threats. They can collect PGRFA for *ex-situ* maintenance, develop *in-situ* conservation actions, and adopt agricultural practices that enhance the use of diverse varieties and maintenance of genetic diversity in crop varieties.<sup>65</sup> It should be noted that *ex-situ* conservation of genetic resources is essential not only to provide ready access to germplasm where needed, but also to conserve biodiversity that might otherwise be lost in nature.<sup>66</sup> To effectively eliminate or minimize threats to PGRFA, country parties have to establish procedures to be used in the identification and quantification of threats to PGRFA and adopt systems of monitoring changes in the conservation status of PGRFA.<sup>67</sup>

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<sup>64</sup> RAB Letter to the Secretary of ITPGRFA of 26 March 2013 notifying the contribution of Rwanda to the Multilateral System of the ITPGRFA; See also R Vernooij *et al* *Strengthening national capacities to implement the International Treaty on Plant Genetic Resources for Food and Agriculture* (2013) 5.

<sup>65</sup> Gerald Moore & Witold Tymowski *Explanatory guide to the International Treaty on Plant Genetic Resources for Food and Agriculture* IUCN Environmental Policy and Law Paper no. 57 (2005) 48.

<sup>66</sup> Dora Schaffrin, Benjamin Görlach & Christiane Gerstetter *The International Treaty on Plant Genetic Resources for Food and Agriculture - Implications for developing countries and interdependence with international biodiversity and intellectual property law* 5 Final Report IPDEV Work Package (2006) 16.

<sup>67</sup> Gerald Moore & Witold Tymowski *op cit* note 65 at 49.

In Rwanda, these obligations are not implemented at all. However, their implementation would give a clear indication of what must be done to eliminate or minimize such threats in Rwanda.

### *Sustainable use of PGRFA*

Article 6 of the ITPGRFA requires parties to develop and maintain appropriate policy and legal measures that promote the sustainable use of PGRFA. Such measures include:

- sustaining beneficial farming systems;
- maximizing intra- and inter-specific variations of plant varieties;
- promoting plant breeding efforts with farmers;
- broadening the variety of genetic material available to farmers;
- promoting locally adapted varieties;
- promoting crop diversity, sustainable use and conservation as well as developing links between farmers and plant breeders; and
- reviewing and adjusting breeding strategies and regulations concerning which varieties are released for use.<sup>68</sup>

Article 7 of the ITPGRFA complements Articles 5 and 6 by requiring contracting parties to integrate all activities regarding the promotion of an integrated approach to the exploration, conservation and sustainable use of PGRFA, elimination and/ or minimization of threats to PGRFA, and sustainable use of PGRFA into agricultural and rural development programmes and policies. Cooper argues that this complements Article 6 of the CBD, by integrating national biodiversity strategies and action plans into sectoral and inter-sectoral policies.<sup>69</sup>

In Rwanda, this obligation is not well implemented. Farming practices currently promoted are those related to the use of uniform plant species recognized as being more productive, as confirmed by all research interviewees who reported the promotion of uniform planting. Besides, traditional farming practices and the local varieties do not have any legal protection as discussed in chapters six and seven.

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<sup>68</sup> Article 6.2 ITPGRFA.

<sup>69</sup> David H Cooper op cit note 60 at 3.

*Protection and promotion of farmers' rights*

The recognition of farmers' rights at the international level acknowledges the contribution of farmers in creating and preserving a vast biological variety in agriculture.<sup>70</sup> Article 9 of the ITPGRFA states that parties have to:

Recognize the enormous contribution that the local and indigenous communities and farmers of all regions of the world, particularly those in the centres of origin and crop diversity, have made and will continue to make for the conservation and development of plant genetic resources which constitute the basis of food and agriculture production throughout the world.

Article 9.2 of the ITPGRFA therefore obliges countries to recognise farmers' contribution by taking measures to protect and promote farmers' rights. Though the Treaty does not define "farmers' rights", this term is defined elsewhere as rights arising from the past, present and future contributions of farmers in conserving, improving, and making available plant genetic resources, particularly those in centres of origin/diversity.<sup>71</sup> The Treaty provides for three substantive elements of farmers' rights, namely protection of farmers' traditional knowledge related to PGRFA, the right of farmers to participate equitably in sharing benefits arising from the utilisation of PGRFA, and the right of farmers to participate in making decisions relevant to PGRFA at national level.<sup>72</sup>

Farmers' rights were seen as a means to reward farmers and their communities for their past contributions, to encourage them to continue in their efforts to conserve and improve PGRFA, and to allow them to participate in the benefits derived, at present and in the future, from the improved use of plant genetic resources, through plant breeding and other scientific methods.<sup>73</sup>

In Rwanda, no regulation is in place to protect relevant farmers' knowledge, and to give them the right to participate equitably in the sharing of benefits arising from the utilisation of PGRFA.

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<sup>70</sup> FAO *International Treaty on Plant Genetic Resources for Food and Agriculture* Issue Papers: People and Biodiversity (2008) at 6.

<sup>71</sup> FAO Conference Resolution 5/89.

<sup>72</sup> Article 9. 2 (a, b & c) ITPGRFA.

<sup>73</sup> Gerald Moore & Witold Tymowski op cit note 65 at 67.

### **3.2.3 The United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD)**

The United Nations Convention to Combat Desertification (UNCCD) is relevant to Rwanda where about half of farmland shows evidence of moderate to severe erosion, alteration of vegetation, loss of soil moisture and soil organisms, disturbance in agroecosystems functions and processes, two-thirds of farmland being acidic and exhausted; all this constituting evidence of desertification.<sup>74</sup> The UNCCD was adopted on 17 June 1994 and entered into force on 26 December 1996. Rwanda ratified it on 30 September 1997 and it entered into force on 29 December 1997.

#### *3.2.3.1 Objective*

The objective of the UNCCD is to combat desertification and mitigate the effects of drought through effective action at all levels, supported by international cooperation and partnership arrangements.<sup>75</sup>

Desertification is defined as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities,<sup>76</sup> which include agriculture. Agriculture causes desertification, which threatens biodiversity, mostly in countries with insufficient and over cultivated arable lands, coupled with a high rate of population growth, and where most of their population's economy and living are primarily based on subsistence agriculture.<sup>77</sup> The population over-exploits marginalized lands due to lack of any other alternative economic resource or livelihoods, which is the case for Rwanda.

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<sup>74</sup> RoR op cit note 18 at 57; UNEP *Ensure environmental sustainability : where we are available at <http://www.rw.undp.org/content/rwanda/en/home/mdgoverview/overview/mdg7.html>*, accessed on 7 August 2015.

<sup>75</sup> Article 2 UNCCD.

<sup>76</sup> Article 1(a) UNCCD.

<sup>77</sup> RoR *Rwanda Environmental Policy* (2003) 10.



### 3.2.3.2 Obligations pertinent to biodiversity and agriculture

#### *Give due priority to combat desertification*

Country parties have to prioritize combating desertification and mitigate the effects of drought.<sup>78</sup> To implement this obligation, they have to adopt policies with environmental and economic development objectives. These policies must aim at the protection, rational use and management of land and water resources, the improvement of living conditions at the community level, and poverty eradication.<sup>79</sup> In formulating their policies, agriculture must be considered among the priorities.

In Rwanda, combating desertification and drought have been prioritized; different policies that affect biodiversity and agriculture and which aim, among other things, at the rational and organized management of land and water and encourage reforestation, terracing and rational use of wetlands have been adopted.<sup>80</sup>

#### *Establishment of strategies and priorities for sustainable development plans*

The UNCCD requires parties to establish strategies and priorities for sustainable development in different sectors, including agriculture.<sup>81</sup> In this sector, strategies have to address the problem of food security and the increase of revenue incomes to improve the well-being of the population in an environmental friendly manner.<sup>82</sup> They have, in addition, to deal with the use and management of soil, water and wetlands, soil erosion control, improvement of soil fertility and land use planning.

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<sup>78</sup> Article 5 (a) UNCCD.

<sup>79</sup> Article 2 (2) UNCCD; See also Christine Fusch 'UN Convention to Combat Desertification: Recent developments' (2008) 12 *Max Planck UNYB* 287 at 289; Alon Tal and J A Cohen 'Bringing "top- down" to "bottom-up": a new role for environmental legislation in combating desertification' (2007) 31 *Harvard Environmental Law Review* at 173.

<sup>80</sup> RoR op cit note 77 at 32-34; RoR *National land Policy* (2004) 22-24; RoR *Rwanda Vision 2020 Policy* (2002) 43; RoR *Economic Development and Poverty Reduction Strategy 2013-2018: Shaping our development* (2013).

<sup>81</sup> Article 5(b) UNCCD.

<sup>82</sup> Decision 3/COP.8 *The 10-year strategic plan and framework to enhance the implementation of the Convention* (Strategic objectives 1 and 2 at 9-10).

In Rwanda, strategies and priorities for sustainable development were established according to different sectors.<sup>83</sup> In the agricultural sector, most adopted strategies are concerned with the problem of food security and how revenue incomes can be increased to improve the well-being of the population. Different priorities have been established. Some of them, like combating soil erosion, improving soil fertility, fair allocation of water and wetlands' resources are beneficial to biodiversity conservation in agricultural sector. However, other priorities, such as selection of cultures and development of animal husbandry are potentially detrimental to biodiversity.<sup>84</sup> The beneficial priorities reflect the sustainable development plan as per the Convention, but the potentially detrimental ones – although aimed at implementation of this aspect of the Treaty- nonetheless are contentious for biodiversity conservation.

*Promotion of awareness and participation of local population*

The Convention calls for awareness and participation of the most affected people, especially women and youth, who are in contact with land, water and forest resources with the support of non governmental organisations.<sup>85</sup> Desertification is effectively tackled, and biodiversity conserved, if these people are fully involved and committed. To promote awareness and participation in local communities, all people, especially farmers, have to be trained on the causes of desertification, impacts of their activities on the desertification process, impacts on biodiversity and adequate mechanisms they can use to avoid it.

Historically, women and youth have been marginalized in decision-making in Rwanda. However, their crucial role in the management of land and water is now recognized. The government is now making efforts to integrate them in decision-making. For example, women currently account for more than 50% of the country's Chamber of Deputies and more than 30% of the Senate. In addition, in other decision-making groups, women and youth each must account for 30% of the body. Also, Rwanda encourages NGOs' support. For example, Care International supports different projects, including projects on water-system rehabilitation, on agro-forestry and sustainable land use management.<sup>86</sup>

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<sup>83</sup> Rwanda Vision 2020 Strategy (2000), Environmental Education for Sustainable Development (EESD) Strategy (2010), National Forestry Policy (2004), Sectoral Policy on Water and Sanitation (2004), Energy Policy (2004), Economic Development and Poverty Reduction Strategy and so on.

<sup>84</sup> RoR *Strategic Plan for the Transformation of Agriculture in Rwanda-Phase II* (2009).

<sup>85</sup> Article 5(d) UNCCD.

<sup>86</sup> Anicet Munyeshirwe *CASE Project Baseline Report* (2008) 4.

### **3.2.4 The Rotterdam Convention on the Prior Informed Consent Procedure for certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)**

The Rotterdam Convention was adopted on 10 September 1998 and entered into force on 24 February 2004. It covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons and severely hazardous pesticide formulations.<sup>87</sup> Rwanda ratified the Rotterdam Convention on 7 January 2004.

#### *3.2.4.1 Objective*

The Rotterdam Convention aims to promote shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use. This objective will be achieved through facilitating information exchange about their characteristics, providing for a national decision-making process on their import and export and disseminating these decisions to Parties.<sup>88</sup>

#### *3.2.4.2 Obligations applicable to biodiversity and agriculture*

##### *Regulation of chemicals and pesticides entry*

The Parties to the Convention have a right and obligation to regulate, ban or severely restrict the entry and use of certain chemicals and pesticides. Thereafter they must notify, in writing, the Secretariat to the Convention of their regulatory action.<sup>89</sup> The Convention provides for the procedure to ban or restrict an entry of a chemical or a pesticide.<sup>90</sup> Countries have, in addition, to regulate the procedure and must give timely decisions.<sup>91</sup> They should ensure, in their regulation, that such chemicals are not exported from their territories to an importing party, contrary to the import decision notified by the Party.<sup>92</sup> It is important to note that some

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<sup>87</sup> Article 3 (1) Rotterdam Convention.

<sup>88</sup> Article 1 Rotterdam Convention.

<sup>89</sup> Article 5 (1) Rotterdam Convention.

<sup>90</sup> Article 5 (3-6): If the notification is complete, the Secretariat forwards to all parties its summary. After receiving at least one notification from each of two Prior Informed Consent regions regarding a particular chemical and the notifications meet the requirements of Annex I, the Secretariat forwards them to the Chemical Review Committee which reviews such notifications, and recommend to the Conference of the Parties whether the chemical in question should be made subject to the Prior Informed Consent procedure and, accordingly, be listed in Annex III.

<sup>91</sup> Article 10 Rotterdam Convention.

<sup>92</sup> Article 11 Rotterdam Convention.

chemicals and pesticides governed by the Rotterdam Convention are used in agriculture and they produce negative effects on biodiversity. When national legislations ban or restrict them, biodiversity is conserved.

In Rwanda, entry of chemicals and pesticides is governed by the Environmental Framework Law,<sup>93</sup> the Agrochemicals Law,<sup>94</sup> and the Prime Minister's Order n° 26/03 of 23/10/2008 establishing a list of chemicals and other prohibited pollutants that are not permitted.<sup>95</sup> Although these laws have general application, they can be applied, to a limited extent, to implement the Rotterdam Convention. More details are provided in chapter four.<sup>96</sup>

While the Annex III of the Rotterdam Convention currently contains a total of 43 (32 pesticides and 11 industrial chemicals) banned or severely restricted chemicals and pesticides, Rwandan legislation establishes a list of 11 prohibited chemicals and pollutants. Despite the existence of the two laws of general application and the Ministerial Order, Rwanda still does not comply with Annex III of the Convention, because Annex III has some substances on its list that are still not banned or restricted by Rwandan legislation. In addition, the Rwandan legislation does not give details on procedures to follow in exporting or importing listed chemicals and pesticides.

#### *Public access to information and training of local people*

Article 15(2) of the Convention requires parties to ensure, to the extent practicable, that the public has appropriate access to information on chemical handling and accident management and on alternatives that are safer for human health or the environment than using the chemicals listed in Annex III.

Notwithstanding the hazardous nature of some agrochemicals, some countries still use such banned or restricted agrochemicals for various reasons, such as eradication of a certain pest. They argue that the economic benefits of using such chemicals outweigh the risks involved. It is argued that although the risks are inevitable, it is crucial to establish clear and

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<sup>93</sup> Article 91 Environmental Framework Law.

<sup>94</sup> Article 1 Agrochemicals Law.

<sup>95</sup> Such chemicals include aldrine, chlordane, dieldrine, endrine, heptachlor, hexachlorobenzene, mirex, toxaphene, polychlorinated biphenyls, DDT and polychlorinated dibenzo-p-dioxins and dibenzofurans.

<sup>96</sup> See paragraph 4.2.7.

detailed procedures for the safe use of agrochemicals by taking proper precautions.<sup>97</sup> Some of the precautions are that agrochemical users must have information and be trained on the hazards of the substances they handle, how they enter the body, the nature of toxic effects and the proper methods of use,<sup>98</sup> as well as how they can be safely transported, stored, used and disposed. However, in Rwanda, there are no specific legal provisions that detail how agrochemicals' users must have access to information and be trained, which increases the impacts of unsustainable use of agrochemicals on biodiversity.

### **3.2.5 The Stockholm Convention on Persistent Organic Pollutants (The Stockholm Convention)**

The Stockholm Convention was signed on 23 May 2001 and entered into force on 17 May 2004. Rwanda ratified the Convention on 5 June 2002.

#### *3.2.5.1 Objective*

The Stockholm Convention has the objective of protecting human health and the environment from persistent organic pollutants.<sup>99</sup> This is to be achieved through the Convention's support for a risk-based approach to reducing or eliminating the potential impacts of listed POPs.<sup>100</sup>

#### *3.2.5.2 Obligations relevant to agriculture*

Three obligations which are relevant to conservation of biodiversity in agriculture are discussed below.

#### *Elimination and restriction of dangerous POPs*

The Convention divides the concerning POPs into three distinct groups and lists them in separate annexes. Article 3(1) (a) requires parties to prohibit or take the necessary measures to eliminate the production and use of each substance, listed in Annex A, subject to its

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<sup>97</sup> IPCS *Safety and health in the use of agrochemicals* Available at <http://actrav.itcilo.org/actrav-english/telearn/osh/kemi/pest/pesti2.htm> (accessed 16 November 2011).

<sup>98</sup> Ibid.

<sup>99</sup> Article 1 Stockholm Convention; See also Fernando, B Gonzalez *Citizen's guide to the Stockholm Convention: international POPs elimination project (IPEP)* (2005) at 9.

<sup>100</sup> Paul E Hagen & M P Walls 'The Stockholm Convention on Persistent Organic Pollutants' (2005) 19 *Natural Resources & Environment* 49 at 50.

provisions. Annex A contains 18 intentionally produced substances, but countries are allowed to register, for a limited period, specific exemptions for some substances. Article 3(1) (b) requires parties to restrict the production and use of substances contained in Annex B, in accordance with its provisions. Annex B lists two substances, one of them being DDT. Under Annex B, countries can also benefit from specific exemptions for acceptable purposes to be identified for particular substances. Parties must therefore take regulatory measures with the aim of eliminating and restricting the production and use of POPs listed in the two annexes. Elimination can be accomplished through banning sale and distribution in commerce or withdrawing registration of the concerned substances.<sup>101</sup> Annex C applies to POPs unintentionally produced and lists four substances. Some of these POPs are used in agriculture and have harmful effects on biodiversity.

In Rwanda, POPs can be eliminated through implementation of different laws and regulations that regulate the use of chemical substances or products namely the Environmental Framework Law,<sup>102</sup> the Agrochemicals Law,<sup>103</sup> and different regulations supplementing these two laws, which include: Prime Minister's Order n° 26/03 of 23/10/2008 establishing a list of chemicals and other polluting substances that are not permitted and the Ministerial Order n° 006/2008 of 18/08/2008 regulating the importation and exportation of ozone layer-depleting substances, products and equipments containing such substances. Although these laws and regulations do not expressly mention the term 'Persistent Organic Pollutants', they control and prohibit, to some extent, the entry of some POPs -some being used in agriculture- into the Rwandan territory by considering their polluting and dangerous nature. This contributes to the protection of biodiversity in agricultural sector. However, the said laws and regulations do not include all POPs included in Annex A of the Convention. Also some of the laws are of a general nature, which limits the possibility of addressing specific issues regarding POPs. More details are provided in chapter four.<sup>104</sup>

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<sup>101</sup> Peter L Lallas 'The Stockholm Convention on Persistent Organic Pollutants' (2001) 95 *American Journal of International Law* 692 at 699.

<sup>102</sup> Article 91 Environmental Framework Law.

<sup>103</sup> Article 1 Agrochemicals Law.

<sup>104</sup> See paragraph 4.2.6.

### *Cleaning-up old stockpiles and equipment containing POPs*

Stockpiles, storage facilities or dumps of POPs have to be designated and managed in order to minimize leaks and other releases into the environment; and, when necessary, clean up releases in a safe and responsible way.<sup>105</sup> Parties must develop adequate strategies for identifying stockpiles consisting of or containing chemicals listed in Annex A or B and products and articles in use and wastes consisting of, containing or contaminated with a chemical listed in Annex A, B or C.<sup>106</sup> POPs prohibited and no longer subject to any specific exemption as per Annexes A and B or for an acceptable purpose specified in Annex B, except stockpiles which are allowed to be exported, must be considered as waste and parties must take appropriate measures of handling, collecting, transporting and storing them in an environmentally sound manner.

In Rwanda during the inventory done in 2006, no stock of obsolete POPs used in agriculture was recorded. However a stock of 2,948 kg of out-dated, persistent toxic substances was identified during this inventory. It is thus necessary to ensure continuous safety of this stock in a temporary way before it can be ecologically and rationally eliminated.<sup>107</sup>

### *Promotion of public participation and research on the dangers of POPs*

Parties to the Stockholm Convention have to provide access to all available information related to POPs, their effects and the alternatives. In addition, they have to develop programs for public education and awareness, especially for women and children and the least educated. They should also update this information on an ongoing basis and have to disseminate it regularly.<sup>108</sup> Although access to information, education and awareness must be effective enough to involve and raise awareness among farmers, small land owners and other workers who come in contact with POPs do not read literature related to their effects.<sup>109</sup>

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<sup>105</sup> UNEP *Ridding the world of POPs: a guide to the Stockholm Convention on Persistent Organic Pollutants* (2005) 13.

<sup>106</sup> Article 6 Stockholm Convention.

<sup>107</sup> RoR *National Implementation Plan of the Stockholm Convention on Persistent Organic Pollutants (POPs) in Rwanda: 2007-2025* (2006) 42-43.

<sup>108</sup> Articles 10-11 Stockholm Convention; See also E Bivol & V Ciubotaru *Awareness building and communication in persistent organic pollutants* 9<sup>th</sup> International HCH and Pesticides Forum for CEECCA Countries (2007) 316.

<sup>109</sup> E Bivol & V Ciubotaru op cit note 108 at 316.

In addition to information dissemination, country parties to the Stockholm Convention also have to promote and support research on POPs contamination in their environment, like in soils and waters, their contamination in food and feed and so on,<sup>110</sup> all of which applies to POPs used in agriculture.

In Rwanda, the Rwanda Environment Management Authority (REMA) has the responsibility to conduct research, prepare, publish and broadcast the teaching handbooks on the standards and laws relating to the management of the environment as discussed in chapter four.<sup>111</sup> It has a unit in charge of environmental education, sensitization and institutional development and creation of awareness of the dangers of the use of chemical products in the populations. However, the implementation of this obligation is very limited due to lack of clear policy on how to inform all stakeholders involved in the use and the management of POPs or other chemical substances, including those used in agriculture. With regards to research on POPs, Rwanda lacks enough financial resources and technical capabilities. In sum, implementation of the obligations under the Convention and research on POPs in Rwanda is limited, which affects efforts of conserving biodiversity in agriculture.

### **3.2.6 The United Nations Framework Convention on Climate Change (UNFCCC)**

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the Rio United Nations Conference on Environment and Development (UNCED) in 1992. It entered into force on 21 March 1994 and Rwanda ratified it in 1995.

#### *3.2.6.1 Objective*

The ultimate objective of the UNFCCC is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed sustainably.<sup>112</sup>

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<sup>110</sup> M Porta & E Zumeta 'Implementing the Stockholm Treaty on Persistent Organic Pollutants' (2002) 59 *Occupational and Environmental Medicine* (2002) 651 at 652.

<sup>111</sup> Article 3 (5, 9) of the Law n°63/2013 of 27/08/2013 determining the mission, organization and functioning of Rwanda Environment Management Authority (REMA) *O G* n° 41 of 14/10/2013; paragraph 4.3.1.3.

<sup>112</sup> Article 2 UNFCCC.



### 3.2.6.2 Obligations important to biodiversity and agriculture

#### *Adoption and implementation of mitigation and adaptation programs*

All parties to the UNFCCC are obliged to prepare and regularly update national climate change mitigation and adaptation programmes and measures, including measures addressing sources of green house gas emissions and protecting and enhancing sinks and reservoirs.<sup>113</sup> Agriculture is one a major source of greenhouse gas emissions.<sup>114</sup> However, reduced deforestation for agriculture, changes in land use and agricultural practices provide much scope for the mitigation, reduction and adaptation against climate change, thereby also conserving biodiversity.

#### Adaptation to climate change in agriculture and biodiversity conservation

In agriculture, countries must develop programs supporting farmers in their endeavours to adapt to climate change, such as efforts to plant different varieties of the same crop, changing planting dates and other adapting practices. They can also develop programs on crop and livestock insurances, research on and dissemination of crops resistant to flood, heat, and drought, and develop new irrigation systems. Countries have also to provide to farmers all necessary weather and climate information.<sup>115</sup>

Rwanda adopted a National Adaptation Programme of Action to Climate Change in 2006. With regards to agriculture, the country is committed to promoting:

- non rain-fed agriculture;
- intensive agriculture and animal husbandry;
- introduction of drought resistant species;
- integrated water resource management;
- stocking and conservation of agriculture produce; and
- access to information and early warning systems.<sup>116</sup>

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<sup>113</sup> Article 4.1 (b) UNFCCC.

<sup>114</sup> Anita Wreford, Dominic Moran & Neil Adger *Climate change and agriculture: impacts, adaptation and mitigation* (2010) 79.

<sup>115</sup> Ibid at 63.

<sup>116</sup> RoR *National Adaptation Programmes of Action to Climate Change: NAPA-Rwanda* (2006) 42.

Important as these programmes are, developing crop and livestock insurances schemes and promotion of crop and livestock diversity have been omitted from the 2006 Programme. This is a big challenge to Rwanda where the tendency is to promote uniformity in plant and animal varieties to achieve high productivity. However, diversity in crop and livestock varieties is recognized as assisting in adaptation to climate change as discussed in chapter six.

### Mitigation programs in agriculture and biodiversity conservation

Mitigation measures in agriculture aimed at the reduction of greenhouse gas include reducing emissions via improved farming efficiency, including genetic improvement; displacing fossil fuel emissions via alternative energy sources; and enhancing the removal of atmospheric CO<sup>2</sup> via sequestration into soil and vegetation sinks. Some mitigation options deliver improved farm profitability as well as lower emissions<sup>117</sup> and profits biodiversity. According to FAO, adoption of some improved agricultural practices like improved cropland and grassland management can potentially and simultaneously increase productivity, the adaptive capacity of agricultural production systems and act as an effective mitigative action.<sup>118</sup>

Rwanda's commitment to the reduction of GHG emissions in the agricultural sector includes:

- reducing the cattle herds to respect the carrying capacity per unit area of pasturelands to reduce GHG emission from enteric fermentation;
- using biogas digesters and reduction of fermentation materials to reduce methane emissions from anaerobic management of manure;
- supervising, training and informing farmers;
- developing research on innovations for agriculture modernisation to reduce GHG emissions from savannah and farm residues burning; and
- extending agro-forestry practice.<sup>119</sup>

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<sup>117</sup> Anita Wreford, Dominic Moran & Neil Adger op cit note 114 at 84.

<sup>118</sup> FAO *Towards a work programme on agriculture: A submission to the AWG-LCA by the Food and Agriculture Organization of the United Nations* (2010) 4 available at <http://unfccc.int/resource/docs/2010/smsn/igo/081.pdf>, accessed on 28 November 2011.

<sup>119</sup> RoR *Initial National Communication under the United Nations Framework Convention on Climate Change* (2005) 47-48.

*Strengthening scientific and technical research and systematic observation*

UNFCCC encourages its parties to carry out, promote and cooperate in scientific and technical research on the certainty, magnitude and the likely consequences of the impacts of climate change. They also have to research and cooperate in systematic observation and development of data archives related to their climate system.<sup>120</sup> This commitment is of critical importance to the development of adaptation strategies as well as the timing of mitigation.<sup>121</sup>

For agriculture, research on climate change addresses its possible physical effects on agriculture, like changes in crop and livestock yields as well as the economic consequences of these potential yield changes.<sup>122</sup> Also, research should find out possible mitigation measures in agricultural systems and the role of human adaptations in responding to climate change, possible regional impacts to agricultural systems and potential changes in patterns of food production and prices.<sup>123</sup> Besides, according to the World Meteorological Organization, forecasts based on good observations allow adjustments in farm operations, such as cropping dates, weeding, fertiliser application, spraying, integrated pest management, and harvesting.<sup>124</sup> Also, farmers and agricultural decision-makers require climate observations to be available at a spatial resolution appropriate to their needs.<sup>125</sup> Biodiversity benefits from such researches and systematic observations because, if farmers are able to adapt to climate change, they do not put much pressure on biodiversity. It is important to note that the best system of adaptation to climate change is that which considers biodiversity conservation as a priority.

In Rwanda, the level of implementation of the obligation of research, systematic observation and training is still low. Research on climate change is very limited. The country

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<sup>120</sup> Article 4.1 (g) and 5 UNFCCC.

<sup>121</sup> Farhana Yamini & Joanna Depledge *The international climate change regime: a guide to rules, institutions and procedures* (2004) 200.

<sup>122</sup> Richard M Adams et al 'Effects of global climate change on agriculture: an interpretative review' (1998) 11 *Climate Research* 19 at 19.

<sup>123</sup> Ibid.

<sup>124</sup> WMO 'Weather, climate and food security' (2001) 933 *WMO* 1 at 20.

<sup>125</sup> William Westermeyer *Observing the Climate for Development* GCOS steering committee seventeenth session (2009) 10 available at [http://www.wmo.int/pages/prog/gcos/SCXVII/09.4\\_INF\\_Observing\\_the\\_Climate\\_for\\_Development.pdf](http://www.wmo.int/pages/prog/gcos/SCXVII/09.4_INF_Observing_the_Climate_for_Development.pdf), accessed on 28 November 2011.

is struggling to build its meteorological systems, thus limiting the ability to predict local climate change and establishing adequate understanding of the national climate conditions.<sup>126</sup> Most of the research participants reported that the provided information on climate change is, most of the time, not accurate and mostly provided during cropping seasons only.<sup>127</sup> This impedes farmers from adopting adequate adaptation measures and hence causes them to put much pressure on biodiversity. However, it is hoped that with the recently acquired radar to be stationed in Bugesera which is believed to have high capacity to predict precipitation and climate-related changes, climate change observation in Rwanda will improve.<sup>128</sup>

### *Education, training and public awareness*

Parties to the UNFCCC must promote education, training, public awareness, public access to information, public participation and international cooperation.<sup>129</sup> This commitment serves to support long-term change in habits, impart specific skills, get early results, make information freely available, increase popular involvement in decision-making processes, strengthen capacity-building and sharing best practices.<sup>130</sup> To implement this obligation, the Conference of the Parties called for involvement of groups with a key role in climate change communication and education, such as journalists, teachers, youth, women, children, indigenous communities, civil society and others.<sup>131</sup>

In agriculture, all groups involved in farming activities can play a big role in addressing the problem of climate change if they are educated or trained on the interlinkages between climate change, agriculture and biodiversity and the possible mitigation and adaptation measures to climate change in agricultural sector.

In Rwanda, REMA has an Environmental Education and Mainstreaming Unit and has the responsibility to ensure education, training and public awareness about all environmental

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<sup>126</sup> REMA *Rwanda Environment Report and Outlook* (2009) 104.

<sup>127</sup> Respondents 1, 4, 6, 10, 11 and 18.

<sup>128</sup> The radar was launched on 30/06/2015.

<sup>129</sup> Article 6 UNFCCC.

<sup>130</sup> Laurence Pollier *Article 6 of UNFCCC & The New Delhi Work Programme: an overview* (2005) 4.

<sup>131</sup> Decision -/CP.16 on progress in and ways to enhance the implementation of the amended New Delhi Work Programme on Article 6 of the Convention.

issues, including climate change.<sup>132</sup> Training and public awareness campaigns have been conducted but at a low level. More training and awareness-raising initiatives are still needed to sensitize all categories of individuals with greater focus on those involved in agricultural activities and biodiversity conservation.

### **3.2.7 The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)**

The Ramsar Convention was signed on 2 February 1971 and entered into force on 21 December 1975. It has been amended twice, firstly by the Paris Protocol of 3 December 1982 and secondly by the Regina Amendments of 28 May 1987. Rwanda has been party to the Ramsar Convention since 29 December 2003 and it came into force on the 1 April 2006.

#### *3.2.7.1 Objective*

The Ramsar Convention aims at the conservation and rational use of wetlands through local and national action, as well as international cooperation.<sup>133</sup>

#### *3.2.7.2 Obligations applicable to biodiversity and agriculture*

##### *Designation of wetlands of international importance*

Parties are required to designate at least one wetland to be included in the list of wetlands of international importance, promote its conservation and continue to designate other wetlands situated on their territories.<sup>134</sup> However, they must take measures to conserve wetlands and waterfowls, like establishing nature reserves in wetlands regardless of whether they are included on the list or not.<sup>135</sup> Wetlands are fragile and valuable ecosystems supporting a diversity of species and habitats of plants, invertebrates, fish, amphibians, reptiles and

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<sup>132</sup> Article 3 of the Law no. 63/2013 of 27/08/2013 establishing REMA O G no. 41 of 14/10/2014; See also REMA *Rwanda Environmental education for sustainable development strategy: A Strategy and Action Plan for 2010-2015* (2010) 4.

<sup>133</sup> A Tiéga *The Ramsar Convention on Wetlands: 40 Years of Action* (2011) 2.

<sup>134</sup> Article 2 (4) and 2 (5) Ramsar Convention.

<sup>135</sup> Article 4 (1) Ramsar Convention.

mammals and water birds. They therefore require environmentally compatible agricultural practices to support biodiversity conservation.<sup>136</sup>

On ratification of the Ramsar Convention, Rwanda designated Rugezi as a wetland of international importance. Today, other wetlands have been identified as potential Ramsar sites that will be registered in the future, such as the complex of Mugesera-Rweru, Kamiranzovu marshes and the wet zones of the Akagera National Park.<sup>137</sup>

### *Wise use of wetlands*

Wetlands must be utilised in a way and at a rate that does not lead to their long-term degradation.<sup>138</sup> For this, countries have to control all activities, including agricultural ones, which are carried out in wetlands. Therefore, farming practices like irrigation, use of agrochemicals and introduction of new species, taking place in wetlands, must be adequately controlled.

Protection of wetlands is one of the objectives of Rwanda's many different policies, such as Vision 2020, Economic Development and Poverty Reduction Strategy, Environmental Policy, and the National Biodiversity Policy. In addition, wetlands are generally protected by the Environmental Framework Law and particularly by the Ministerial Order n° 008/16.01 of 13/10/2010. The latter establishes the limits and modalities of wetlands' management and divides wetlands into different categories to ensure that they are used for their proper functions and ensure their sustainability.<sup>139</sup> Some wetlands can be used under specific conditions, while others can be used unconditionally.<sup>140</sup>

In Rwanda, agricultural activities are carried out in different wetlands, which are considered to be more productive. However, not enough research on agriculture-wetland interactions has been conducted in Rwanda.<sup>141</sup> Thus there may be negative effects on

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<sup>136</sup> J M Mironga 'Effect of farming practices on wetlands of Kissi District, Kenya' (2005) 3 *Applied Ecology and Environmental Research* 81 at 81 ; A J Halls *Wetlands, biodiversity and the Ramsar Convention: the role of the convention on wetlands in the conservation and wise use of biodiversity* (1997).

<sup>137</sup> Fabian Twagiramungu *Environmental profile of Rwanda* (2006) 16-17.

<sup>138</sup> Third meeting of the Conference of the Contracting Parties-Regina Canada (1987) Recommendation REC. C.3.3. Annex: Definition of Wise Use.

<sup>139</sup> Article 2 Ministerial Order no 008/16.01 of 13 October 2010 *O G* n° 44 of 01/11/2010.

<sup>140</sup> Article 3 Ministerial Order no 008/16.01.

<sup>141</sup> REMA *National report on the implementation of the Ramsar Convention on Wetlands* (2011) 14.

wetlands and biodiversity due to agricultural activities, which include drainage, pollution from fertilisers, agricultural run-off and disappearance of some species due to introduction of alien species. Some interviewees asserted that agriculture is causing biodiversity loss in wetlands. They reported that species like *melanthera scanden* (plant) and *imisambi* (bird) have declined in Rwandan wetlands due to, among other things, agricultural exploitation.<sup>142</sup>

### **3.2.8 The African Convention on the Conservation of Nature and Natural Resources**

The African Convention on Nature and Natural Resources was first adopted in Algeria on 15 September 1968 and entered into force on 16 June 1969 and was revised on 11 July 2003. Rwanda became a member to this Convention on 6 March 1980.

#### *3.2.8.1 Objectives*

The African Convention on Nature and Natural Resources aims to enhance environmental protection; foster the conservation and sustainable use of natural resources; and harmonise and coordinate policies in these fields with a view to achieving ecologically rational, economically sound and socially acceptable development policies and programmes.<sup>143</sup>

#### *3.2.8.2 Obligations relevant to biodiversity and agriculture*

##### *Conservation and management of land resources, water and vegetation*

Country parties to the Convention must take the appropriate measures for the conservation and management of soil, vegetation and related hydrological processes. They must combat soil misuse, erosion and degradation. In implementing agricultural practices and agrarian reforms, parties are required to establish land-use plans based on scientific investigations and local knowledge and experience. They must introduce sustainable farming practices to ensure long term productivity, control pollution caused by agricultural activities and implement mitigation and rehabilitation measures in areas affected by land degradation.<sup>144</sup>

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<sup>142</sup> Respondents 1, 3, 9 and 18.

<sup>143</sup> Article II African Convention on Conservation of Nature.

<sup>144</sup> Article VI African Convention on Conservation of Nature.

Parties must also manage water resources, whether underground, surface or rain water in a way that maintains them at the highest level of quality and quantity and to ensure the protection of human health.<sup>145</sup>

Moreover, parties to the Convention are compelled to take all necessary measures for the protection, conservation, sustainable use and rehabilitation of vegetation cover. They have to adopt measures based on scientific research and sound traditional conservation, utilisation and management plans for areas with vegetation cover, such as wetlands, woodlands and rangelands, taking into account the socio-economic needs of the peoples. They must control fires, forest exploitation, land clearing for cultivation and grazing of domestic and wild animals, and invasive species.<sup>146</sup>

In Rwanda, protection of the land, water and vegetation is among the objectives of some policies including the Environmental Policy, Vision 2020, the Economic Development and Poverty Reduction Strategy, the Strategic Plan for Agricultural Transformation. It will be argued in chapters four and five that, different laws and regulations contribute, in a limited fashion, to the protection and conservation of these three natural resources in different sectors, including agriculture. The laws include the Environmental Framework Law,<sup>147</sup> the Land Law,<sup>148</sup> the Water Law,<sup>149</sup> and their implementing regulations.

#### *Maintenance of species genetic diversity*

The African Convention requires parties to establish and implement *in-situ* and *ex-situ* measures to maintain and enhance species and genetic diversity of plants and animals, whether terrestrial, fresh-water or marine. They must preserve as many varieties as possible of domestic or cultivated species and their wild relatives and have to identify and eliminate factors causing depletion of species which are threatened or likely to be threatened. Parties are required to control the intentional and accidental introduction of non-native species,

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<sup>145</sup> Article VII African Convention on Conservation of Nature.

<sup>146</sup> Article VIII African Convention on Conservation of Nature.

<sup>147</sup> Articles 11 to 14, 17, 83, 84 Environmental Framework Law; See also Article 13 Land Law.

<sup>148</sup> The use of land in a productive way is to protect it from erosion, safeguard its fertility and ensure its production in a sustainable way.

<sup>149</sup> Articles 5, 15-25, 32-45, 80-89 Water Law.



including modified organisms, and eradicate those already introduced where the consequences are detrimental to native species or to the environment in general.<sup>150</sup>

This provision of the Convention is in line with the CBD, which calls for conservation of diversity at three levels: genetic, species and ecosystem. It is also consistent with the Cartagena Protocol, which applies to the transfer, handling and use of living modified organisms, including GMOs and the provisions of the ITPGRFA that aims at the conservation of diversity in plant genetic resources for food and agriculture.<sup>151</sup>

In Rwanda in relation to maintenance of species diversity, areas of critical importance for the survival of different fauna and floral species have been identified and declared as protected areas, therefore out of bounds for agriculture, in order to avoid extinction of different species in such areas.<sup>152</sup> The Convention however obliges parties to preserve as many varieties as possible of domestic or cultivated species and their wild relatives. This is a great challenge to Rwanda, where there is promotion of uniformity in domesticated or cultivated plant and animal species. Diversity conservation is more detailed in chapter six.

#### *Identification of processes and activities that impact the environment*

Parties to the Convention have to use best practicable technologies and harmonise their policies with other international obligations in order to prevent, eliminate and reduce the detrimental effects on the environment of radioactive, toxic, and other hazardous substances and wastes.<sup>153</sup> This means that the countries have to regulate the use of and introduction into the environment of toxic or hazardous substances used in agriculture, such as pesticides and fertilisers.

In Rwanda, the introduction of toxic and hazardous substances used in agriculture (agrochemicals) is governed by different agrochemical laws and regulations which contribute, to a limited extent, to the conservation of nature and natural resources. These include the Environmental Framework Law, the Agrochemicals Law, the Ozone Layer Depleting

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<sup>150</sup> Articles IX and X African Convention on Conservation of Nature.

<sup>151</sup> IUCN *An introduction to the African Convention on the Conservation of Nature and Natural Resources* (2004) 9.

<sup>152</sup> Volcanoes National Park, Nyungwe National Park and Akagera National Park.

<sup>153</sup> Article XIII African Convention on Conservation of Nature.

Substance Regulation and the Chemicals and other Prohibited Pollutants Regulation. More details on this aspect are elaborated on in chapter four.<sup>154</sup>

### *Recognition of traditional knowledge*

The contracting parties are asked to take legislative and other measures to ensure that traditional rights and intellectual property rights of local communities, including farmers' rights, are respected. They must subject access to indigenous knowledge and its use to the prior informed consent of the concerned communities and to specific regulations recognizing their rights to, and appropriate economic value of, such knowledge. Parties have to establish the measures necessary to enable active participation by the local communities in the process of planning and management of natural resources upon which such communities depend.<sup>155</sup> This provision is consistent with the CBD, which calls for the respect, preservation and maintenance of the knowledge, innovations and practices of indigenous and local communities.<sup>156</sup> It is also in line with the provisions of the ITPGRFA, which call for recognition of farmers' rights and contributions that farmers and indigenous communities have made and will continue to make for the conservation and development of plant genetic resources for food and agriculture.<sup>157</sup>

It will be argued in chapters four and seven that, in Rwanda, the recognition of indigenous knowledge is regulated in a very limited way by the Biodiversity Law.<sup>158</sup> This leads to the loss of Rwandan traditional knowledge in general, including farmers' traditional knowledge about the use and conservation of agricultural biological resources.

Having discussed the different international environmental conventions that can contribute to biodiversity conservation in harmony with agricultural development, international institutions that intervene in this area are examined next.

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<sup>154</sup> See paragraphs 4.2.1 & 4.2.7.

<sup>155</sup> Article XVII African Convention on Conservation of Nature.

<sup>156</sup> Article 8 (j) CBD.

<sup>157</sup> Article 9 ITPGRFA.

<sup>158</sup> Article 27-28 Rwanda Biodiversity Law; Paragraph 4.2.3.6 & 7.3.

### 3.3 INTERNATIONAL INSTITUTIONS ADDRESSING BIODIVERSITY CONSERVATION IN AGRICULTURE

#### 3.3.1 The Conference of the Parties to the CBD

As discussed in chapter two,<sup>159</sup> the Conference of the Parties to the CBD, in its different meetings, considered different matters related to interlinkages between biodiversity conservation and agriculture. Such matters encompass:

- encouraging conservation and sustainable use of agricultural biodiversity by parties, governments, civil-society organizations and other non-governmental organizations;<sup>160</sup>
- conservation and utilisation of plant genetic resources for food and agriculture;<sup>161</sup>
- the need for a worldwide reorientation towards sustainable agriculture;<sup>162</sup>
- the need to promote the positive effects and mitigate negative impacts of agricultural systems and practices on biodiversity in agro-ecosystems;
- the need to promote the conservation and sustainable use of genetic resources of actual and potential value for food and agriculture;<sup>163</sup>
- conservation and sustainable utilisation of soil biodiversity, animal genetic resources, trade liberalisation and genetic use restriction technologies;<sup>164</sup> and
- the adoption of the framework for a cross-cutting initiative on biodiversity for food and nutrition.<sup>165</sup>

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<sup>159</sup> Paragraph 2.7.2.

<sup>160</sup> Decision I/9 COP 1, Decision III/11 COP 3, Decision VI/5 COP 6 and Decision VII/ 3 COP 7. COP 3 specifically encouraged parties to identify key components of biological diversity in agricultural production systems responsible for maintaining natural processes and cycles, to monitor and evaluate the effects of different agricultural practices and technologies on those components and to adopt repairing practices to attain appropriate levels of biological diversity. In addition, they were encouraged to develop technologies and farming practices that not only increase productivity, but also arrest degradation as well as reclaim, rehabilitate, restore and enhance biological diversity. These could include, *inter alia*, organic farming, integrated pest management, biological control, no-till agriculture, multi-cropping, inter-cropping, crop rotation and agricultural forestry. Parties were requested to empower their indigenous and local communities and build their capacity for *in situ* conservation and sustainable use and management of agricultural biological diversity

<sup>161</sup> Decision II/15 COP 2.

<sup>162</sup> Decision IV/6 COP 4.

<sup>163</sup> Decision V/5 COP 5.

<sup>164</sup> Decision VI/5 COP 6 and Decision VIII/23 COP 8.

<sup>165</sup> Decision VIII/23 COP 8.

### 3.3.2 The Food and Agriculture Organization (FAO)

The FAO is preoccupied with the major challenge of feeding the growing number of people from a natural resource base that is seriously threatened by unsustainable farming practices. As discussed in chapter two,<sup>166</sup> it undertakes different activities aimed not only at fighting hunger but also at considerations for environment and biodiversity conservation. To meet the growing need for food, the FAO supports agricultural programs and projects and encourages them to balance increased production with environmental and sustainability concerns, which comprises biodiversity conservation.<sup>167</sup> The legally binding International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) (discussed above) was adopted at the 2001 FAO Conference.

The FAO supports conservation of crop varieties, sustainable use of water and soil in agricultural operations and encourages improved use of potentially harmful agrochemicals. It encourages farmers to use manure, crop residues, mineral, and naturally occurring (soil) nutrients.<sup>168</sup> It has even adopted the International Code of Conduct on the Distribution and Use of Pesticides.<sup>169</sup> The FAO recommends that policies and laws have to remove incentives that encourage soil degradation,<sup>170</sup> link formal and farmer-saved seed systems, foster the emergence of local seed enterprises,<sup>171</sup> eliminate perverse subsidies that encourage farmers to waste water and promote the principle of Integrated Pest Management.<sup>172</sup>

The FAO works closely with the Government of Rwanda, civil society and local communities to enhance agricultural production and development and ensure food security without compromising biodiversity conservation. Their priorities in Rwanda closely linked to agriculture and biodiversity are:

- improvement of food security and human nutrition;

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<sup>166</sup> Paragraph 2.7.1.

<sup>167</sup> FAO *Putting nature back into agriculture* available at [http://reliefweb.int/sites/reliefweb.int/files/reliefweb\\_pdf/node-419638.pdf](http://reliefweb.int/sites/reliefweb.int/files/reliefweb_pdf/node-419638.pdf) (accessed 18 October 2011); FAO *Save and Grow: a policymaker's guide to the sustainable intensification of smallholder crop production* (2011) vii.

<sup>168</sup> Ibid at viii.

<sup>169</sup> The International Code of Conduct on the Distribution and Use of Pesticides was adopted by the Hundred and Twenty-third Session of the FAO Council in November 2002.

<sup>170</sup> FAO op cit note 167 at viii.

<sup>171</sup> Ibid.

<sup>172</sup> Ibid at ix.

- agriculture and livestock productivity through sustainable management of natural resources adapted to climate change;
- value chain development and private sector investment to boost commercialized agricultural development; and
- institutional collaboration and knowledge sharing in relation to food security, agricultural development and poverty actions.<sup>173</sup>

### 3.3.3 The Consultative Group on International Agricultural Research (CGIAR)

The Consultative Group on International Agricultural Research (CGIAR), established in 1971, is a global partnership, of organisations engaged in research for sustainable development.<sup>174</sup> CGIAR has the vision of reducing poverty and hunger, improving human health and nutrition, and enhancing ecosystem resilience through high-quality international agricultural research, partnership and leadership.

Today, CGIAR works in partnership with the Rwanda Agriculture Board (RAB) in conducting joint research and development of projects on different commodities and other thematic issues in agriculture, which profits biodiversity conservation and agricultural development.<sup>175</sup>

### 3.3.4 Biodiversity International

The main purpose of Biodiversity International is to investigate the conservation and use of agricultural biodiversity in order to achieve better nutrition, improve smallholders' livelihoods and enhance agricultural sustainability.<sup>176</sup> The organisation has developed a world-class network of research partners.<sup>177</sup> It leads important scientific efforts to improve

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<sup>173</sup> *FAO in Rwanda* available at <http://coin.fao.org/cms/world/rwanda/Home.html>, accessed on 2 February 2015.

<sup>174</sup> CGIAR unites 15 agricultural research centers: Africa Rice Center, Bioversity International, CIAT - Centro Internacional de Agricultura Tropical, CIFOR - Center for International Forestry Research, CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo, CIP - Centro Internacional de la Papa, ICARDA - International Center for Agricultural Research in the Dry Areas, ICRISAT - International Crops Research Institute for the Semi-Arid Tropics, IFPRI - International Food Policy Research Institute, IITA - International Institute of Tropical Agriculture, ILRI - International Livestock Research Institute, IRRI - International Rice Research Institute, IWMI - International Water Management Institute, World Agroforestry Centre (ICRAF), and World Fish Center.

<sup>175</sup> K Flaherty & J M Munyengabe *Rwanda recent developments in agricultural research* (2011) 3.

<sup>176</sup> Biodiversity International *Introducing Biodiversity International* available at [www.biodiversityinternational.org](http://www.biodiversityinternational.org) (accessed 10 December 2011).

<sup>177</sup> *Ibid.*

and diversify farming systems, ensure the conservation of valuable plant genetic resources. The organisation aims also to shape both international policy in favour of agricultural biodiversity and how domestic policies and laws impact sustainable use and conservation of genetic resources used in agriculture. As an example, in the area of sustainable agriculture, Biodiversity International launched a major study to examine the way farmers use crop biodiversity to combat pests and diseases in four countries.<sup>178</sup> In the area of impact of policies and laws regarding conservation of genetic resources in agriculture, its research mainly relates to access and benefit-sharing, intellectual property, mechanisms to promote farmers' rights and the implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture.<sup>179</sup>

Biodiversity International works on different projects in partnership with 96 developing countries, including Rwanda.<sup>180</sup> An example of such a project was the research on "Strengthening national capacities to implement the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)". The project was carried out in height countries, including Rwanda.<sup>181</sup>

### 3.3.5 International Federation of Organic Agriculture Movements (IFOAM)

IFOAM is the international umbrella organization of the organic agriculture movement worldwide.<sup>182</sup> Its members comprise associations, institutions, businesses and non-profit organizations whose activities are predominantly organic.<sup>183</sup> It started in 1972<sup>184</sup> and has a mission of leading, uniting and assisting the organic movement in its full diversity,

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<sup>178</sup> The study was conducted in China, Ecuador, Morocco and Uganda under the funding of UNEP-GEF, Swiss Development Corporation (SDC) and FAO.

<sup>179</sup> Available at [http://www.biodiversityinternational.org/research/policy\\_law.html](http://www.biodiversityinternational.org/research/policy_law.html) (accessed 20 August 2012).

<sup>180</sup> Biodiversity International *Biodiversity International Key Facts* (2011) 3.

<sup>181</sup> Ronnie Vernooy & Michael Halewood *Strengthening national capacities to implement the International Treaty on Plant Genetic Resources for Food and Agriculture* (2012) (Report of the Research Planning and Training Workshop: 2-4 May 2012, Rome Italy). Partnering institutions are the Secretariat on the International Treaty on Plant Genetic Resources for Food and Agriculture, CIAT, some universities from UK, Belgium and USA and other countries where research is conducted are Côte d'Ivoire, Burkina Faso, Uganda, Costa Rica, Guatemala, Nepal and Bhutan.

<sup>182</sup> IFOAM defines "organic agriculture" as a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

<sup>183</sup> IFOAM *IFOAM Information Brochure* available at [http://www.ifoam.org/about\\_ifoam/pdfs/IFOAM\\_GI\\_screen\\_en.pdf](http://www.ifoam.org/about_ifoam/pdfs/IFOAM_GI_screen_en.pdf), accessed on 10 December 2011.

<sup>184</sup> *Ibid.*

particularly aiming toward the worldwide adoption of ecologically, socially and economically sound systems that are based on the principles of organic agriculture.<sup>185</sup> As of 8 August 2015, IFOAM has 815 affiliates from 120 countries ;<sup>186</sup> two of them come from Rwanda.<sup>187</sup>

### 3.3.6 The World Bank

The World Bank (WB) is a vital source of financial and technical assistance to developing countries around the world. It started in 1944 as a single institution but later expanded to an associated group of coordinated development institutions.<sup>188</sup> It started with the mission of facilitating post-war reconstruction and development but currently has the mandate of worldwide poverty alleviation and shared prosperity. The WB now focuses on varied projects including those targeting agriculture.<sup>189</sup> In its mission of poverty alleviation, the World Bank has been drawing the connections between environment, development and poverty reduction. It recognises biodiversity as the natural capital that supports ecosystem functions which provide the flow of ecosystem goods and services necessary for poverty alleviation. The World Bank recognises that biodiversity is particularly important for the poor and one of the measures to lift them out of poverty is financing projects including those aiming at integrating biodiversity conservation into production landscapes. This is obviously applicable to conservation of biodiversity into agricultural development activities. In Rwanda the World Bank funds different projects including those aiming at helping farmers manage marshland and hillside cropping, which are important in agriculture development and biodiversity conservation.<sup>190</sup>

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<sup>185</sup> Principles of Organic Agriculture developed by IFOAM are the principle of health, ecology, fairness and care.

<sup>186</sup> IFOAM *The organic movement worldwide: membership e-directory 2015* available at [http://www.ifoam.bio/sites/default/files/directory\\_2015updated\\_lowres.pdf](http://www.ifoam.bio/sites/default/files/directory_2015updated_lowres.pdf), accessed on 8 August 2015.

<sup>187</sup> These are COOPAC LTD and POSADA.

<sup>188</sup> Five organisations of the World Bank are the International Bank for Reconstruction and Development, the International Development Association, the International Finance Corporation, the Multilateral Investment Guarantee Agency and The International Centre for Settlement of Investment Disputes.

<sup>189</sup> 'The World Bank Group Archivists' Chronology: 1944-2013' available at <http://www.worldbank.org/en/about/archives/history/chronology> accessed on 3 December 2015.

<sup>190</sup> Rwanda became a member of the WB since 1963. For example, in August 2014, the WB approved a grant of US\$ 9.3 million for the Government of Rwanda to help boost land management of the Gishwati and Mukura forests and improve the environment, local livelihoods, and climate resilience. This information is available at <http://www.worldbank.org/en/country/rwanda/projects> accessed on 3 December 2015.

### 3.3.7 The African Development Bank

The African Development Bank (AfDB) was established in 1964 and has a mission of contributing to the economic and social progress of its regional member countries, individually and collectively, and thus contributing to poverty reduction. The AfDB has an environmental policy and acknowledges that environmental concerns should be integrated into economic development policies to reduce their negative externalities while enhancing positive externalities. According to the AfDB, the economic growth must be sustainable. This is possible when the natural capital –mainly biodiversity- that nurtures it is preserved and enhanced.<sup>191</sup> In addition, the AfDB has an agriculture sector strategy which has natural resources (such as land and water) management as one of its pillars.<sup>192</sup>

The AfDB funds programs in agriculture and food security, biodiversity conservation, land and water management, sustainable energy, and activities to combat climate change. For example, in Rwanda and Burundi, the AfDB finances the project having the objective of improving food security in Bugesera region by increasing agricultural production. The project assists in building irrigation infrastructure, access roads and storage facilities, increasing agricultural production and conserving water and the soil; which is beneficial to the conservation of biodiversity components and agricultural development.<sup>193</sup>

## 3.4 CONCLUSION

This chapter has found that there are different international environmental agreements adopted due to the concern of growing environmental degradation and which contribute to the protection of biodiversity against the detrimental effects of agricultural operations. Such conventions regulate environmental issues such as biodiversity, plant resources for food and agriculture, desertification, potentially toxic substances, such as pesticides and fertilisers that pollute the environment, climate change, wetlands, nature and natural resources and others. Although many of these agreements do not regulate expressly the conservation of biodiversity in agriculture, the either positive or negative way some of their obligations are formulated

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<sup>191</sup> AfDB *African Development Bank Group's policy on the environment* (2004) iv.

<sup>192</sup> African Bank Development Group *Agriculture Sector Strategy* (2010) iii-iv.

<sup>193</sup> AfDB *Bugesera natural region rural infrastructure support project (pair): Multinational Rwanda-Burundi Project appraisal report* (2009) available at [http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Burundi\\_-\\_Rwanda\\_-\\_Bugesera\\_Natural\\_Region\\_Rural\\_Infrastructure\\_Support\\_Project\\_PAIR\\_-\\_Appraisal\\_Report.pdf](http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Burundi_-_Rwanda_-_Bugesera_Natural_Region_Rural_Infrastructure_Support_Project_PAIR_-_Appraisal_Report.pdf) accessed on 3 December 2015.



lead to the inclusion of that issue in their implementation. The obligations that most of the conventions establish -that apply to the relationship between agriculture and biodiversity – are:

- sustainable use of biodiversity components;
- adoption of *in-situ* and *ex-situ* conservation measures;
- conservation of nature and natural resources ;
- protection of particular ecosystems;
- establishment of incentive measures to promote both biodiversity conservation and economic viability of individuals, farmers or other stakeholders;
- public participation, education, awareness and research with special consideration of women, youth and the least educated;
- use of impact assessments;
- consideration of how to handle biotechnology;
- elimination or restriction of dangerous agrochemicals;
- prevention of desertification ; and
- consideration of climate change adaptation in agriculture and biodiversity conservation.

Chapter three revealed that, in Rwanda, some of these obligations are sufficiently implemented, while others are either implemented in a limited way or not implemented at all. It was also noted that Rwanda’s national efforts to implement the obligations of the discussed international conventions are vitally supplemented by the activities of some international institutions.

Having discussed the international regulatory and institutional framework supporting biodiversity conservation in harmony with agricultural development, the following chapter examines the applicable Rwandan policy, legal and institutional regime.

**CHAPTER FOUR:  
THE NATIONAL POLICY, REGULATORY AND INSTITUTIONAL REGIME FOR  
BIODIVERSITY AND AGRICULTURE**

#### **4.1 INTRODUCTION**

This chapter outlines the policy, legal and institutional regime for biodiversity conservation in Rwanda. From the point of view that biodiversity issues are not adequately considered or integrated into the activities of different departments, particularly, of the agricultural sector, this regime is not well developed. The relevant policies do not adequately incorporate the important strategies to ensure both biodiversity conservation and agricultural development. Additionally, laws and regulations in the agricultural sector are disparate and inadequately developed, as are the institutions that intervene in that field. The latter's interventions are spread across competing activities and interests, which weaken their contribution. Prior to considering the respective agriculture and biodiversity regulatory framework, the Rwandan biodiversity and agricultural policy framework is reviewed, thereafter, the constitutional position is outlined.

#### **4.2 THE BIODIVERSITY AND AGRICULTURAL POLICY FRAMEWORK**

##### **4.2.1 The 2003 Rwanda Environmental Policy**

The 2003 Rwanda Environmental Policy was the first policy on environment adopted in Rwanda. It applies to several sectors including agriculture and biodiversity conservation and its implementation requires involvement of all stakeholders in the social, political and economic sectors. This policy sets out the main and specific objectives and fundamental principles of the improved environmental management. It lays the foundation of the legal and institutional framework for environmental improvement and contains policy statements and strategic options for achieving improved environmental management in all sectors of activities.<sup>1</sup>

The Rwanda Environmental Policy recognises the need to reconcile the three pillars of sustainable development (environment, social and economic matters). It acknowledges that in Rwanda, environmental dimension has been poorly recognised by socio-economic sectors.

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<sup>1</sup> RoR *National Environmental Policy* (2003) 30,4-42.

With regards to agriculture and biodiversity, the environmental policy recognises that agricultural practices have contributed to the loss of biodiversity and environment degradation. The policy therefore intends to promote environment and biodiversity friendly agro-pastoral methods and techniques.<sup>2</sup> It also provides for the strategic actions necessary to improve the conservation and management of natural resources including those mostly used for agricultural purposes such as the land, water, wetlands and genetic resources.<sup>3</sup> While the 2003 Rwanda Environmental Policy is the first policy dedicated to the environment improvement; it applies generally to all sectors and it does not sufficiently detail the strategic actions to improve biodiversity conservation throughout agricultural activities.

#### 4.2.2 The 2011 Rwanda Biodiversity Policy

The 2011 Rwanda Biodiversity Policy aims at:

conserving biodiversity, sustaining integrity, health and productivity of biodiversity ecosystems and ecological processes while providing lasting development benefits to the country through the ecologically sustainable, socially equitable, and economically efficient use of biological resources.<sup>4</sup>

The Biodiversity Policy acknowledges the contribution of, among other things, agricultural development to biodiversity degradation and sets up the framework for effective strategic actions to save biodiversity and promote sustainable use.<sup>5</sup> It is greatly important in reconciling biodiversity conservation and agriculture as it calls for conservation of agrobiodiversity and requires integration of biodiversity conservation into agricultural practices. The strategies identified by the Biodiversity Policy to achieve this include:

- generation of data on the status and trends of Rwanda's agrobiodiversity;
- continuous agricultural biodiversity assessment and monitoring;
- integration of agro-biodiversity into national and sectoral biodiversity and land use planning policies and decision-making processes;
- effective implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture;
- use of traditional knowledge; and

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<sup>2</sup> Id at 18-21, 35.

<sup>3</sup> Id at 32-34.

<sup>4</sup> RoR *Rwanda Biodiversity Policy* (2011) 6.

<sup>5</sup> Id at 2.

- development of institutional, policy and legal guidelines and provisions for the conservation of agro-biodiversity and agro-ecosystems.

Most of the Rwanda Biodiversity Policy's provisions were translated into the Law on Biodiversity adopted in 2013. The latter is very important though the implementation of some of its provisions that are important in reconciling biodiversity conservation and agriculture is still problematic as discussed later in this chapter.<sup>6</sup>

#### **4.2.3 The 2004 National Land Policy**

The main objective of the Rwandan National Land Policy adopted in 2004 is to establish a land tenure system which ensures land tenure security for all Rwandans and guide the necessary land reforms for good management and wise use of land resources.<sup>7</sup> It therefore focuses much on how land ownership rights should be ensured through land law. The Land Policy establishes general principles that should guide land use, management and development in Rwanda. One of its principles important to mention is the recognition of the land as the common heritage for the past, present and future generations.<sup>8</sup> The latter calls for conservation and sustainable use of the land for all purposes including agricultural purposes. The Rwanda National Land Policy instituted the land reform which required the establishment of a land law that was necessary to guide the judicious use and management of the land resource to increase the country's economy and fight poverty.<sup>9</sup> The land law was adopted one year later in 2005 and repealed later in 2013.

The National Land Policy acknowledges the contribution of agricultural activities to land or soil degradation. However, it does not set out clear strategic options which should be respected in the interest of land conservation. The Land Policy has introduced some agricultural practices such as agricultural crop specialisation and land consolidation, aiming at increasing productivity. These practices were later incorporated in the Land Law but the said practices impact negatively Rwandan biodiversity as discussed in chapter two.<sup>10</sup> However, some strategies identified for the implementation of the Land Policy are important

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<sup>6</sup> See paragraph 4.3.3.

<sup>7</sup> RoR *National Land Policy* (2004) 22.

<sup>8</sup> Id at 22-24.

<sup>9</sup> Id at 9.

<sup>10</sup> Id at 17-18, 42.

in both agricultural development and biodiversity conservation. For example, The Land Policy provides that water and soil conservation should be the basic element that decision-makers, technicians and farmers should accord a great importance. In addition, the Policy promotes the use of agro-forestry, which was later incorporated in the Forest Law. Further, it identifies the prohibition of overgrazing and pasture burning as an important strategy for rational land use.<sup>11</sup> Moreover, the Land Policy identifies land use planning and land categorisation as strategies to facilitate rational land use. It specifically provides that for agricultural development, it is important to have inventories of land, water and vegetation resources. For that purpose, maps must be developed and the later are important for conducting studies on soil capability, land development, hydro-agricultural development, farm management and other agricultural development related activities. This is important for biodiversity conservation.<sup>12</sup>

#### **4.2.4 Rwanda Vision 2020**

The Rwanda Vision 2020 is a long-term development framework for Rwanda adopted in 2000, which presents key priorities and provides the guiding tool for the future. It aims to transform Rwanda into a middle income nation in which citizens are healthier, educated and more prosperous.<sup>13</sup> The Vision has six pillars which include the pillar of productive and market-oriented agriculture<sup>14</sup> and is blended together with other three cross-cutting issues, one of them being protection of environment and sustainable natural resources management.<sup>15</sup>

As regards the pillar of productive and market-oriented agriculture, the Vision 2020 aims to abandon an agriculture that performs poorly with a consistent declining productivity and promote an agriculture intensification to increase agricultural productivity and growth. Some of the areas prioritised to achieve the intended agricultural transformation include extensive research and extension services, use of high yielding varieties and intensive input use -especially fertilisers- and environmental control measures to halt the decline in soil

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<sup>11</sup> Id at 43; See also paragraph 4.3.5 ;

<sup>12</sup> RoR National Land Policy (2004) 48.

<sup>13</sup> RoR *Rwanda Vision 2020* (2000) 11.

<sup>14</sup> Other five pillars are : good governance and a capable state, human resource development and a knowledge based economy, a private sector led economy, infrastructure development and regional and international economic integration.

<sup>15</sup> RoR *Rwanda Vision 2020* (2000) 11.

fertility.<sup>16</sup> As the Vision 2020 gives the general guidance, these key areas in agricultural transformation were later developed in the Strategic Plan for the Transformation of Agriculture in Rwanda. It is very clear that the increasing use of fertilisers and high yielding varieties is founded in the Vision 2020. However, as discussed in different parts of this research, the use of fertilisers and high yielding varieties, accompanied by lack of legal measures to control their negative impacts on the environment, produces negative consequences on biodiversity.

For the cross-cutting issue of environment and natural resources management, the Vision 2020 recognises the problem of imbalance between the population and natural resources and calls for a sustainable management of natural resources. It provides that this can be achieved through implementation of adequate land and water management techniques and a sound biodiversity policy. Water and biodiversity policies and laws are therefore rooted in Vision 2020 policy. However, as this research is concerned, though Vision 2020 provides that, there is still a problem in the management of land and water in agricultural activities as discussed in chapter five.

#### **4.2.5 The Economic Development and Poverty Reduction Strategy (EDPRS)**

The Economic Development and Poverty Reduction Strategy is a medium term framework for achieving the long term development framework provided in the Vision 2020 and the Millenium Development Goals. It was first established in 2002 under the name of Poverty Reduction Strategy Paper (PRSP) to guide the country's development endeavours for a period of five years (2002-2006). In that period, the focus was on six priority areas of rural development and agricultural development, human development, economic infrastructure, private sector development and capacity-building.<sup>17</sup> As regards agricultural development, the objective was to transform agriculture through the use of new inputs like fertilisers and pesticides, new seeds and improved livestock breeds to increase productivity, and strong support to agricultural research and extension. The Paper recognised that the use of fertilisers and pesticides needed to be accompanied by environmental actions to avoid soil

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<sup>16</sup> Id at 17.

<sup>17</sup> RoR *Poverty Reduction Strategy Paper* (2002) 6.

and water pollution.<sup>18</sup> In addition, this PRSP invoked that economic development had to be sustainable.<sup>19</sup>

In 2007 a new strategy was adopted with the name of Economic Development and Poverty Reduction Strategy 1 (EDPRS 1) as the continuation of PRSP of 2002. The assessment of the implementation of the PRSP revealed that while it made good progress in social sectors, the productive sectors which include agriculture remained a challenge. The EDPRS 1 was adopted to guide national economic and poverty reduction for a period of five years (2008-2012). EDPRS 1 prioritised the acceleration of growth, creation of employment and generation of exports under the flagships of sustainable growth for jobs and exports, vision 2020 *Umurenge* and good governance.<sup>20</sup>

In agriculture, EDPRS 1 prioritised, among other things, intensification of agriculture in both crop cultivation and animal husbandry. It encouraged the increase of husbandry and the use of inorganic mineral fertilisers and improved seeds. In environment, EDPRS 1 targeted the good management of environment and optimal utilisation of natural resources. To achieve this, the policy called for rehabilitation of degraded ecosystems, creation of protected areas for biodiversity preservation, increase of forest and agro-forest coverage, reduction of soil erosion and soil fertility decline, and mitigation and adaptation to climate change.<sup>21</sup>

Since 2013 Rwandan economic development is guided by the Economic Development and Poverty Reduction Strategy 2 (EDPRS 2), the continuation of EDPRS 1. This strategy will again apply for a period of five years (2013-2018). EDPRS 2 has four priority areas : economic transformation, rural development, productivity and youth employment and accountable governance. Each one of these thematic areas has respective priorities.<sup>22</sup> This research only focuses on two areas: agricultural development and biodiversity conservation. For agriculture, EDPRS 2 intends to increase agricultural productivity by focusing on irrigation and land husbandry, proximity extension services and connecting farmers to

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<sup>18</sup> Id at 36.

<sup>19</sup> Id at 71.

<sup>20</sup> Id at i. Vision 2020 *Umurenge* is the integrated rural development programme to eradicate extreme poverty and release the productive capacities of the poor.

<sup>21</sup> Id at 37.

<sup>22</sup> RoR *Economic Development and Poverty Reduction Strategy 2* (2013) 14.

agribusiness.<sup>23</sup> Concerning environment, EDPRS 2 calls for mainstreaming environmental sustainability into productive and social sectors, reduction of vulnerability to climate change and pollution prevention. It specifically states that agriculture is one of the key sectors expected to deliver on these areas.<sup>24</sup> This obviously concerns biodiversity conservation in agricultural activities.

#### **4.2.6 The Strategic Plan for Agricultural Transformation in Rwanda (SPAT)**

The first Strategic Plan for the Agricultural Transformation in Rwanda (SPAT) was first adopted in 2004 in the framework of implementation of Vision 2020 and the Poverty Reduction Strategic Paper. It was applied in the period of four years (2005-2008). SPAT had different priority areas, the first one being intensification and development of sustainable production systems.<sup>25</sup> In 2009, a Strategic Plan for the Transformation of Agriculture was adopted and used for the period 2009-2012. Its objectives were to update the 2004 SPAT to align it with other national strategies such as Vision 2020 and EDPRS.<sup>26</sup> It had the same priority areas as those developed under 2004 SPAT but detailed sub-programme specifications more fully in different areas and described activities as concrete as possible.

Today, the transformation of agriculture is guided by the 2013 Strategic Plan for Agricultural Transformation. The latter has the key goals of transforming Rwandan agriculture from a subsistence sector into a market-oriented and value sector and growing rapidly agricultural production and commercialisation to increase rural development and poverty reduction. The 2013 SPAT is built on four pillars: land, irrigation, inputs and infrastructure; soft skills and farmer capacity; value chains and markets; and private sector investment. It recognises environmental sustainability as one of the principles that should guide its implementation.<sup>27</sup> However, it does not give details on how environment and biodiversity are safeguarded during the agricultural transformation process.

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<sup>23</sup> Id at 44.

<sup>24</sup> Id at 91.

<sup>25</sup> RoR *Strategic Plan for Agricultural Transformation in Rwanda* (2004) 38-42.

<sup>26</sup> RoR *Strategic Plan for Agricultural Transformation in Rwanda* (2009) v.

<sup>27</sup> RoR *Strategic Plan for Agricultural Transformation in Rwanda* (2013) v, 10, 12.



#### 4.2.7 The Crop Intensification Program Strategies

The Crop Intensification Program (CIP) is a program implemented by the Ministry of Agriculture and Animal Resources with the objective of increasing agricultural productivity.<sup>28</sup> It was adopted in alignment with the broader agenda of international and regional development agencies like Millennium Development Goals (now replaced by Sustainable Development Goals) and New Partnership for Africa's Development (particularly in the implementation of its Comprehensive Africa Agriculture Development Program (CAADP)). The CIP is also in alignment with other national development policies such as Vision 2020, the Economic Development and Poverty Reduction Strategies and the Strategic Plan for Agricultural Transformation discussed above. The CIP strategies focus on six priority crops of maize, wheat, rice, Irish potatoes, beans and cassava.<sup>29</sup> CIP obliges compulsory regional specialization, monoculture, and grouping farmers into associations. To respond to this, the government instituted the system of land use consolidation, monoculture and rearing of modern livestock varieties, and facilitation of inputs (improved seeds and fertilisers).<sup>30</sup> As mentioned in chapter two,<sup>31</sup> all this, accompanied by a lack of effective agricultural and environmental laws, contribute to loss of biodiversity.

#### 4.2.8 The 2010 Rwanda National Gender Policy

The Rwanda National Gender Policy was first adopted in 2004 and updated in 2010. It supports the Rwandan government's commitment to promote a society free from all forms of discrimination and injustice. It is based on the commitment to promote full and effective participation of all citizens, men and women, in the national development process as gender equality is considered as a development goal.<sup>32</sup> This policy is in alignment with the Vision 2020, Economic Development and Poverty Reduction Strategy which mention gender as a cross-cutting issue to consider in all activities aiming at poverty reduction and sustainable development. The National gender Policy specifically targets increase of women's level of participation in the development process and calls for their representation in all related

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<sup>28</sup> Ministry of Agriculture and Animal Resources *Strategies for Sustainable Crop Intensification in Rwanda: Shifting focus from producing enough to producing surplus* (2011) 19.

<sup>29</sup> Ibid.

<sup>30</sup> Id at 13-16.

<sup>31</sup> Paragraph 2.4.2.

<sup>32</sup> RoR *National Gender Policy* (2010) 17, 19.

decision-making organs.<sup>33</sup> Therefore agricultural development and biodiversity conservation in Rwanda should also consider gender issues. The policy recognises that, in Rwanda, activities aiming at agricultural transformation from subsistence agriculture into market-oriented agriculture can be efficiently undertaken if gender -especially the participation of women- is considered because women are employed in subsistence agriculture in vast majority (87.6%).<sup>34</sup> In this regard, the National Gender Policy calls for an increase of women's capacity and requires that agricultural assets be provided to them.<sup>35</sup>

In addition, the National Gender Policy promotes equal participation of women and men in environmental protection and land use.<sup>36</sup> It calls for guaranteeing to all the protection of their land rights and calls for an effective training and participation of women in environmental impact assessment.<sup>37</sup>

The National Gender Policy is important in biodiversity conservation which has to be considered in agricultural development processes. As argued by Woroniuk and Schalkyk, paying attention to gender-based differences and roles, especially women's roles, strengthen biodiversity initiatives.<sup>38</sup>

#### **4.2.9 Critiques to the Rwandan agricultural development and biodiversity policies**

Different policies examined above contribute to the prevention of tensions between biodiversity conservation and agricultural development in Rwanda. They have the objective of promoting agricultural development to ensure food security and reduce poverty and require environment conservation in all developmental initiatives. In establishing principles that should guide the government's actions in different matters (environment, biodiversity, land use, development aspirations, poverty reduction, agricultural transformation and gender issues), all discussed policies contain sections on environment or biodiversity protection and agricultural development. However, their contribution to the prevention of tensions between agricultural development and biodiversity conservation is limited. On one hand, policies like the Rwanda Environment Policy, the National Land Policy, Vision 2020 and National Gender

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<sup>33</sup> Id at 10, 17.

<sup>34</sup> Id at 16.

<sup>35</sup> Id at 18, 21, 23.

<sup>36</sup> Id at 16.

<sup>37</sup> Id at 27.

<sup>38</sup> B Woroniuk & J Schalkwyk *Biodiversity and equality between women and men* (1998).

Policy are general. They establish general guidelines and principles that apply to their respective matters. They do not provide enough detailed and specific strategic actions that should be undertaken in pursuing agricultural development in harmony with biodiversity conservation. On the other hand, the Economic Development and Poverty Reduction Strategy, the Strategic Plan for Agricultural Transformation in Rwanda and the Crop Intensification Program put much emphasis on agricultural development to increase productivity, ensure food security and reduce poverty. Though they acknowledge the importance of conserving environment and biodiversity, they do not give adequate consideration to the impacts of agricultural activities on biodiversity. They do not provide for proper strategic options to be undertaken in the interest of both agricultural development and biodiversity conservation. In their implementation, agricultural development is more prioritised than biodiversity and environment conservation. These two reasons limit the contribution of the discussed policies to biodiversity conservation, sustainable agricultural development and sustainable development itself. This consequently limits the contribution of Rwandan environmental and agricultural laws to the protection of biodiversity against negative impacts of agriculture since the laws are mostly drafted basing on established policies.

Having reviewed rwandan agricultural development and biodiversity conservation policies, it is necessary to examine the related legal framework, outlining, first, the constitutional position.

## **4.3 THE CONSTITUTIONAL AND LEGAL FRAMEWORK**

### **4.3.1 The 2003 Constitution**

#### *4.3.1.1 Background*

Rwanda adopted a new constitution in 2003, which replaced the 1991 constitution, in the aftermath of the 1994 Genocide perpetrated against Tutsi.<sup>39</sup> Like any other constitution, the Rwandan Constitution is an essential element to manage the state and an important document to guarantee rights to all its people. The Rwandan Constitution is the supreme law and any

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<sup>39</sup> It is important to note that, at the time of finalising this thesis (8 December 2015), the 2003 Constitution is under extensive review process.

other law enacted should be in conformity with it.<sup>40</sup> Therefore, all environmental -and biodiversity-related laws adopted in Rwanda that contribute to the protection of biodiversity against negative effects of agricultural development are founded in the Constitution.

#### *4.3.1.2 The constitutional environmental right*

The Rwandan Constitution is the basis for reconciling biodiversity conservation and agriculture through realization of the right of every citizen to a clean and healthy environment as provided in Article 49, which states:

Every person has a right to a clean and healthy environment.

Every person has the duty to protect, safeguard and promote the environment. The State shall ensure the protection of environment.

The law determines the modalities for protecting, safeguarding and promoting the environment.

A clean and healthy environment means an environment that is adequate for the health or well-being of the people.<sup>41</sup> To ensure that right, the environment should be protected through legislative or other measures to free it from pollution and degradation.<sup>42</sup> Therefore, all activities or practices, including agricultural ones, which can cause pollution or ecological degradation need to be prohibited or controlled. This constitutional provision entitling an environmental right to citizens echoes constitutional provisions of some other African countries like Kenya,<sup>43</sup> Uganda<sup>44</sup> and South Africa.<sup>45</sup>

There is a connection between the right to a clean and healthy environment and other human rights, because the environment is essential to the enjoyment of basic human rights<sup>46</sup> and it is possible to address environmental issues through civil or socio-economic rights, such as the right to life, to health, to property, and so forth. The degradation of the environment and biodiversity resulting from agricultural activities affects all Rwandans, all of whom are

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<sup>40</sup> Preamble and Article 200 of the Rwandan Constitution.

<sup>41</sup> S Atapattu 'The right to a healthy life or the right to die polluted?: The emergence of a human right to a healthy environment under international law' (2002-2003) 16 *Tulane Environmental Law Journal* 65 at 115.

<sup>42</sup> UN. Doe. E/CN.4/Sub.2.1994 Final Report on UN Draft principles on human rights and the environment at 75.

<sup>43</sup> Section 42 Kenyan Constitution.

<sup>44</sup> Article 39 Ugandan Constitution.

<sup>45</sup> Section 24 South African Constitution.

<sup>46</sup> Preamble of the 1972 Stockholm Declaration.

entitled to these rights.<sup>47</sup> For example, soil or water pollution caused by agrochemicals severely affects people's health and the possibility of a decent living.

In addition, as quoted above, Article 49 of the Rwandan Constitution creates a duty for everyone and the State to protect the environment, meaning that neither the State nor individuals may engage in practices that degrade the environment and biodiversity including agricultural practices. They also have responsibility to take any other necessary action to protect the environment and biodiversity, such as adopting laws and policies in different fields, including the agricultural field.

#### **4.3.2 The Environmental Framework Law (Organic Law n° 04/2005 of 08/04/2005)**

The Environmental Framework Law is a law of general application to all environmental matters in Rwanda including biodiversity. It gives to every person and the State the duty to protect, conserve and promote the environment.<sup>48</sup> It determines the modalities of protecting, conserving and promoting the environment and applies to all sectors of activities that may conflict with biodiversity conservation including agriculture as reflected in its different provisions.

##### *4.3.2.1 Environmental Framework Law and Sustainable Development*

Sustainable development is described as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.<sup>49</sup> The Environmental Framework Law refers, in Article 7 (2), to sustainable development as follows:

Human beings are central to sustainable development. They are entitled to the right of a healthy and productive life in harmony with nature. However, the right to development must be achieved in consideration of the needs of present and future generations.

Sustainable development applies generally to the protection of the environment and biodiversity in all sectors of development. It is the cornerstone principle that governs the exploitation of biodiversity resources such as land/soil, water, plant and animal genetic

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<sup>47</sup> Articles 12, 29, 37 and 41 of the Rwandan Constitution.

<sup>48</sup> Articles 3 and 5, Environmental Framework Law.

<sup>49</sup> WCED *Our Common Future* (the Brundtland Report) (1987) 43.

resources, which are exploited for the purpose of agricultural development. Therefore, agricultural development should not compromise the ability of future generations to meet their needs in relation to exploitation of biodiversity resources used in agriculture.

Sustainable development is fleshed out in a number of principles discussed in paragraph 4.3.2.4.

#### 4.3.2.2 Objectives (Article 1)

The Environmental Framework Law provides for different objectives in Article 1, and inherent in these objectives is the conservation of biodiversity in the agricultural sector. The first objective of the Environment Framework Law is to conserve the environment, people and their habitats.<sup>50</sup> This applies to conservation of biodiversity and habitats in all sectors, including agriculture.

The second objective of the Environmental Framework Law is both to set up fundamental principles related to the protection of the environment with the intention of promoting the natural resources of Rwanda, and to discourage any hazardous and destructive means.<sup>51</sup> In this regard, this law establishes different principles of environmental law, which are relevant to the conservation of biodiversity in the agricultural sector as examined below.<sup>52</sup> Also, this law is the foundation of the rational use of natural resources ; the use that enables more sustainable consumption and production and use of non-renewable resources in ways that do not endanger or damage the resources.<sup>53</sup> The biodiversity resources used in agriculture, such as land/soil, water, plant and animal genetic resources have to be managed rationally in accordance with this objective. In addition, the Environmental Framework Law intends to discourage any means that destroy the environment.

The third objective of the Environmental Framework Law is to consider the durability of the resources, with an emphasis especially on the equal rights of present and future

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<sup>50</sup> Article 1 (1) of Organic Law n° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of the environment in Rwanda (Environmental Framework Law) *O G* no 9 of 01/05/2005. This objective is spelt out as it appears in the Government Official Gazette.

<sup>51</sup> Article 1 (2), Environmental Framework Law.

<sup>52</sup> Paragraph 4.2.2.4.

<sup>53</sup> Jane Holder & Maria Lee *Environmental protection, law and policy* 2ed (2007) 704.

generations.<sup>54</sup> To ensure that present and future generations have equal rights to the environment, biodiversity resources exploited in agriculture have to be conserved.

The fourth objective of the Environmental Framework Law is guaranteeing all Rwandans sustainable development, which does not harm the environment and the social welfare of the population.<sup>55</sup> As sustainable development is discussed above,<sup>56</sup> this objective governs the exploitation of natural resources, including those exploited for agricultural development

The fifth objective of the Environmental Framework Law is to set up strategies for protecting and reducing negative effects on the environment and rehabilitating the degraded environment.<sup>57</sup> In compliance with this objective, it is necessary to establish strategies to reduce the negative impacts of agricultural practices on biodiversity and rehabilitate, when necessary and possible, the biodiversity components degraded by such practices.

#### *4.3.2.3 Scope of the Environmental Framework Law*

The Environmental Framework Law covers a wide range of issues including those relevant to agriculture such as dumping, discharging and storing substances or chemical products that may degrade the area of placement, harm human health, soil and sub soils, water, flora and fauna, and environment in general.<sup>58</sup> It additionally refers to activities carried out in critical ecosystems.<sup>59</sup> Though agriculture is not explicitly mentioned, it is implicitly covered. Substances and chemical products referred to include agrochemicals that are dangerous to the environment, human health, soil and subsoil, water, flora and fauna. They cannot be used without authorisation issued in accordance with the laws.<sup>60</sup> Also, agricultural activities cannot be carried out in critical ecosystems without authorisation.<sup>61</sup>

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<sup>54</sup> Article 1 (4), Environmental Framework Law.

<sup>55</sup> Article 1 (5) Environmental Framework Law.

<sup>56</sup> See paragraph 4.2.2.1.

<sup>57</sup> Article 1 (6) Environmental Framework Law.

<sup>58</sup> Article 8 para 1 Environmental Framework Law.

<sup>59</sup> Article 9 para 1 Environmental Framework Law.

<sup>60</sup> Article 8 para 2 Environmental Framework Law.

<sup>61</sup> Article 1 Environmental Framework Law.

#### 4.3.2.4 Environmental law principles

The Environmental Framework Law provides for different environmental law principles that are relevant to the conservation of biodiversity in the agricultural sector, as canvassed below.

##### *Precautionary principle*

The precautionary principle is generally accepted to mean that States must act carefully and with foresight when taking decisions that concern activities that may have an adverse impact on the environment.<sup>62</sup> It requires regulation and possible prohibition of activities and substances which may be harmful to the environment even if no conclusive or overwhelming evidence is available as to the harm or likely harm they may cause to the environment.<sup>63</sup> It is outlined in the Rio Declaration and recognized by the preamble of the CBD<sup>64</sup> and the Environmental Framework Law refers to it as follows:

...activities considered or suspected to have negative impacts on the environment shall not be implemented even if such impacts have not yet been proved. Scientific uncertainty must not be taken into consideration for the benefit of the destroyers of the environment instead it may be used in conservation of the environment.<sup>65</sup>

The precautionary principle is generally accepted as being fundamental to biodiversity conservation in case of scientific uncertainty. Such uncertainty is likely to be observed in the field of biodiversity conservation in the agricultural sector. Consequently, the precautionary principle can be relied upon to reduce excessive damage caused to biological diversity by agriculture.

##### *Polluter-pays principle*

The polluter-pays principle originated as an economic principle, but since 1990 it has been recognized internationally as a legal principle.<sup>66</sup> As the name implies, the principle means

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<sup>62</sup> Jan Glazewski & Lisa Plit 'Towards the application of the precautionary principle in South African Law' (2015) 1 *Stellenbosch Law Review* 190 at 194.

<sup>63</sup> Philippe Sands et al *Principles of International Environmental Law* 3 ed (2012) 222.

<sup>64</sup> Principle 15 of the Rio Declaration states that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. The preamble to the CBD states that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimise such a threat.

<sup>65</sup> Article 7 (1) Environmental Framework Law.

<sup>66</sup>OECD Environment Directorate *The Polluter-Pays Principle: OECD Analyses and Recommendations* at 9



that the polluter has to bear the expenses of preventing, controlling, and cleaning up pollution.<sup>67</sup> Its meaning has changed in the decades, extending its application to preventive measures by polluters to the cost of government administrative actions occasioned by pollution.<sup>68</sup> The polluter-pays principle was explicitly articulated for the first time by the Organisation for Economic Cooperation and Development (OECD) in 1972<sup>69</sup> as one of the guiding principles concerning international aspects of environmental policies.<sup>70</sup> When it was discussed within the OECD, it was mainly directed at the industrial sector, without much attention paid to its application to agriculture and other non-point pollution sources, such as transportation and others.<sup>71</sup> This has changed and later in 1989 the OECD indicated that it should be applied to agriculture.<sup>72</sup>

The Rwandan Environmental Framework Law provides for the polluter-pays principle in the following terms:

Every person who demonstrates behavior or activities that cause or may cause adverse effects to the environment is punished or is ordered to make restitution. He or she is also ordered to rehabilitate it where possible.<sup>73</sup>

This provision applies to agricultural activities or practices that cause negative impacts on biodiversity, such as land, water and air pollution and destruction of biodiversity resources. For example, the unsustainable use of agrochemicals, the use of contaminated water for irrigation, and so forth have proven to cause pollution and damage biodiversity. The polluter-pays principle will oblige such polluters to make restitution or rehabilitation of the polluted area(s) where it is possible.

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Doc. OCDE/GD (92) 81 (1992) [hereinafter OECD PPP Analyses] cited in Margaret Rosso Grossman 'Agriculture and the Polluter Pays Principle' (2007) 11 *Electronic Journal of Comparative Law* available at <http://www.ejcl.org/113/Article113-15.pdf> (Accessed 9 November 2012).

<sup>67</sup> Jane A Tobey and Henri Smets 'The polluter-pays principle in the context of agriculture and the environment' (1996) 19 *The World Economy* 63 at 64.

<sup>68</sup> H Ch Bugge 'The Principles of "Polluter-Pays" in Economics and Law' in E Eide & R Van den Bergh (ed) *Law and Economics of the Environment* 53, 73-74 (1996) at 76-77 cited by Margaret Rosso Grossman op cit note 66 at 25.

<sup>69</sup> Idem at 1.

<sup>70</sup> Jane A Tobey & Henri Smets op cit note 67 at 63.

<sup>71</sup> Idem at 64.

<sup>72</sup> Margaret Rosso Grossman op cit note 66 at 1.

<sup>73</sup> Article 7 (3) Environmental Framework Law. This translation is as it appears in the Rwandan Official Gazette. No attempt to correct the translation was made as pointed out in the methodology section, Chapter one, paragraph 1.6.1.

### *Public Participation*

The principle of public participation has been repeatedly recognized in international legislation and policy instruments.<sup>74</sup> It is Principle 23 of the World Charter for Nature<sup>75</sup> and Principle 10 of the Rio Declaration.<sup>76</sup>

Two provisions of the Environmental Framework Law refer to the public participation principle:

Every person has the right to be informed of the state of the environment and to take part in the decision taking strategies aimed at protecting the environment.<sup>77</sup>

In environmental management, the population has the right to:

- 1° free access to sufficient information on the environment;
- 2° be given time to express their views on the environment;
- 3° representation in decision making organs on environmental issues;
- 4° training, sensitisation and access to findings of the research on the environment.<sup>78</sup>

The above mentioned provisions are relevant to the conservation of biodiversity in the agricultural sector. The effects of agricultural development on biodiversity can be prevented or reduced through public participation, especially participation of community farmers<sup>79</sup> and other people involved in agricultural activities, as will be discussed in more detail in chapter seven.

### *Environmental Impact Assessment*

An Environmental Impact Assessment (EIA) has the object to provide decision-makers with information about possible environmental effects when deciding whether a given activity may

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<sup>74</sup> 1972 Stockholm Declaration; Helsinki Conference of 1975 and Recommendation of the Council of Europe of 28 September 1977.

<sup>75</sup> Principle 23 of the World Charter for Nature states that all persons, in accordance with their national legislation, shall have the opportunity to participate, individually or with others, in the formulation of decisions of direct concern to their environment, and shall have access to means of redress when their environment has suffered damage or degradation.

<sup>76</sup> Principle 10 of the Rio Declaration states that: “Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided”.

<sup>77</sup> Article 7 (4) Environmental Framework Law.

<sup>78</sup> Article 63 Environmental Framework Law.

<sup>79</sup> FAO Sustainable Development Department (SD) *Plan of Action for People's Participation in Rural Development* (1991) available at <http://www.fao.org/sd/ppdirect/ppre0001.htm>, accessed on 26 September 2012.

be authorised to proceed or not.<sup>80</sup> Two provisions of the Environmental Framework Law refer to EIAs as follows:

Every project shall be subjected to an environmental impact assessment, before obtaining authorisation for its implementation. This applies to programmes and policies that may affect the environment....<sup>81</sup>

An order of the Minister having environment in his or her attributions establishes and revises the list of planned works, activities and projects, and of which the public administration shall not warrant the certificate, approve or authorise without an environmental impact assessment....<sup>82</sup>

These two provisions are supplemented by the Ministerial Order n°004/2008 of 15/08/2008 establishing the list of works, activities and projects that have to undergo an environmental impact assessment.<sup>83</sup> This regulation provides for four categories of concerned works, activities and projects. The second of the four categories concerns agriculture and animal husbandry. An EIA is necessary for all agricultural and breeding activities that use agrochemicals in wetlands, large-scale monoculture agricultural practices such as tea, coffee, flowers and pyrethrum, and works and activities that use bio-technology to modify seeds and animals.<sup>84</sup> In supplement to this, the Ministerial Order no. 003/2008 of 15/08/2008 provides for the requirements and procedure for an environmental impact assessment in Rwanda.<sup>85</sup> All these provisions on EIAs contribute to the conservation of biodiversity in agricultural activities and reflects the implementation of international obligations as discussed in chapter three.

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<sup>80</sup> John Glasson, Ricki Therivel & Andrew Chadwick *Introduction to Environmental Impact Assessment* 4 ed (2012) 3-7; See also Alexandre Kiss & Dinah Shelton *International Environmental Law* 3 ed (2004) 86-87; Patricia Birnie & Alan Boyle *International Law & the Environment* 2 ed (2002) 130.

<sup>81</sup> Article 67 Environmental Framework Law.

<sup>82</sup> Article 70 Environmental Framework Law. This quote is article 70 as it appears in the Rwandan Official Gazette. No attempt to correct the translation was made as pointed out in the methodology section, Chapter one, paragraph 1.6.1.

<sup>83</sup> Ministerial Order n°004/2008 of 15/08/2008 establishing the list of works, activities and projects that have to undergo an environmental impact assessment *O G* n° 22 of 15 /11/ 2008.

<sup>84</sup> Articles 1 and 2 para 1 and 2 and the annex to Ministerial Order n°004/2008 of 15 /08/ 2008 establishing the list of works, activities and projects that have to undertake an environmental impact assessment.

<sup>85</sup> Ministerial Order no. 003/2008 of 15/08/2008 relating to the requirements and procedure for environmental impact assessment *O G* n° 22 of 15/11/ 2008.

#### 4.3.2.5 Provisions on the use of biodiversity components used in agriculture

##### *Soil*

The Environmental Framework Law provisions require that Rwandan soil be preserved from all kinds of degradation and be used sustainably, rationally and in consideration of its nature; rotation may not be discouraged.<sup>86</sup> The soil has to be used sustainably because it is a habitat of living organisms and contains rich biodiversity, called soil biodiversity, meaning all organisms living in the soil.<sup>87</sup> Soil biodiversity is important in performance of key environmental functions necessary for agriculture, as will be discussed in chapter five. However, apart from the obligation to ensure soil rotation, the Environmental Framework Law provisions do not detail how the soil must be used sustainably, though it is advocated for in international environmental law as discussed in chapter three.<sup>88</sup>

##### *Water*

The Environmental Framework Law prohibits unfair methods of water resources exploitation which may lead to floods or drought.<sup>89</sup> It is also provided that any acts concerned with water resources like watering plants, the use of swamps and wetlands and others are subject to prior environmental impact assessments (EIA).<sup>90</sup> Additionally, swamps with permanent water are given special protection, which considers their role and importance in the preservation of biodiversity.<sup>91</sup>

These provisions contribute to the reduction of negative impacts that agricultural activities, related to water exploitation, may have on biodiversity and contributes to the encouragement of sustainable use of water required by international environmental conventions as mentioned in chapter three.<sup>92</sup>

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<sup>86</sup> Articles 11 7 12 Environmental Framework Law.

<sup>87</sup> Antony M Breure *Soil biodiversity: measurements, indicators, threats and soil functions* Paper presented at I International Conference on *Soil and compost eco-biology* (León – Spain, 15<sup>th</sup> – 17<sup>th</sup> September 2004) at 84.

<sup>88</sup> See paragraph 3.2.1.2 and 3.2.8.2.

<sup>89</sup> Article 17 paragraph 1 Environmental Framework Law.

<sup>90</sup> Article 17 paragraph 2 Environmental Framework Law.

<sup>91</sup> Article 19 Environmental Framework Law.

<sup>92</sup> See paragraphs 3.2.1.2 and 3.2.8.2.

### *Management of plant and animal species*

The Environmental Framework Law states that the introduction, importation and exportation of any animal or any plant of any species in Rwanda are governed by special rules.<sup>93</sup> It also adds that the importation and exportation of wild animals or products of wild animals and wild plants are governed by permission issued by competent authorities.<sup>94</sup> These two provisions play an important role in preventing or controlling the introduction, establishment or spread of new plant and animal species which may become invasive species and which can damage biodiversity, human beings or other aspects of the environment. It has to be noted that agriculture is the major source of introduction of new plant and animal species. Thus, subjecting their importation for agricultural purpose to a prior authorisation helps to manage their introduction. These provisions also prevent unsustainable management of wild plant and animal species for different purposes including agricultural ones and which may be the cause of biodiversity loss.

However, it will be argued, in chapter five, that these provisions are not effective to ensure prevention of tensions between conservation and use of soil, water, plants and animal species in agriculture.

#### *4.3.2.6 Prohibition of specific agricultural practices*

Article 38 prohibits burning forests, national parks and reserved areas, mountains, swamps, grazing lands, and bushes for the purpose of agriculture or establishing grazing land. The application of this provision ensures the protection of biodiversity since such activities destroy habitats, cause pollution and increase the unsustainable exploitation of biodiversity resources.

Articles 84 and 87 also prohibit all agricultural and pastoral activities at a distance of ten metres from the banks of streams and rivers, a distance of 50 metres from the banks of lakes, and in reserved swamps, except if they are related to research and science. This prohibition is important for the protection of biodiversity against the effects of agriculture

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<sup>93</sup> Article 20 Environmental Framework Law.

<sup>94</sup> Article 24 Environmental Framework Law.

since lakeshores, riverbanks and swamps are critical habitats for biodiversity. In addition, Article 91 prohibits the purchase, sale, export, import, transit, storage and piling of a diversity of chemicals and other polluting or dangerous substances including agrochemicals. This is relevant to biodiversity conservation in agriculture. This provision on the control of agrochemical substances facilitates implementation of the related international environmental conventions as pointed out in chapter three.<sup>95</sup> More details on this subject are given under paragraph 4.2.6.

#### *4.3.2.7 Obligations of different entities and the population*

The general application of this Law implies that every Rwandan and the State have both negative and positive duties toward the environment in general and biodiversity in particular. They therefore have the duty to make sure that the agricultural sector does not undermine the protection, conservation and promotion of biodiversity.

#### *General obligations*

The State, the population and land developers are obliged to sustainably exploit natural resources.<sup>96</sup> This means that natural resources exploited in agriculture, such as land/soil, water and animal or plant species must be managed in accordance with conservation laws.

#### *State's obligations*

In addition to the general obligation of sustainable exploitation of natural resources used in agriculture, the State has different obligations relevant to the conservation of biodiversity in the agricultural sector. These include:

- preparing plans of actions and emergency plans for environmental protection in all domains, including agriculture;<sup>97</sup>
- initiating a national policy on environment and ensuring its implementation;<sup>98</sup>

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<sup>95</sup> See paragraph 3.2.4.2.

<sup>96</sup> Article 45 Environmental Framework Law.

<sup>97</sup> Article 48 Environmental Framework Law.

<sup>98</sup> Article 50 (1) Environmental Framework Law.

- taking necessary measures to protect and respect the obligations stipulated in ratified international conventions,<sup>99</sup>
- establishing measures to control soil erosion, soil pollution by chemical substances, fertilisers and other chemical products and establishing measures to prevent diffusion of soil pollution, as well as concrete measures to rehabilitate degraded soils; and
- promote environmental education, training and sensitization.<sup>100</sup>

A few points of particular relevance here to Rwandan agricultural activities that impact biodiversity are soil erosion and polluting agricultural chemicals. Soil erosion is ranked as one of the most serious environmental problems with pervasive effects and long lasting damages, such as the reduction of the diversity of plants, animals and microbes, all components of biodiversity. Agriculture is one of the activities that contribute to soil erosion.<sup>101</sup> In Rwanda, agriculture practiced on the slopes of hills and mountains, coupled with deforestation has caused extensive land degradation and soil erosion,<sup>102</sup> Also, the ubiquitous use of chemical substances used in agriculture in Rwanda can cause pollution with resultant negative consequences for biodiversity. The State's obligations and its pertinent role are therefore critical for ensuring that agricultural practices do not impact negatively on biodiversity. However, respect for these obligations is a challenge to the State.

#### *Obligations of decentralized entities*

The decentralized entities have obligations that are relevant to the conservation of biodiversity and which concern agriculture. They have a general obligation to implement laws, policies, strategies, objectives and programmes relating to protection, conservation and promotion of the environment in Rwanda.<sup>103</sup> In addition, they are responsible for ensuring activities related to better management of land, such as soil erosion control, afforestation, protection and better management of forests, rivers, lakes, all sources of water and swamps.<sup>104</sup>

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<sup>99</sup> Article 49(2) Environmental Framework Law.

<sup>100</sup> Article 51 (1-3), 58 and 61 (1) Environmental Framework Law.

<sup>101</sup> David Pimentel & Nadia Kounang 'Ecology of Soil Erosion in Ecosystems' (1998) 1 *Ecosystems* 416 at 416 available at <http://www.springerlink.com/content/tc6206ax3gfld314/fulltext.pdf>, accessed on 16 October 2012.

<sup>102</sup> REMA Rwanda *state of environment and outlook: our environment for economic development* (2009) 34.

<sup>103</sup> Article 60 Environmental Framework Law.

<sup>104</sup> Article 61 Environmental Framework Law.

### *Obligations of the population*

The population has a general obligation to conserve the environment by individual action or through collective activities.<sup>105</sup> This encompasses the conservation of biodiversity in different activities, which include agricultural activities.

#### *4.3.2.8 Incentives to environment conservation*

The Environmental Framework Law provides for incentives to persons involved in some specified activities aiming at environmental conservation. In relation to agriculture and biodiversity conservation, it states that any activity aiming at soil erosion and drought control may receive support from the National Fund for Environment.<sup>106</sup> This provision is pertinent because controlling soil erosion and drought in agricultural activities is important for biodiversity conservation. However, as will be argued in chapter seven, these incentives are not effective with regard to protection of biodiversity against negative effects of agricultural practices.

### **4.3.3 The Rwandan Biodiversity Law (Law n° 70/2013 of 02/09/2013)**

The Biodiversity Law was adopted in 2013 and has the objective of determining modalities of management and conservation of biodiversity in Rwanda.<sup>107</sup> It appears to have borrowed many provisions from the South African National Environmental Management: Biodiversity Act 10 of 2004.<sup>108</sup> The Rwandan Biodiversity Law is of general application and the following discussions are limited to its provisions that are closely related to agriculture and biodiversity conservation.

#### *4.3.3.1 Identification and monitoring of biodiversity conservation status*

The Biodiversity Law obliges the Minister in charge of biodiversity to monitor the conservation status of various components of Rwanda's biodiversity, including those used in

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<sup>105</sup> Article 64 Environmental Framework Law.

<sup>106</sup> Article 71 Environmental Framework Law.

<sup>107</sup> Article 1 of the Law n° 70/2013 of 02/09/2013 governing biodiversity in Rwanda *O G* n°38 of 23/09/2013.

<sup>108</sup> See National Environmental Management : Biodiversity Act 10 of 2004, Chapter 3, Part 1 & 2 ss 38-50, Chapter 4, Part 1 & 2 ss 52-58, Chapter 5, Part 1 ssc 65-67, Chapter 5, Part 2 ss 70-72, 75-78.



agriculture, and promote biodiversity research.<sup>109</sup> Monitoring is the action of watching and checking something over a period of time in order to see how it develops, so that one can make necessary changes.<sup>110</sup> Monitoring biodiversity means the repeated observation or measurement of biodiversity and all pressures put on it to determine its status and trends. The Minister in charge of biodiversity has therefore to monitor soil, water and plant or animal genetic resources exploited in agriculture. Such monitoring helps to adopt changes towards effective conservation measures that may facilitate agricultural development and biodiversity conservation. To implement the obligation of monitoring, the authority in charge of environment (REMA) has the responsibility to establish mechanisms and indicators to determine the conservation status of various components of biodiversity including those used in agriculture and any positive or negative trends affecting their conservation status and produce a biodiversity status report every two years.<sup>111</sup> However, such mechanisms and indicators have not been developed.

#### *4.3.3.2 Listing ecosystems and species to be protected*

The Biodiversity Law requires the establishment of a list of ecosystems and a list of species that are threatened and in need of protection, and a list of activities prohibited in threatened ecosystems.<sup>112</sup> Establishment of such lists may lead to the prohibition of some agricultural activities in both natural and agriculturally threatened ecosystems to ensure biodiversity conservation. Also special protection may be accorded to threatened plant or animal species exploited in agriculture. The Biodiversity Law additionally prohibits activities involving species or specimens included on the list of protected species unless authorised by the Minister,<sup>113</sup> which applies to protected agricultural plant or animal species. This can contribute to the conservation of critical agricultural ecosystems and species. However, there is no list of agricultural species that need special protection, though some crop and animal species have been disappearing from the Rwandan environment.

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<sup>109</sup> Article 3 of Law n° 70/2013 of 02/09/2013 governing biodiversity in Rwanda *O G* n°38 of 23/09/2013.

<sup>110</sup> A S Hornby *Oxford Advanced Learners Dictionary of current English* 7 ed (1997).

<sup>111</sup> Article 11 & 13 Biodiversity Law.

<sup>112</sup> Articles 14-16 Biodiversity Law.

<sup>113</sup> Article 17 Biodiversity Law.

#### 4.3.3.3 Biodiversity management

The Biodiversity Law allows individuals, organizations or organs of State to contribute to biodiversity management on condition of preparing and submitting biodiversity management plans to REMA for approval. The plans must be related to the management of an ecosystem, indigenous species and alien and migratory species.<sup>114</sup> As this provision is of general application to biodiversity, the management plans may concern conservation of agricultural ecosystems, as well as indigenous and alien species used in agriculture. It is important to note that management plans help to identify threats and determine important strategies. However, at the time of writing, there are no such management plans which are known to have been developed and this has negative consequences on the management of agricultural biodiversity resources.

#### 4.3.3.4 Research promotion

Article 12 provides for the promotion of research related to protection, conservation and sustainable use of biodiversity. It obliges REMA to conduct research on:

- conservation status of the various components of biodiversity;
- negative or positive trends affecting the conservation status of various components of biodiversity;
- various activities likely to have an impact on biodiversity conservation;
- the assessment of strategies and techniques for biodiversity conservation;
- the determination of biodiversity conservation needs and priorities; and
- the sustainable use, protection and conservation of indigenous biological resources.

Relying on this provision, it is necessary to conduct research on conservation of agricultural biodiversity in Rwanda, negative agricultural trends and activities that affect biodiversity conservation, strategies to conserve biodiversity against negative effects of agriculture and how indigenous agricultural resources found in Rwanda can be protected and conserved. It is very important to do research on interrelationships between biodiversity conservation and agriculture development in Rwanda. However, the implementation of this provision requires financial means, which are limited by the socio-economic conditions in

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<sup>114</sup> Article 9 Biodiversity Law.

Rwanda. In addition, the Biodiversity Law does not encourage other individuals, apart from those working with REMA, to conduct research in this area, further limiting biodiversity scientific research.

#### *4.3.3.5 Prohibition and eradication of species or organisms potentially threatening biodiversity*

The Biodiversity Law prohibits the introduction of and activities involving alien species, invasive species, specimens of an alien species and genetically modified organisms that may pose a potential threat to biodiversity, unless authorised.<sup>115</sup> The authorisation can be issued if an evaluation of the impacts of such species on biodiversity has been conducted and all required steps to minimise harm to biodiversity have been taken.<sup>116</sup> In addition, the Biodiversity Law calls for control and eradication, if necessary, of alien and invasive species to prevent or minimize their harm to biodiversity.<sup>117</sup> Although these provisions are of general application, they directly concern agriculture where many species are introduced and threaten biodiversity.

The provisions of the Biodiversity Law not only contribute to the protection of biodiversity in the agricultural sector, but also facilitate the implementation of international environmental legal obligations discussed in chapter three.

### **4.3.4 Land sector**

#### *4.3.4.1 The Rwandan Land Law (Law no 43/2013 of 16/06/2013)*

The Land Law has the objective of determining modalities for the allocating, acquisition, transfer, use and management of land in Rwanda, and establishes principles applicable to land rights.<sup>118</sup> It has some provisions which are relevant to biodiversity conservation in agriculture.

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<sup>115</sup> Articles 19-21 Biodiversity Law.

<sup>116</sup> Articles 19, 21, 22 and 26 Biodiversity Law.

<sup>117</sup> Articles 18, 23 and 24 Biodiversity Law.

<sup>118</sup> Article 1 of Law n° 43/2013 of 16/06/2013 governing land in Rwanda *O G* n° Special of 16/06/2013.

First, the Land Law provides that the land is part of the common heritage of all Rwandan people: ancestors, present and the future generations.<sup>119</sup> It gives the State the supreme power to manage the national land in the general interest of all, to ensure rational economic and social development.<sup>120</sup> These provisions invoke the idea of rational land use, which allows the land to serve both present and future generations. To use the land rationally, landowners need to adopt sustainable agricultural practices that consider biodiversity conservation.

Second, the Land Law provides for different categories of land: urban and rural land; and individual and public land.<sup>121</sup> Here an emphasis is put on public land, as conservation of biodiversity in agriculture is the concern. Public land may be in the private or public domain. Public land in the private domain consists of all the public land not reserved for public activities or infrastructures.<sup>122</sup> Public land in the public domain consists of all land reserved to be used by the general public or land reserved for organs of State service and land reserved for environment protection. It can be owned by the State or local government.<sup>123</sup> State public land in the public domain comprises land occupied by lakes and rivers, listed as natural resources; shores of lakes and rivers up to the length determined by specific regulation; land occupied by springs and wells as determined by specific regulation; and land composed of natural forests, national parks, protected swamps, State's public gardens and tourist sites.<sup>124</sup> Article 19 confirms clearly that swamps cannot be allocated to individuals. Most of these areas are the best habitats of plant and animal species or particular ecosystems suitable for biodiversity conservation. It is easier for the State to act for the greater conservation of such areas, because individuals may pursue other interests, such as agricultural production at the expense of biodiversity conservation. As long as all these areas make up state land, their use and management will generally not give rise to legal problems. Therefore, the State has the capacity to prohibit agricultural activities conducted by third parties in those areas and carry out any management measures required to conserve biodiversity. De Klemm asserts that

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<sup>119</sup> Article 3 Land Law.

<sup>120</sup> Article 3 Land Law.

<sup>121</sup> Articles 9-11 Land Law.

<sup>122</sup> Articles 14 & 15 Land Law.

<sup>123</sup> Articles 12 & 13 Land Law.

<sup>124</sup> Article 13 Land Law.

public ownership of land forms a powerful conservation tool of area-based biodiversity conservation.<sup>125</sup>

Third, there is an opportunity to consider biodiversity in the process of land use and development planning as required by Article 27 of the Land Law. Planning is a powerful tool for sustainable utilisation of biological resources. In adequate planning, areas reserved for agriculture are delimited which can facilitate the control of agricultural activities in such areas and their impact on biodiversity. This can consequently lead to the adoption of necessary measures to maintain biodiversity. Land use planning in Rwanda is governed by the law n° 24/2012 of 15/06/2012 discussed below.<sup>126</sup>

Fourth, the Land Law provides for land use consolidation to improve rural land management and productivity. Land use consolidation means the procedure of putting together small plots of land in order to manage the land and use it in an efficient and uniform manner to increase its productivity.<sup>127</sup> The landowners co-own the land; each landholder remains entitled to the rights over his/her plot of land.<sup>128</sup> Land reserved for agriculture and animal resources less than one hectare may not be subdivided.<sup>129</sup> The Land Law is supplemented by the Ministerial Order n°14/11.30 of 21/12/2010, which determines the models of land consolidation and its productivity.<sup>130</sup> Land use consolidation contributes to biodiversity conservation, since it stops land fragmentation, which has negative effects on species richness, distribution and reproduction.<sup>131</sup> However, due to the obligation to homogenise crops, land consolidation is likely to reduce diversity of species and affect negatively biodiversity.

Fifth, the Land Law requires landowners to enjoy full rights and exploit their lands in accordance with the law and other regulations.<sup>132</sup> In this regard, contracts granting rights to land issued by the State specify special conditions to be fulfilled for the conservation and

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<sup>125</sup> Cyrille de Klemm & Clare Shine 'Biological Conservation and the Law: Legal Mechanisms for conserving species and ecosystems' (1993) *IUCN Environmental Policy and Law Paper* No. 29 at 165.

<sup>126</sup> See paragraph 4.2.4.2.

<sup>127</sup> Article 2 Land Law.

<sup>128</sup> Article 30 Land Law.

<sup>129</sup> Article 30 Land Law.

<sup>130</sup> Ministerial Order n°14/11.30 of 21/12/ 2010 determining the models of land consolidation and its productivity *O G* n° 52 of 27/12/2010.

<sup>131</sup> Lenore Fahrig 'Effects of Habitat Fragmentation on Biodiversity' (2003) 34 *Annual Review of Ecology, Evolution, and Systematics* 487 at 505.

<sup>132</sup> Article 34 Land Law.

exploitation of the land.<sup>133</sup> This means that land exploitation for agricultural purposes must respect Land Law and Environmental Framework Law provisions that require land conservation, leading to biodiversity conservation. In addition, the Land Law requires the landlords and people who use others' lands to use them in a productive way<sup>134</sup> and protect them from erosion,<sup>135</sup> all of which assists in protecting biodiversity against the negative effects of agriculture.

#### 4.3.4.2 *The Land Use Planning and Development Law (Law n° 24/2012 of 15/06/2012)*

The Law n° 24/2012 has different objectives, including the objective of setting up fundamental principles to ensure that the planning of land use and development provides for the natural resource base to be protected and allow for ecological balance between land use, development and biodiversity.<sup>136</sup> Additionally, it requires that land use planning and development be guided by principles, including that of ensuring that administration and management of land use and development contribute to the sustainable development and the principle of ensuring that the land use helps minimize the need for land development based on the excessive use of land, energy and natural resources.<sup>137</sup> The two principles are important in the conservation of biodiversity against the negative effects of agriculture, because sustainable development of the land and minimisation of its excessive use call for its rational use and conservation of biodiversity.

Rwanda has adopted in 2011 a National Land Use Development Master Plan and District Land Use and Development Plans were completed between end 2013 and early 2015. Such plans provide for areas reserved for different economic and competing sectors such as agriculture, forestry, infrastructure development, mining, tourism, industries, rural and urban settlements and environment protection.<sup>138</sup> However, such plans are still new and it remains to see whether their implementation will be effective.

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<sup>133</sup> Article 37 Land Law.

<sup>134</sup> Article 39 Land Law.

<sup>135</sup> Article 41 Land Law.

<sup>136</sup> Article 3 (2) of Law n° 24/2012 of 15/06/2012 relating to the land use planning and development in Rwanda *O G* n° 31 of 30/07/2012.

<sup>137</sup> Article 4 (1) Land Use Planning and Development Law

<sup>138</sup> Available at <http://rwandalanduse.rnra.rw/index.php?id=37>

#### 4.3.5 Forest sector: The Forest Law (Law no 47 bis/2013 of 28/06/2013)

While Forest Law mainly concerns forests management and utilisation, some of its provisions may assist in the conservation of biodiversity in agriculture. First, it requires minimisation of adverse effects on forests resulting from various activities including agricultural ones.<sup>139</sup> Second, the population is obliged to conserve and protect forests and inform the nearest authorities of prohibited activities that may negatively affect proper forest management.<sup>140</sup> Third, the Forest Law requires collaboration of public and private institutions, and non-governmental organizations in forests' protection and allows planting agroforestry trees.<sup>141</sup> All these provisions of the Forest Law play an important role in the conservation of forests and biodiversity against agricultural impacts. Allowing for the planting of agroforestry trees contributes to the conservation of biodiversity. Agroforestry can directly increase plant diversity and reduce, at the same time, habitat loss and fragmentation and helps to reduce pressure on the remaining forests.<sup>142</sup> Agroforestry systems maintain a rich biodiversity compared to biodiversity found in monoculture systems and are an adequate habitat for a number of forest-dependent species on farmlands.<sup>143</sup>

#### 4.3.6 Water sector: The Water Law (Law n° 62/2008 of 10/09/2008)

The Water Law regulates the use and management of water resources. It places water under the State's public domain and establishes rules applicable to the use, conservation and management of water resources.<sup>144</sup> The Water Law also establishes the principles to be respected in water management, namely precaution, pollution prevention, user-payer, polluter-payer and users' association.<sup>145</sup> The following discussion examines the provisions relevant to the conservation of biodiversity in the agricultural sector.

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<sup>139</sup> Article 19 (1° and 4°) Forest Law.

<sup>140</sup> Article 20 Forest Law.

<sup>141</sup> Article 21 Forest Law.

<sup>142</sup> Brent Swallow, Jean Marc Boffa & Sara J Scherr 'The potential for agroforestry to contribute to the conservation and enhancement of landscape biodiversity' in D Garrity et al (ed) *World Agroforestry into the future* (2006) 95 at 95 ; Jeffrey A Mcneely & Götz Schroth 'Agroforestry and biodiversity conservation – traditional practices, present dynamics, and lessons for the future' (2006) 15 *Biodiversity and Conservation* 549 at 551-553.

<sup>143</sup> Ibid.

<sup>144</sup> Article 1 & 3 Water Law.

<sup>145</sup> Article 5 Water Law: The precaution principle aims at the adoption of efficient measures to prevent serious and irreversible risks; the prevention aims at prevention of pollution with priority to the source; the user-payer and polluter-payer principle mean that the user of water and the polluter support the expenses resulting from measures of prevention, of pollution reduction and resource restoration in quality and quantity; the users'

#### *4.3.6.1 Sustainable use of water*

To use water sustainably, the Water Law subjects different activities likely to negatively impact water to three management regimes: declaration, authorisation, and concession.<sup>146</sup> Agricultural activities may be subject to one of the three regimes depending on their impacts on water.

The declaration regime applies to operations that will not present any serious dangers for health and public security, will not impact the limits on the out-flow of waters, on water as resource, both quantitatively and qualitatively, as well as on the diversity of the aquatic environment.<sup>147</sup> Before carrying out activities subject to it, the person intending to undertake them has to declare them to the competent authority.

Under the authorisation regime, operations that are susceptible to present dangers for health and public security, to harm the free out flow of water, to reduce the water resource and to harm the quality of water or the diversity of the aquatic environment can be carried out if authorised.<sup>148</sup>

The concession regime applies to operations and activities that may considerably increase the risk of flooding, and which may seriously endanger aquatic life, and operations of water use of general interest or approved by the relevant authority.<sup>149</sup> In authorising such operations, the competent authority establishes some limitations or boundaries.

While the operations or activities under the declaration regime do not pose significant problems, the operations or activities relegated to the authorisation and concession regimes pose problems for water and biodiversity. Such operations can include those related to agricultural activities. For instance, irrigation practices may cause diversion of a river for agricultural purpose. This is harmful to the free out-flow of the river, and its water quantity and quality, which impacts on its aquatic biodiversity. Other examples are farming and using agrochemicals in areas adjacent to certain water sources, like rivers, lakes or wetlands. These

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association means that the users of water must group themselves in associations for better administrative management of water.

<sup>146</sup> Articles 32-45 Water Law.

<sup>147</sup> Article 33 Water Law.

<sup>148</sup> Article 34 Water Law.

<sup>149</sup> Article 35 Water Law.



activities present dangers to health, security, water quality or quantity and aquatic biodiversity. The application of rules governing water management regimes can consequently contribute to the conservation of biodiversity against negative impacts of agricultural practices.

The Water Law obliges landowners to rationally and optimally utilise water resources in irrigation activities and obliges the administration in charge of irrigation to apply the principles of integrated water resources' management.<sup>150</sup> This directly concerns water use in agricultural operations and helps in the conservation of water and biodiversity. It is necessary to note that sustainable use of biodiversity components including water is called for by the international environmental conventions, ratified by Rwanda, as mentioned in chapter three.<sup>151</sup>

#### *4.3.6.2 Establishment of the protected humid zones and easements*

The Water Law requires the establishment of an updated inventory of humid zones and other reserves, which may have the status of protected areas, considering their national or international importance in consideration of biodiversity, or ecological and hydrological importance.<sup>152</sup> Such inventory has been established by Ministerial Order n° 008/16.01 of 13/10/2010 which establishes a list of 867 swamps grouped in three categories: the category of swamps that can be used without specific conditions; the other comprising swamps which can be used under particular conditions and the category of swamps under full protection. Inside protected swamps, the law prohibits or restricts carrying out different activities including agricultural ones. It is important to note that in Rwanda agriculture is frequently conducted in swamps. Therefore, their indirect protection via the protection of water resources is vital in the protection of biodiversity. In addition, the Water Law provides for the possibility to establish easements around any water source.<sup>153</sup> In such easements different harmful activities are prohibited including cultivation of plants especially those that require so much water ;<sup>154</sup> which contributes to protection of biodiversity in such areas.

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<sup>150</sup> Article 48 Water Law.

<sup>151</sup> See paragraph 3.2.1.2 and 3.2.8.2.

<sup>152</sup> Article 53 Water Law.

<sup>153</sup> Article 63 Water Law.

<sup>154</sup> Article 64 Water Law.

### 4.3.7 Laws on chemical products and substances

Under this section, three laws are discussed: Law no 30/2012 of 1/08/ 2012 governing agrochemicals (Agrochemical Law), Ministerial Order n° 006/2008 of 18 August 2008 regulating the importation and exportation of ozone layer depleting substances, and products and equipments containing such substances (Ozone Depleting Substances Regulation) and Prime Ministerial Order n° 26/03 of 23/10/2008 determining the list of chemicals and other prohibited pollutants.<sup>155</sup>

#### 4.3.7.1 *The Agrochemicals Law (Law no 30/2012 of 1/08/ 2012)*

The Agrochemical Law regulates the manufacture import, distribution, use, storage, sale, disposal and burial of agrochemicals for the protection of human and animal health and the environment, and avoiding injury and contamination that may result from their use.<sup>156</sup> It contributes to the conservation and protection of biodiversity against the negative effects of agriculture, as discussed below.

The Agrochemicals Law subjects different activities involving agrochemicals to registration and licensing regimes which assist in the control of their management and use. With registration, every person who wants to own, use, possess, import, manufacture, distribute or sell an agrochemical must apply for registration to the registrar of agrochemicals<sup>157</sup> who, after verifying all the requirements, may accept and issue a certificate or refuse to register an agrochemical.<sup>158</sup> The certificate applies for the period of its validity and can be modified or cancelled in case the agrochemical no longer complies with the terms and conditions of its use or is neither effective nor suitable.<sup>159</sup> For the licensing regime, the person who wants to manufacture, import, export, sell, offer for sale, store for sale, transport or dispose of agrochemicals has to obtain a license after obtaining a registration certificate.<sup>160</sup> The registration and licensing regimes are important in preventing the negative effects of agrochemicals on biodiversity because the authority in charge of registering agrochemicals or

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<sup>155</sup> Prime Ministerial Order no 26/03 of 23/10/2008 determining the list of chemicals and other prohibited pollutants *O G* n° 21 *bis* of 1/11/ 2008.

<sup>156</sup> Article 1 Agrochemicals Law.

<sup>157</sup> Article 12 Agrochemicals Law.

<sup>158</sup> Article 13 Agrochemicals Law.

<sup>159</sup> Article 14, 15 (1 & 2) Agrochemicals Law.

<sup>160</sup> Article 17 Agrochemicals Law.

issuing certificates and licenses may refuse to register or issue certificates or licenses if the agrochemicals concerned are harmful to biodiversity.

The Agrochemicals Law provides for specific provisions on the post-registration control and supervision,<sup>161</sup> the importation or exportation of agrochemicals,<sup>162</sup> their storage,<sup>163</sup> and transport,<sup>164</sup> avoidance of their accidental spillage<sup>165</sup> and their labeling and packaging,<sup>166</sup> which all contribute to the conservation of biodiversity in agricultural activities.

As such, the Agrochemicals Law contributes indirectly to the conservation of biodiversity in agriculture. However, it should be backed by regulations that specify technical standards to be applied in its implementation and such regulations are not yet in place. These include regulations governing agrochemicals, provided by its Article 4, regulations that establish the list of registered agrochemicals and the list of prohibited agrochemicals required by Article 16, and regulations specifying the modalities of disposing of agrochemicals required by Article 17. The absence of such regulations may lead to inefficient implementation of the Agrochemicals Law, which may also lead to biodiversity degradation resulting from agrochemicals' management.

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<sup>161</sup> Article 22 Agrochemicals Law: This control and supervision helps to ensure that the conditions established for the use, storage and exhibition of agrochemicals are complied with and to make sure that negative impacts and other types of effects of agrochemicals are communicated to the Advisory Council.

<sup>162</sup> Article 23 Agrochemicals Law: The person importing or exporting an agrochemical must present to the competent inspector the documents related to such agrochemical.

<sup>163</sup> Article 24 Agrochemicals Law: The agrochemicals cannot be stored in just any place. They should be stored in a locked room displaying a notice specifying that the agrochemical is stored therein and prohibiting access to unauthorised persons; in an area that does not allow the agrochemical to be exposed to direct sunlight; in a leak-proof container; at a level of at least 45 centimetres above the ground level. No person shall be allowed to store or sell an agrochemical in an area in which food or animal feed is stored or prepared for consumption; store an agrochemical in a room.

<sup>164</sup> Article 25 Agrochemicals Law: Agrochemicals cannot be transported in a vehicle that transports people, other living beings, food or animal feed.

<sup>165</sup> Article 26 Agrochemicals Law: It is prohibited to mix or pour any agrochemical on an open ground within nine metres of a watercourse or lake and any person who carries or uses any agrochemical has to prevent its spillage by taking precautions. In case of spillage, the person must report it to the nearest administrative authority within 24 hours.

<sup>166</sup> Article 27 Agrochemicals Law: The person intending to sell, offer or supply any agrochemical has to label it in accordance with agrochemicals labeling regulations and in conformity with international standards.

#### 4.3.7.2 *The Ozone Depleting Substances Regulation (Ministerial Order n° 006/2008 of 18/08/2008)*

The Ozone Depleting Substances Regulation (ODSR) covers the import, export and re-export of substances that deplete the ozone layer, and products and equipments containing such substances. Though the ODSR aims to prevent degradation of the ozone layer, it contributes to the conservation of biodiversity in agricultural activities as explained below:

The ODSR establishes the regimes for management of Ozone Depleting Substances (ODS), such as authorisation, licensing and quota allocation. The person who wants to import or export ODS must first obtain authorisation from REMA, which authorisation indicates the quotas of ODS to be imported. After obtaining the authorisation letter, the importer or exporter has an obligation to apply for the license from the competent authorities.<sup>167</sup> In addition, the ODSR requires fixation of a national import quota for the following year.<sup>168</sup> The quotas must be fixed on a decreasing scale in order to reduce the use of ODS.<sup>169</sup> The Ozone Layer Depleting Substances Regulation contains five annexes containing lists of substances subject to the three regimes and annexure IV contains different substances including pesticides, rodenticides, fungicides and herbicides, all of which are used in agricultural activities.<sup>170</sup> The latter are known to react with the ozone layer and increases incidences of dangerous diseases, crop damage and biodiversity reduction.<sup>171</sup> Therefore, the implementation of the ODSR indirectly benefits biodiversity conservation in agriculture.

#### 4.3.7.3 *The Chemicals and Other Prohibited Pollutants Regulation (Prime Ministerial Order n° 26/03 of 23/10/2008)*

Prime Ministerial Order n° 26/03 of 23/10/2008 establishes a list of 11 chemicals that may not be purchased, sold, imported, exported, stored and piled in Rwanda.<sup>172</sup> Their prohibition is

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<sup>167</sup> Article 3 ODSR.

<sup>168</sup> Article 7 ODSR.

<sup>169</sup> Article 8 ODSR.

<sup>170</sup> Annex IV to the ODSR.

<sup>171</sup> GEF *Investing in the phase-out of ozone depleting substance: GEF experience* (2010) 3 available at [http://www.thegef.org/gef/sites/thegef.org/files/publication/phase-out-2010\\_en.pdf](http://www.thegef.org/gef/sites/thegef.org/files/publication/phase-out-2010_en.pdf), accessed on 26 October 2012.

<sup>172</sup> Prime Ministerial Order no 26/03 of 23 October 2008 determining the list of chemicals and other prohibited pollutants *O G n° 21 bis* of 01/11/2008. Such chemicals include aldrine, chlordane, dieldrine, endrine,

based on their dangerousness in impacting human health, in polluting the environment and damaging biodiversity. Their prohibition is therefore beneficial to biodiversity conservation in agricultural sector.

It is necessary to note that the agrochemicals governed by the Agrochemicals Law and the two Ministerial Orders are regulated by some international environmental conventions contributing to the conservation of biodiversity in harmony with agricultural development as discussed in chapter three. The provisions of these three Rwandan legal texts facilitate the implementation of these international instruments.<sup>173</sup>

#### 4.3.8 Seed sector

##### 4.3.8.1 *The Seed Law (Law n°14/2003 of 23/05/2003)*

The Seed Law protects, to a limited extent, Rwandan plant genetic resources. It provides that commercial quality seeds have to be processed, be free from foreign materials, clean, well packed and labeled in a way clearly showing the characteristics of the seeds.<sup>174</sup> Each juridical person marketing quality seeds must have an authorisation and be enlisted in the register of quality seed sellers.<sup>175</sup> Further, imported seeds must always be accompanied by an official certificate delivered by the country of origin and be subjected to controls referred to in this law.<sup>176</sup> This law is important in the protection of agro-biodiversity from risks associated with invasive species and GMOs through the controls of seeds' introduction.

##### 4.3.8.2 *The Seed Regulations (Ministerial Order n°003/11.30 of 18/08/2010 and Ministerial Order n°005/11.30 of 18/08/2010)*

Two Seed Ministerial Orders supplement the Seed Law. The first is the Ministerial Order n°003/11.30 of 18/08/2010 which sets conditions required for marketing quality seeds. It subjects commercial seeds to quality control and requires a certificate of quality issued by the

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heptachlor, hexachlorobenzene, mirex, toxaphene, polychlorinated biphenyls, DDT and polychlorinated dibenzo-p-dioxins and dibenzofurans.

<sup>173</sup> See paragraph 3.2.4.2, 3.2.5.2 and 3.2.8.2.

<sup>174</sup> Article 7 of Law n°14/2003 of 23/05/2003 on production, quality control and commercialization of plant-quality seeds *O G* n° Special of 11/07/2003 (Seed Law).

<sup>175</sup> Article 9 Seed Law.

<sup>176</sup> Article 10 Seed Law.

competent authority.<sup>177</sup> Only the seeds of a variety registered on the list of approved varieties in Rwanda may be marketed as quality seeds.<sup>178</sup> Imported seeds must satisfy the standards and regulations governing seeds produced in Rwanda, or international standards where Rwandan standards are absent. These seeds must always be accompanied by an official certificate from the country of origin, indicating their purity, moisture content, germination rate and testifying that they are free from any diseases that can be transmitted.<sup>179</sup> No-one can market quality seeds if not authorised.<sup>180</sup>

The second relevant Ministerial Order is the Ministerial Order n°005/11.30 of 18/08/2010 which sets standards for processing quality seeds. The latter establishes the standards related to seed purity, germination, grain moisture content and phytosanitary issues, and establishes the labeling conditions to be fulfilled.<sup>181</sup>

The provisions of the Seed Law and two Ministerial Orders mentioned above contribute to the protection of agro-biodiversity from risks associated with GMOs and pests. However, their contribution is very limited because an analysis reveals that their main objective is to promote seeds that are more productive rather than the protection and conservation of seed diversity, which leads to genetic erosion. It is necessary to have a legal basis that ensures that seed commercialisation does not contribute to genetic erosion.<sup>182</sup>

#### **4.3.9 The Penal Code (Organic Law N° 01/2012/OL of 02/05/2012)**

The Penal Code punishes different criminal acts including some that relate to interrelationships between biodiversity conservation and agriculture. Article 429 punishes anyone who carries out agricultural activities (cropping and breeding activities) without respecting a distance of ten meters from the banks of rivers, and a distance of 50 meters from

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<sup>177</sup> Article 2 of the Ministerial Order n°003/11.30 of 18/08/2010 setting forth conditions required for marketing quality seeds *O G* n° 40 of 04/10/2010.

<sup>178</sup> Article 3 of the Ministerial Order n°003/11.30 of 18/08/2010.

<sup>179</sup> Article 4 of the Ministerial Order n°003/11.30 of 18/08/2010.

<sup>180</sup> Article 6 of the Ministerial Order n°003/11.30 of 18/08/2010.

<sup>181</sup> Articles 2-7 of the Ministerial Order n°005/11.30 of 18/08/2010 setting forth standards for processing quality seeds *O G* no 40 of 04/10/2010.

<sup>182</sup> Bert Visser 'An Agrobiodiversity Perspective on Seed Policies' in N Louwaars (ed) *Seed Policy, Legislation and Law: Widening a Narrow Focus*(2002) cited in R Bocci 'Seed Legislation and agrobiodiversity:conservation varieties' (2009) 103 *Journal of Agriculture and Environment for International Development* 31 at 32.

the shores of lakes.<sup>183</sup> This ensures the protection of biodiversity in the agricultural sector, since agricultural activities in such areas -known to be rich in biodiversity- cause pollution, destruction of habitats and increase unsustainable consumption of biological resources.

Article 428 of the Penal Code also punishes anyone who burns crop residues in fields and pollutes the atmosphere.<sup>184</sup> Because atmospheric pollution is a threat to biodiversity, prevention of an agricultural activity that causes it benefits biodiversity in the agricultural sector.

Additionally, the Penal Code punishes anyone who does not carry out a prior environmental impact assessment (EIA) for any project which may impact the environment negatively.<sup>185</sup> It was discussed above that agricultural and breeding activities that use agrochemicals in wetlands, large-scale monoculture agricultural practices, and works and activities that use bio-technology to modify seeds and animals require an EIA.<sup>186</sup> Therefore, punishing failure to conduct an EIA for such activities contributes to the conservation of biodiversity in agricultural activities, since the EIA would guide the decision-maker in refusing such activities if the EIA indicates that they can harm the biodiversity.

After discussing the rwandan regulatory regime applicable to the conservation of biodiversity in the agricultural sector, it is vital to examine the institutions that intervene in that area and the role of their interventions.

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<sup>183</sup> Article 429 (1<sup>o</sup>-3<sup>o</sup>) Penal Code. The punishment provided is imprisonment of two (2) months but less than six (6) months and a fine of five hundred thousand (500,000) to five million (5,000,000) Rwandan francs or one of these penalties. In case of recidivism, these penalties shall be doubled. In addition, the convicted may be ordered to rehabilitate the damaged area.

<sup>184</sup> Article (428, 1<sup>o</sup>) Penal Code. The convicted shall be punished with a fine of ten thousand (10,000) to fifty thousand (50,000) Rwandan francs.

<sup>185</sup> The convicted of that criminal act shall be liable to suspension of activities and closure of his/ her association and shall also pay damages.

<sup>186</sup> Articles 1 and 2 para 1 and 2 and the annex to Ministerial Order n°004/2008 of 15/08/2008 establishing the list of works, activities and projects that have to undertake an environmental impact assessment.

## 4.4 THE INSTITUTIONAL FRAMEWORK FOR THE BIODIVERSITY AND AGRICULTURAL SECTORS

### 4.4.1 Governmental institutions

#### 4.4.1.1 *The Ministry of Natural Resources (MINIRENA)*

MINIRENA is responsible to ensure environmental protection and conservation and rational utilisation of natural resources for sustainable development. It is mainly in charge of establishing, disseminating and following up the implementation of policies, strategies and programs in the sector of environment and related subsectors; and developing institutional and human resources capacities in the protection of the environment and related sub-sectors.<sup>187</sup>

MINIRENA is responsible for the implementation of almost all laws and regulations discussed above<sup>188</sup> and, as the overall institution in charge of environmental protection and conservation and sustainable utilisation of natural resources, it intervenes obviously in the conservation of biodiversity in the agricultural sector. It directly intervenes in the management and conservation of land, water, plant and animal genetic resources which form part of biodiversity and which have been degraded by agricultural activities in Rwanda.

#### 4.4.1.2 *The Ministry of Agriculture and Animal Resources (MINAGRI)*

MINAGRI has the mission of initiating, developing and managing suitable programs for the transformation and modernization of agriculture and livestock to ensure food security and contribute to the national economy.<sup>189</sup> Its main responsibilities include:

- development, dissemination, supervision, implementation, monitoring and evaluation of the sector and related sub-sectors' policies, laws, strategies and programs;<sup>190</sup>

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<sup>187</sup> Ministry of Natural Resources Citizens' Charter (2012) 10.

<sup>188</sup> It highly intervenes in the implementation of the Environmental Framework Law and its implementing regulations, Biodiversity Law, Land Law, Forest Law, Water Law and its implementing regulations and the Chemicals and Other Prohibited Pollutants Regulation.

<sup>189</sup> MINAGRI available at [http://www.minecofin.gov.rw/webfm\\_send/1885](http://www.minecofin.gov.rw/webfm_send/1885), accessed on 31 October 2012.

<sup>190</sup> Ibid.



- coordination and facilitation of interventions related to crops and animal diseases control;<sup>191</sup> and
- development of institutional and human resources capacities in the sector by putting in place appropriate mechanisms to intensify and conduct agricultural and livestock research and extension.

MINAGRI intervenes in the area of biodiversity conservation in the agricultural sector, since, in the pursuit of agricultural sector development, it is in charge of controlling the introduction of agricultural inputs such as new plant and animal species and agrochemicals. Uncontrolled introductions of new agricultural inputs constitute a threat to Rwanda's biodiversity as discussed in chapter two. This was confirmed by the majority of research participants who reported to experience loss of crop and livestock varieties due to the introduction of and focus on few modern varieties and introduction of agrochemicals.<sup>192</sup> However, MINAGRI's control needs to be environment or biodiversity conservation-oriented. Additionally, MINAGRI assists in soil and water management and conservation and in the fight against erosion to ensure food security, which contributes a lot in the conservation of biodiversity. Also MINAGRI is entrusted to intervene actively in the implementation of some of the laws discussed above.<sup>193</sup>

#### *4.4.1.3 Rwanda Environment Management Authority (REMA)*

REMA is the authority in charge of supervising, monitoring and ensuring that issues relating to the environment are integrated in all national development programs.<sup>194</sup> To accomplish this mission, REMA is responsible, among other things, for:

- implementing government environmental policy, advising the government on policies, strategies and legislation related to environmental management and implementation of international environmental legal obligations;
- conducting inspection of environmental management and to report on the status of the environment in Rwanda every two years;

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<sup>191</sup> Ibid.

<sup>192</sup> See paragraphs 2.3.3 and 2.3.4.

<sup>193</sup> Land Law, Land Consolidation Regulation, Agrochemicals Law, Seed Law, and Seed Regulations.

<sup>194</sup> Article 3 of the Law n°63/2013 of 27/08/2013 determining the mission, organization and functioning of the Rwanda Environment Management Authority (REMA) O G n° 41 of 14/10/2013.

- establishing measures designed to prevent climate change and cope with its impacts;
- undertaking research activities in the field of the environment and disseminating the findings;
- monitoring and assessing development programs to ensure their compliance with the laws on the environment during their preparation and implementation;
- preparing, publishing and disseminating education materials relating to principles and laws regarding environmental management and protection; and
- monitoring and supervising impact assessments, environmental audits, strategic environmental assessments and any other environmental studies.<sup>195</sup>

Under supervision of MINIRENA, REMA oversees the protection and management of the environment. It is specifically entrusted with different responsibilities of environment protection by many of the laws discussed above.<sup>196</sup> REMA has therefore the responsibility to ensure that environmental protection receives attention in agricultural development programs and to ensure that biodiversity components such as soil, water, plant and animal genetic resources are used in agriculture to achieve sustainable development. For instance, REMA is currently cautioning about the use of chemical fertilisers, which comes at a time when the government is employing everything possible to increase the country's agricultural production to scale up both food security and exports. REMA asserts that although chemical fertilisers multiply crop yield, consideration must be given to their long term use, which may become detrimental to the environment and biodiversity.<sup>197</sup>

#### *4.4.1.4 Rwanda Development Board (RDB)*

RDB is a permanent and independent national organ with administrative and financial autonomy that reports directly to the President of the Republic.<sup>198</sup> It has seven departments

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<sup>195</sup> Article 3 Law establishing REMA.

<sup>196</sup> Environmental Framework Law, Biodiversity Law, EIA Regulations, Ozone Depleting Substances Regulation and the Chemicals and Other Prohibited Pollutants Regulation.

<sup>197</sup> Theogene Ishimwe 'Agriculture minister clarifies use of chemical fertilisers' New Times 29 October 2012 available at <http://www.newtimes.co.rw/news/index.php?i=15160&a=60078>, accessed on 29 October 2012.

<sup>198</sup> Article 4 of Organic Law n° 53/2008 of 02/09/2008 establishing the Rwanda Development Board (RDB) and determining its responsibilities, organisation and functioning *O G* n° special 05 September 2008.

but this research emphasises on the activities of two departments: the Department of Tourism and Conservation and the Department of Agriculture.<sup>199</sup>

The tourism and conservation department is mandated to conserve the rich biodiversity of the protected areas and to develop sustainable tourism in collaboration with stakeholders for the benefit of all Rwandan people.<sup>200</sup> Its conservation division has the task of maintaining, enhancing and sustaining the ecological integrity, health and productivity of Rwanda's ecosystems with priority given to the conservation of national parks. It should be noted that the sizes of the three national parks and their rich biodiversity have been diminished as a result of high population growth, coupled with the problem of insufficient arable land as discussed in chapter two.<sup>201</sup> The role of the RDB of ensuring national parks' protection implies that it has to prevent agricultural activities from infringing the conservation of national parks and their biodiversity.

The Agriculture Department is concerned with identifying and proposing to government key policy and institutional mechanisms aimed at stimulating agricultural growth. It therefore identifies investment opportunities, develops projects and attracts private investors with the intention to boost crops and animal product business development.<sup>202</sup> RDB may play a big role in the conservation of biodiversity if it authorises investors who are biodiversity conservation-oriented.

#### *4.4.1.5 Rwanda Agricultural Board (RAB)*

Under supervision of MINAGRI, RAB has the general mission of developing agriculture and animal husbandry through reform and the use of modern methods in crop and animal production, research, agricultural extension, education and training of farmers in new technologies.<sup>203</sup> RAB main responsibilities include:

- implementing the national agricultural and animal husbandry laws and policies;

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<sup>199</sup> Other departments are the department of investment, information and communication technology, asset and business management, trade and manufacturing and services development.

<sup>200</sup> Available at <http://www.rdb.rw/about-rdb/history.html> (accessed 30 October 2012).

<sup>201</sup> Paragraph 2.3.1.

<sup>202</sup> Information available at <http://www.rdb.rw/departments/agriculture/role-of-the-agriculture-department.html> (accessed 30 October 2012).

<sup>203</sup> Article 4 para 1 Law n°38/2010 of 25/11/2010 establishing the Rwanda Agriculture Board (RAB) and determining its responsibilities, organisation and functioning *O G* n°04 of 24/01/2012.

- providing information, technical support and extension services to farmers and consumers of agricultural products;
- preventing, controlling and fighting plant and animal diseases;
- carrying out research aiming at agricultural and animal husbandry development;
- monitoring and coordinating activities of persons exercising the profession of agriculture, animal husbandry and research;
- identifying and providing new technologies for proper management of land and water to farmers;
- examining, verifying and issuing certificates of standards for agricultural and animal husbandry products;
- issuing licenses for import, export, delivery, trade and use of veterinary products and agriculture inputs;
- monitoring activities of production, control and trade of selected seeds; and
- collecting national and international innovations, new and appropriate technologies and refining them for use in agriculture and animal husbandry in Rwanda.<sup>204</sup>

Looking at its responsibilities, RAB is highly concerned with biodiversity conservation in agriculture. It must ensure the quality of agricultural inputs such as agrochemical products, crop and animal husbandry inputs. If RAB controls their introduction, import or export by issuing certificates and licenses to those that are biodiversity friendly, this is good for biodiversity. Also RAB offers advice and technical support to farmers and extension services; if they are provided with support that is biodiversity conservation-oriented, this is important for Rwandan biodiversity. As an institution in charge of agricultural research, RAB has the potential to contribute to biodiversity conservation in the agricultural sector, if its research is oriented towards sustainable agriculture that integrates biodiversity conservation practices.

#### *4.4.1.6 Rwanda Natural Resources Authority (RNRA)*

Under MINIRENA's supervision, RNRA leads the management and promotion of natural resources composed of land, water, forests, mines and geology. It is entrusted with supervision, monitoring and ensures the implementation of issues relating to the promotion

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<sup>204</sup> Ibid.

and protection of natural resources in programs and activities of all national institutions.<sup>205</sup>

RNRA is specifically responsible for:

- establishing and implementing national policies, laws, strategies, regulations, guidelines, government resolutions in matters relating to the promotion and protection of natural resources and international conventions related to the conservation of natural resources that Rwanda has ratified;
- advising the government on appropriate mechanisms for management, use and conservation of natural resources and investment opportunities;
- providing technical advice on the proper use of natural resources, following-up and supervising activities relating to proper use, management, promotion and valuation of natural resources;
- rehabilitating and conserving natural resources where they are damaged;
- promoting activities relating to investment and added value in the activities of use and exploitation of natural resources; and
- initiating research and study on natural resources and publishing the results.<sup>206</sup>

Looking at the responsibilities of RNRA, it is clear that it is involved in activities of biodiversity conservation in the agricultural sector where it has to ensure that land and water –the biodiversity components- used in agriculture are adequately managed. RNRA is specifically entrusted with different responsibilities of environment and biodiversity conservation under some laws discussed above.<sup>207</sup>

#### *4.4.1.7 Rwanda Standards Board (RSB)*

RSB is mainly responsible for standardisation matters. It :

- establishes, publishes, carries out researches, trains and raises awareness on national standards,
- participates in setting technical regulations related to standards ;

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<sup>205</sup> Article 3 para 1 of Law n°53/2010 of 25 /01/ 2011 establishing the Rwanda Natural Resources Authority (RNRA) and determining its mission, organisation and functioning *O G* n°10 of 07/03/2011.

<sup>206</sup> Article 4 para 2 of Law n°53/2010 of 25/01/ 2011 establishing the Rwanda Natural Resources Authority (RNRA).

<sup>207</sup> Forest Law and Water Regulations.

- provides products and quality service certifications and monitor conformity for issued certifications; and
- advises the government on matters related to defining, devising and implementing the standardisation policy.<sup>208</sup>

From the above, it is clear that the RSB can play a role in the conservation of biodiversity in the agricultural sector as it has to ensure that national standards for agricultural inputs, such as seeds, breeds and agrochemicals are of good quality - of a quality that does not harm the health of Rwandans, their environment and her biodiversity. Some of the laws discussed above entrust RSB with specific responsibilities important in the conservation of biodiversity in the agricultural sector.<sup>209</sup>

#### *4.4.1.8 The National Agricultural Export Development Board (NAEB)*

NAEB is an amalgamation of the Rwanda Coffee Development Authority (OCIR-CAFÉ), Rwanda Tea Development Authority (OCIR-THE) and the Rwanda Horticulture Development Authority (RHODA), the three government agencies that were responsible for exports of agricultural products, now under one management.<sup>210</sup> NAEB main responsibilities include:

- participating in the elaboration and implementation of policies and strategies for developing exports of agricultural and livestock products;
- identifying and supporting research on agricultural extension regarding agricultural and livestock products for export;
- setting quality standards for agriculture and livestock export commodities and issuing certificates of origin; and
- supervising, facilitating, training, partnering with and coordinating activities of non-governmental organizations, private operators and cooperatives involved in agricultural and livestock production for export.<sup>211</sup>

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<sup>208</sup> Article 4 of the Law no 50/2013 of 28/06/2013 establishing RSB.

<sup>209</sup> The Ozone Depleting Substances Regulation.

<sup>210</sup> Available at [http://www.naeb.gov.rw/index.php?option=com\\_content&view=Article&id=25&Itemid=28](http://www.naeb.gov.rw/index.php?option=com_content&view=Article&id=25&Itemid=28), accessed on 31 October 2012.

<sup>211</sup> Article 3 of the Law N°39/2010 of 25/11/ 2010 establishing National Agricultural Export Development Board.

Considering the responsibilities that the law assigns to the NAEB, it can contribute to ensuring that Rwandan agricultural and livestock products are produced under biodiversity-friendly conditions to be acceptable in international markets. It has to make sure that Rwandan products do not carry pests and do not contain high levels of toxins from chemical residues which endanger crops, livestock and human health.<sup>212</sup> This is important in biodiversity conservation.

#### 4.4.1.9 Local administrative entities: Districts

In Rwanda, districts are recognised as decentralised administrative entities with legal personality constituting the basis for community development and having administrative and financial autonomy.<sup>213</sup> The law on decentralised administrative entities provides that the districts' responsibilities include :

- implementation of Government policies;
- planning, coordinating and implementing development programs;
- maintaining the safety of people and property in the district; and
- putting in place programs designed to promote social welfare.<sup>214</sup>

In addition, the Environmental Framework Law gives to the districts like any other decentralised entities the obligation to implement laws, policies, strategies, objectives and programmes relating to protection, conservation and promotion of the environment in Rwanda.<sup>215</sup> They are also responsible for ensuring activities related to better management of land, such as soil erosion control, afforestation, protection and better management of forests, rivers, lakes, all sources of water and swamps.<sup>216</sup>

These obligations of the districts as per the Decentralisation Law and the Environment Framework Law are relevant to the conservation of biodiversity and concern agriculture. In case districts facilitate the implementation of government environmental and agricultural related policies and laws that are biodiversity-friendly, this is beneficial to biodiversity

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<sup>212</sup> John H Barton 'Biotechnology, the Environment and International Agricultural Trade' (1996-1997) 9 *Geo.Inte'l. L. Rev.* 95 at 95-97.

<sup>213</sup> Article 3 of the Law n° 87/2013 of 11/09/2013 determining the organisation and functioning of decentralised administrative entities *O G* n° special of 30/10/2013.

<sup>214</sup> Article 123 of the Decentralisation Law.

<sup>215</sup> Article 60 Environmental Framework Law.

<sup>216</sup> Article 61 Environmental Framework Law.

conservation. Also, if districts' agricultural development plans and programs take into account environment and biodiversity conservation, this is very important. Further, if they have the responsibility to ensure the safety of the people and promote their social welfare, they are indirectly obliged to protect environment. This implies that they are tasked to ensure that agricultural activities conducted within districts are in harmony with biodiversity conservation. It is important to mention that at every district level, there are officers in charge of agriculture and environment conservation. The latter can play a significant role in reconciling biodiversity conservation and agriculture on condition that they act in cooperation, pursuing both agricultural development and biodiversity conservation interests.

#### **4.4.2 Higher learning and research institutions and Non-Governmental Organizations (NGOs)**

In Rwanda, activities of biodiversity conservation in agricultural sector conducted by the above-mentioned government institutions are supplemented by the activities of some higher learning and research institutions and NGOs. Higher learning and research institutions carry out research, training, education and awareness programs on biodiversity conservation in different sectors. They include the University of Rwanda (UR), the Institute of Scientific and Technological Research (IRST) and the Kitabi Conservation Training Centre (KCTC). For NGOs, they aim to promote a sound and pleasant environment for sustainable social and economic development; to have a country where nature is conserved and where integrated environmental management offers sustainable livelihoods; and to enhance the conservation of critical ecosystems and promote sustainable development. Such NGOs advocate for and take positive national action on environmental, nature and wildlife challenges.<sup>217</sup> They advocate for a durable, planned and equitable management of natural resources in a bid to protect nature and environment and fight against poverty.<sup>218</sup> Mention can be made of, among others, the Rwanda Environment Conservation Organization (RECOR), the *Association Rwandaise des Ecologistes* (ARECO-RWANDA NZIZA),<sup>219</sup> the Albertine Rift Conservation Society (ARCOS) and the *Association pour la Conservation de la Nature au Rwanda* (ACNR). Looking at their respective missions, these NGOs obviously fight for conservation of

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<sup>217</sup> Available at <http://www.rwandaenvironment.org/>; see also <http://arcosnetwork.org> (accessed 2 November 2012).

<sup>218</sup> Available at <http://arecoRwandanziza.org/> (accessed 2 November 2012).

<sup>219</sup> This is translated as Rwandan Ecologists' Association.



biodiversity, which should be in harmony with activities conducted in different sectors, including the agricultural sector.

#### **4.4.3 The role of local communities**

The Rwandan legislation is not adequately developed to ensure full recognition of the local communities' role. Rwandan local communities have that general obligation to conserve the environment by individual action or through collective activities.<sup>220</sup> This encompasses the conservation of biodiversity in different activities, which include agricultural activities. It is important that Rwandan legislation establishes detailed guidance on involvement of local communities especially farmers in designing, planning, implementing and monitoring the implementation of agricultural practices likely to affect biodiversity. Based on their experience, local communities develop cropping and breeding practices that are favorable to their specific conditions and which demonstrate their excellent capability to conserve biodiversity or its components.<sup>221</sup> They behave in their self-interest if empowered to do so.<sup>222</sup> This is done through allowing their public participation, as detailed in chapter seven.

#### **4.4.4 Institutional fragmentation in biodiversity conservation and agriculture development**

From the above given overview of responsibilities of Rwandan institutions intervening in biodiversity conservation and agriculture, it is clear that their interventions in this matter are important but fragmented. For example, under supervision of MINIRENA, REMA and RNRA both are responsible for establishing and implementing national policies, laws, strategies, regulations and guidelines in matters relating to the protection of natural resources including those exploited in agriculture, and implementation of related international conventions that Rwanda has ratified. They are responsible for advising the government on appropriate mechanisms for management, use and conservation of natural resources.<sup>223</sup> Also, RSB and NAEB, both have the responsibility of setting quality standards for agriculture and livestock commodities;<sup>224</sup> which standards may help in conservation of biodiversity. This

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<sup>220</sup> Article 64 Environmental Framework Law.

<sup>221</sup> Ibid.

<sup>222</sup> Jeffrey A McNeely op cit note 142.

<sup>223</sup> Article 3 of the Law establishing REMA and Article 4 para 2 of the Law establishing RNRA.

<sup>224</sup> Article 3 of the Law N°39/2010 of 25/11/ 2010 establishing NAEB & Article 4 of Law n°50/2013 of 28/06/2013 establishing RSB.

leads to duplication of efforts used in the pursuit of agriculture development and biodiversity protection; consequently leading to ineffective interventions and inherent negative impacts on biodiversity.

In addition, different institutions discussed above pursue fulfilment of their respective responsibilities independently and separately within the areas of their mandate without adequate consideration of matters that cross-cut among them. This results from the lack of legal provisions calling for holistic governance of biodiversity consideration and agriculture related matters in the fulfilment of institutional responsibilities. Holistic governance should be understood as:

The ideal form of government which is established by way of collaboration, coordination, cooperation and integration of policies, regulation, service provision and scrutiny or assessment functions of co-existing governmental organs into a single system of government in order to achieve sustainable results.<sup>225</sup>

Besides, there is no clear legal obligation for working together between governmental institutions, higher learning and research institutions and NGOs intervening in the field of biodiversity conservation and agricultural development. All this needs to be fixed.

#### **4.5 CONCLUSION**

This chapter has found that Rwanda has adopted different environment and agriculture related policies that contribute to the conservation of biodiversity in the agricultural sector. It was found that their contribution is limited. Some of the discussed policies set up general principles and strategic options to conserve environment and biodiversity and develop agriculture but do not establish detailed strategies that promote these two sectors at the same time. In addition, the chapter has found that Rwanda has adopted different environmental laws that contribute to the conservation of biodiversity in the agricultural sector, the main law being the Environmental Framework Law. While some of these laws are of general application, others have sectoral application dealing with specific biodiversity areas like land, forest, water, plants and others. Both general and sectoral laws assist, to some extent, in the conservation of biodiversity in agriculture. However, they are disparately and inefficiently developed. Some of them are not detailed and lack the implementing regulations; others do not contain all the elements necessary for the conservation of biodiversity in the agricultural

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<sup>225</sup> Perri 6 et al *Towards Holistic Governance* 28-29 cited in LJ Kotzé 'Improving unsustainable environmental governance in South Africa: The case for holistic governance' (2006) 9 *PER* 75 at 95.

sector. In addition, this chapter has found that Rwanda has different governmental and non-governmental institutions that participate, directly or indirectly, in biodiversity conservation in agriculture; REMA being the leading institution in such matters. However, they are disparate, their interventions are spread across competing activities and interests and there is no inter-institutions coordination, which weakens their intervention. Since biodiversity and agriculture-related matters are cross-sectoral, different institutions discussed in this chapter should be pulled together to coordinate their efforts. There is a need of institutional cooperative governance in matters of biodiversity conservation and agriculture development.<sup>226</sup>

Having discussed Rwandan laws that are applicable to biodiversity conservation and agriculture-related issues, chapter five examines to what extent such laws ensure the conservation of soil, water and crop and livestock genetic resources in agricultural development.

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<sup>226</sup> Cooperative governance should be understood as: the integration of the different spheres of government and line functionaries at international, intra-regional and intra-governmental level; cooperation between individual government officials in each sphere/line functionary; cooperation between government officials in different spheres/line functionaries; integration of policy, regulation methods and tools, service provision and scrutiny; and cooperation with industry and the public in order to achieve the principles of sustainability: See LJ Kotzé *Legal framework for integrated environmental governance in South Africa and the North West Province* (2005) LLD Thesis North West University at 56.

**CHAPTER FIVE:**  
**RECONCILING CONSERVATION OF BIODIVERSITY COMPONENTS AND**  
**AGRICULTURAL DEVELOPMENT**

**5.1 INTRODUCTION**

As in most countries, the conservation of biodiversity is a complex and broad-ranging environmental challenge in Rwanda. More specifically, conservation of biodiversity entails the conservation of its specific components, the main ones outlined in this chapter being soil, water and genetic resources, which are inherent to the agricultural sector.

**5.2 IMPORTANCE OF CONSERVING SOIL, WATER AND GENETIC RESOURCES IN AGRICULTURE**

Soil is both the inherent part of biodiversity as well as the major part of its foundation.<sup>1</sup> It shelters the diversity of life, which exists and interacts at genetic, interspecies and ecological levels and nowhere in nature are species so densely packed as they are in soil communities as the soil is seen as the last frontier for biodiversity on earth.<sup>2</sup> Healthy soil provides nutrients to thousands of micro-organisms and plant and animal species in a region.<sup>3</sup> It is therefore necessary to use it sustainably for biodiversity conservation, future food security and for securing other important ecosystem services, like carbon sequestration, water holding capacity, and flood prevention which are directly or indirectly beneficial to humanity and the

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<sup>1</sup> Ian Hannam & Ben Bower *Drafting legislation for sustainable use of soils: a guide* (2004) IUCN *Environmental Policy and Law Paper No. 521*.

<sup>2</sup> George G Brown et al 'Management of soil biodiversity in agricultural ecosystems' in Devra Ivy Jarvis, Christine Padoch & H David Cooper (ed) *Managing biodiversity in agricultural ecosystems* (2007) 224-225; Geertrui Louwagie, Stephan Hubertus Gay & Alison Burrell *Addressing soil degradation in EU agriculture: relevant processes, practices and policies* (2009) Report on the project 'Sustainable Agriculture and Soil Conservation (SoCo)' 41; M J Swift *Towards the second paradigm: integrated biological management of soil* (1999) in Geertrui Louwagie, Stephan Hubertus Gay & Alison Burrell op cit note 2; FAO *Adapting to climate change through land and water management in Eastern Africa: Results of pilot projects in Ethiopia, Kenya and Tanzania* (2014) 15-16.

<sup>3</sup> 'Global issues: biodiversity conservation' available at <http://www.isric.org/global-issues#Biodiversity%20conservation>, accessed on 19 November 2012.

natural environment.<sup>4</sup> It is also fitting to protect it against any threats resulting from human activities, including agriculture.<sup>5</sup>

With regard to water, generally inland waters constitute complex ecosystems of biodiversity diversified at species, genetic and ecosystem levels.<sup>6</sup> It is argued that water and biodiversity are interdependent; a disruption in either naturally leads to a disruption in both.<sup>7</sup> Water constitutes an integral aspect of agriculture and biodiversity; without water, agriculture cannot survive.<sup>8</sup> It is therefore critical to conserve the complex ecosystems of water in Rwanda and maintain their ecosystem services throughout agricultural practices for the benefit of biodiversity and agriculture. The conservation of biodiversity cannot be successful without water conservation.

As regards genetic resources, they comprise the wide variability of the planet's organisms, including both species and intra-species diversity of plants, animals (terrestrial and aquatic), trees, micro-organisms and invertebrates. Genetic resources are indispensable because humankind has used, developed and relied upon them for food and agriculture for many years.<sup>9</sup> They have been used over the centuries as genetic bases of crop and farm animals; first farmers and then researchers have been selecting the best plant and animal species, crossing them together, and selecting the best offspring.<sup>10</sup> Genetic resources constitute the foundation of sustainability for they provide raw material for adaptation, evolution, and survival of species and individuals, especially under changed environmental, disease and social conditions; which allows species or individuals to respond to the

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<sup>4</sup> Mark G Kibblewhite, Ladislav Miko & Luca Montarella 'Legal frameworks for soil protection: current development and technical information requirements' (2012) 4 *Current Opinion in Environmental Sustainability* 573 at 573; Hurni Hans 'Current international actions for furthering the sustainable use of soils' (2002) 61 *Sumposium paper no. 1855* 1; George G Brown et al op cit note 2 at 233.

<sup>5</sup> Ibid at 234.

<sup>6</sup> Available at <http://www.cbd.int/waters/about.shtml>, accessed on 7 December 2012.

<sup>7</sup> Secretariat of the Convention on Biological Diversity 'Drinking Water, Biodiversity and Poverty Reduction: A Good Practice Guide' (2009) 5 available at <http://www.unwater.org/downloads/cbd-good-practice-guide.pdf>, accessed on 7 December 2012.

<sup>8</sup> Available at <https://www.cbd.int/ibd/2008/water/>, accessed on 7 December 2012.

<sup>9</sup> FAO Commission on Genetic Resources for Food and Agriculture 'Biodiversity for a World without hunger' available at <http://www.fao.org/fileadmin/templates/nr/documents/CGRFA/commissionfactsheet.pdf>, accessed on 15 December 2012; 'Genetic resources and biodiversity' available at <http://www.fao.org/nr/biodiv/biodiv-home/en/>, accessed on 13 December 2012.

<sup>10</sup> European Commission 'Agriculture and Rural Development Preserving genetic resources in agriculture: the 17 actions of the community programme 2006-2011' (2010) available at [http://ec.europa.eu/agriculture/genetic-resources/publications/leaflet-2010\\_en.pdf](http://ec.europa.eu/agriculture/genetic-resources/publications/leaflet-2010_en.pdf), accessed on 15 December 2012.

challenges of the next century.<sup>11</sup> There cannot be conservation of biodiversity in agricultural sector without due regard to genetic resources conservation.

### **5.3 IMPACTS OF AGRICULTURE ON SOIL, WATER AND GENETIC RESOURCES**

In Rwanda, like in most countries, various agricultural practices are reported to be the most damaging practices affecting the soil, water and genetic resources and thus biodiversity.

As regards the soil, the agricultural practices that generally damage soil are regrettably the most often used practices in Rwanda. Such practices include the unsustainable use of agrochemicals, specialisation of production systems and intensification of certain practices, such as overcultivation without restoration of soil nutrients, overgrazing, abandonment of mixed cropping systems, reduction in number of used species and varieties, conversion of natural ecosystems such as wetlands to agriculture and the shortening of the fallow period in shifting cultivation.<sup>12</sup> In Rwanda, these agricultural practices have degraded the soil, caused soil erosion, pollution and infertility which led to biodiversity loss as also mentioned in chapter one.<sup>13</sup> This was also confirmed by the majority of the interviewees, who particularly mentioned that the need to reduce poverty and ensure food security has resulted in the increasing focus on modern crop and livestock varieties accompanied by the increasing use of agrochemicals and abandonment of traditional varieties with negative impacts on soil.<sup>14</sup>

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<sup>11</sup> Karl Hammer 'Resolving the challenge posed by agrobiodiversity and plant genetic resources - an attempt' 76 *Journal of Agriculture and Rural Development Tropics and Subtropics*; K Hammer & Y Teklu 'Plant Genetic Resources: Selected Issues from Genetic Erosion to Genetic Engineering' (2008) 109 *Journal of Agriculture and Rural Development in the Tropics and Subtropics* no 1 (15) at 18; K Hammer, A Diederichsen & M Spahillari 'Basic studies toward strategies for conservation of plant genetic resources' in Serwinski and Faberov Proceedings of the Technical Meeting on *The Methodology of the FAO World Information and Early Warning System on Plant Genetic Resources* (1999) in K Hammer & Y Teklu op cit note 11.

<sup>12</sup> REMA *Rwanda state of environment and outlook report: Our environment for economic development* (2009) 33-36; Geertrui Louwagie, Stephan Hubertus Gay & Alison Burrell op cit note 2 at 43; Ian Hannam & Ben Boer op cit note 1 at 13; FAO *Adapting to climate change through land and water management in Eastern Africa: Results of pilot projects in Ethiopia, Kenya and Tanzania* (2014) 15.

<sup>13</sup> RoR *Rwanda biodiversity policy* (2011) 2; REMA op cit note 12 at 33-36; Paragraph 1.1.3.

<sup>14</sup> This was revealed during interviews with respondents 1, 2, 5, 7, 8, 9, 11, 12, 13, 14, 16, 17 and 18.

For water, agriculture is by far the most consumptive human use of fresh water<sup>15</sup> and is classified among the non-point sources of water pollution.<sup>16</sup> It affects surface and underground water quality and quantity. Different agricultural practices, such as tillage or ploughing, fertilising, manure spreading, use of pesticides, irrigation, clear cutting, silviculture and aquaculture among others, harm aquatic biodiversity when they are not well controlled.<sup>17</sup> Such practices harm the surface and underground water through pollutants contained in the drainage water, runoff, and effluents.<sup>18</sup> Once water quality is impaired by high levels of salinity and pollutants from agriculture, biodiversity is reduced.<sup>19</sup> In Rwanda, these harmful agriculture too have been practiced, with similar results to her water resources, particularly with regard to the hydrological composition of swamps and other connected water resources.<sup>20</sup> This was borne out by the research data, that pointed to the damaging effects of farming in the proximity to water bodies and unsustainable agricultural exploitation of wetlands.<sup>21</sup>

Genetic erosion is mostly caused by agricultural practices and this too is the case in Rwanda.<sup>22</sup> Genetic erosion is defined as the loss of individual genes and of combinations of genes, such as those found in locally adapted landraces. It results mainly from the replacement of local varieties by modern varieties since genes found in the varieties of previous generation farmers are not all contained in the modern varieties. In addition, introduction of commercial varieties into agricultural ecosystems reduces the number of

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<sup>15</sup>Biodiversity International *Sustainable agriculture and the sustainable use of agricultural biodiversity: concepts, trends and challenges* An information note submitted for the Fourteenth Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity (2010) 38.

<sup>16</sup> Edwin D Ongley 'Control of water pollution from agriculture' (1996) FAO Irrigation and Drainage Paper 55 available at

<http://www.fao.org/docrep/W2598E/w2598e04.htm#non%20point%20source%20pollution%20defined>, accessed on 7 December 2012). A non-point source of water pollution is the one that causes water pollution resulting from different human activities for which the pollutants have no obvious point of entry into receiving watercourses.

<sup>17</sup> Ibid.

<sup>18</sup> Biodiversity International op cit note 15 at 39.

<sup>19</sup> CGIAR 'Water, land and ecosystems improved natural resources management for food security and livelihoods' (2011) 21 available at

[http://www.iwmi.cgiar.org/CRP5/PDF/Water\\_Land\\_Ecosystems/CRP5\\_Water\\_Land\\_and\\_Ecosystems\\_20110926.pdf](http://www.iwmi.cgiar.org/CRP5/PDF/Water_Land_Ecosystems/CRP5_Water_Land_and_Ecosystems_20110926.pdf), accessed on 7 December 2012.

<sup>20</sup> RoR *Fifth National Report to the CBD* (2014) 56-57; Rwanda Natural Resources Authority *Water quality monitoring in Rwanda* (Report I: 2011) 4, 7, 8, 30; Ministry of Natural Resources *Water resources management sub-sector strategic plan: 2011-2015* (2011) 17; RoR op cit note 13 at 2; REMA op cit note 12 at 78-79; RoR *Fourth National Report to the Convention on Biological Diversity* (2009) 24.

<sup>21</sup> Respondents 1, 3, 5, 6, 7, 11 and 18.

<sup>22</sup> RoR op cit note 20 at 58; RoR *The state of plant genetic resources for food and agriculture in Rwanda: Country Report* (2013) 14; RoR op cit note 13 at 2; REMA op cit note 12 at 55-56; RoR op cit note 20 at 25.

varieties used into traditional farming systems. Other causes of genetic erosion include the over-exploitation of genetic resources, emergence of new pests, weeds and diseases, environmental degradation and land clearing through deforestation and bush fires for agricultural purposes.<sup>23</sup> The fieldwork data revealed that currently some agricultural practices threaten crop and livestock genetic resources due to: replacement of local and more diverse varieties by productive but less diverse modern varieties, the practice of land consolidation, regionalization of crops, the use of agrochemicals to which traditional crops are sensitive, market preferences for newer varieties and government agricultural policy that promotes monocultures.<sup>24</sup>

The international community is therefore concerned with the protection and conservation of soil, water and genetic resources in agriculture as reflected in some international environmental agreements discussed in chapter three, which Rwanda has ratified. The related relevant international obligations are discussed below.

## **5.4 CONSERVATION OF SOIL, WATER AND GENETIC RESOURCES UNDER INTERNATIONAL ENVIRONMENTAL LAW**

### **5.4.1 International Environmental Law applicable to soil, water and genetic resources**

Of the international conventions examined in chapter 3, which Rwanda has ratified, there are four international Conventions and one African Convention that are applicable to all three biodiversity components under discussion in this chapter. These are:

- The Convention on Biological Diversity, 1992 (CBD);
- The Rotterdam Convention on the Prior Informed Consent Procedure for certain Hazardous Chemicals and Pesticides in International Trade, 1998 (Rotterdam Convention) and The Stockholm Convention on Persistent Organic Pollutants, 2001 (The Stockholm Convention), which deal with hazardous chemicals and organic pollutants respectively;
- The Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971 (Ramsar Convention); and

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<sup>23</sup> FAO 'Plant genetic resources: use them or lose them' available at [http://www.fao.org/fileadmin/templates/nr/documents/CGRFA/factsheets\\_plant\\_en.pdf](http://www.fao.org/fileadmin/templates/nr/documents/CGRFA/factsheets_plant_en.pdf), accessed on 15 December 2012.

<sup>24</sup> Respondents 1, 3, 5, 6, 7, 8, 9, 11, 15, 17 and 18.



- The African Convention on the Conservation of Nature and Natural Resources, 1968.

Their particular relevance to soil, water and genetic resources will be briefly expounded upon here.

#### 5.4.1.1 The Convention on Biological Diversity, 1992 (CBD)

As discussed in chapter three, the CBD has, among its objectives, the sustainable use of the components of biological diversity including soil, water and genetic resources.<sup>25</sup> The sustainable use of these three components of biodiversity concerns agriculture like any other sector. The CBD also obliges parties to, *inter alia*, integrate consideration of the conservation and sustainable use of biological resources into national decision-making. For instance, Parties to the Convention have launched a specific programme dedicated to the biodiversity of inland waters. That programme promotes the ecosystem approach by recognizing watershed management as the best means to reconcile competing demands of inland waters. With that programme, the maintenance of biodiversity has to be integrated into the critical demands for freshwater use encompassing agricultural water demands.<sup>26</sup>

Furthermore, the CBD obliges parties to adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity.<sup>27</sup> This applies to all biological resources including those tied to agriculture such as agricultural cultivars, domesticated animals, pollinators, pests and pest predators and soil microbes.<sup>28</sup>

The CBD additionally recognises sovereignty of States over genetic resources including those relevant to agriculture. It encourages their customary use and adoption of adequate conservation measures (*in-situ* and *ex-situ*).<sup>29</sup>

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<sup>25</sup> Article 2 CBD.

<sup>26</sup> UNEP *The Greening of Water Law: Managing Freshwater Resources for People and the Environment* (2010) 28.

<sup>27</sup> Article 10 CBD; Paragraph 3.2.1.

<sup>28</sup> B K Desai & B T Pujari *Sustainable Agriculture: A vision for future* (2007) 76-77.

<sup>29</sup> Article 15 CBD.

#### *5.4.1.2 Rotterdam, 1998 and Stockholm, 2001 Conventions*

The Rotterdam and Stockholm Conventions contribute to the conservation of soil, water and genetic resources in agricultural development indirectly and this has positive impacts on biodiversity.<sup>30</sup> On one hand, the Rotterdam Convention promotes shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals to protect human health and the environment. It obliges parties to regulate the entry of chemicals and pesticides.<sup>31</sup> On the other hand, the Stockholm Convention aims at protecting human health and the environment from persistent organic pollutants. It requires its parties to eliminate and restrict dangerous persistent organic pollutants and clean old stockpiles of dangerous persistent organic pollutants.<sup>32</sup> Though there are no concrete provisions in the text of the Rotterdam and Stockholm Conventions, which precisely call for the conservation of soil, water and genetic resources, the two Conventions indirectly protect such components of biodiversity in agricultural development. The indirect protection comes from the conventional requirement to control the entry and the use of chemicals, pesticides and persistent organic pollutants including those used in agriculture and which constitute the big threats to biodiversity. The chemicals, pesticides and persistent organic pollutants governed by the two Conventions degrade the soil, water and genetic resources, and are used in different sectors including agriculture.

#### *5.4.1.3 The Ramsar Convention, 1971*

The Ramsar Convention contributes to sustainable use and conservation of soil, water and genetic resources through protection of wetland ecosystems in both the wetlands declared as wetlands of international importance and other wetlands.<sup>33</sup> Importantly, wetlands are sensitive areas, rich in biodiversity, but areas where many agricultural activities are taking place impacting negatively their soils, waters and genetic resources. Therefore, agricultural activities carried out in wetlands must be conducted sustainably to conserve soil, water and genetic resources found in wetlands.

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<sup>30</sup> Paragraphs 3.2.4 and 3.2.5.

<sup>31</sup> Article 5 (1) Rotterdam Convention.

<sup>32</sup> Articles 1 and 3 (1) (a) Stockholm convention.

<sup>33</sup> Articles 2 (4), 2 (5) and 4 (1) Ramsar Convention.

#### 5.4.1.4 African Convention on the Conservation of Nature and Natural Resources, 1968

The African Convention on the Protection of Nature and Natural Resources obliges parties to take appropriate measures for the conservation and management of soil, water and genetic resources as discussed in chapter three. As regards soil, parties must combat soil erosion, soil misuse and deterioration of its physical, chemical and biological or economic properties.<sup>34</sup> Agriculture can be the source of all these threats. Therefore, taking measures to combat such threats in agricultural development activities is beneficial to the conservation of soil and biodiversity. As regards water, parties must manage water resources, whether underground, surface or rain water in a way that maintains them at the highest level of quality and quantity and to ensure the protection of human health.<sup>35</sup> As agriculture is a large consumer of water resources and the way water resources are used in agricultural development can have negative impacts on biodiversity, this directly applies to it. With regard to genetic resources, the African Convention on the Conservation of Nature and Natural Resources contributes to their conservation through obliging parties to maintain and enhance genetic diversity. It obliges parties to establish and implement policies for the conservation and sustainable use of genetic resources, integrate species' *in situ* and *ex situ* conservation within land-use planning and preserve possible varieties, control intentional and accidental introduction of non-native species, and eradicate introduced invasive species.<sup>36</sup>

#### 5.4.2 International Convention particularly applicable to Soil and Water : The United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, 1994 (UNCCD)

While the UNCCD does not provide anything related to genetic resources' conservation, it applies to the conservation of soil and water in all sectors including agriculture. The UNCCD recognises soil conservation where it obliges country parties to fight against land degradation, the main cause of desertification; and soil degradation is part of land degradation.<sup>37</sup> It also requires parties to give due priority to combating desertification and establishing strategies and priorities for sustainable development plans. The latter are supposed to deal with soil,

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<sup>34</sup> Article VI African Convention on Conservation of Nature.

<sup>35</sup> Article VII African Convention on Conservation of Nature.

<sup>36</sup> Article IX African Convention on Conservation of Nature.

<sup>37</sup> Article 2 UNCCD; See paragraph 3.2.3.

water and wetlands, among others, with emphasis on soil erosion control, increase of soil fertility and land use planning,<sup>38</sup> which directly concerns agriculture and biodiversity.

The UNCCD further recognises the conservation of water in different activities as a strategy to combat desertification. Water should be conserved, since the direct physical effects of land degradation include the drying up of freshwater resources.<sup>39</sup> The Convention states that country parties, working in cooperation, have to understand the nature and the value of scarce water;<sup>40</sup> and adopt integrated strategies to improve conservation and sustainable management of water resources.<sup>41</sup> This applies to agricultural development like any other sector and benefits biodiversity conservation.

### **5.4.3 International Convention specifically applicable to Water: the United Nations Framework Convention on Climate Change, 1992 (UNFCCC)**

While the importance of conserving soil and genetic resources for adaptation to climate change is not specifically addressed under the UNFCCC, it specifically provides for the protection and conservation of water as a measure to adapt to climate change. The UNFCCC recognizes water as a fundamental aspect of climate and provides that all parties should prepare for adaptation to the impacts of climate change by, among other things, developing and elaborating appropriate and integrated plans for coastal zone management, water resources and agriculture.<sup>42</sup> Water is considered a necessary vehicle for climate change adaptation<sup>43</sup> and needs therefore to be conserved. The provisions of the Convention do not establish a specific list of sectors under which water should be conserved as a measure to adapt to climate change, thus by implication agriculture is therefore included. As discussed in chapter one and later discussed in chapter six, climate change is a big threat to biodiversity

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<sup>38</sup> Article 5(a) and (b) UNCCD.

<sup>39</sup> 'Water scarcity and desertification' UNCCD Thematic Fact Sheet Series no. 2 available at <http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/Desertificationandwater.pdf>, accessed on 10 December 2012. This relationship between wetlands and water is recognized in the preamble of the text of the Ramsar convention.

<sup>40</sup> Article 3 (c), 4 (d), 17 (g) UNCCD.

<sup>41</sup> Article 2 (2) UNCCD.

<sup>42</sup> Article 4.1 (e) UNFCCC.

<sup>43</sup> Global Public Policy Network on Water management (GPPN) *Water and Climate Change Adaptation* Proposals for the fifth session of the UNFCCC Ad Hoc Working Group on Long-Term Cooperative Action under the Convention (AWG LCA) (Bonn, 29th March-8th April 2009) available at <http://unfccc.int/resource/docs/2009/smsn/ngo/147.pdf>, accessed on 10 December 2012.

and agricultural development.<sup>44</sup> Therefore, conservation of water in the agricultural sector, as a measure for adaptation to climate change, contributes to the conservation of biodiversity.

#### **5.4.4 The International Convention specifically applicable to Genetic Resources: The International Treaty on Plant Genetic Resources for Food and Agriculture, 2001 (ITPGRFA)**

As discussed in chapter three, the ITPGRFA requires parties to promote an integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture, to eliminate their threats, use them sustainably and promote farmers' rights.<sup>45</sup> This directly applies to the conservation of plant genetic resources, one of the three components of biodiversity studied in this chapter, in the development of agriculture.

In sum, as a member to the above outlined conventions, Rwanda has to ensure that agricultural development activities are conducted in harmony with conservation of soil, water and genetic resources in respect of the guidance provided by these conventions.

### **5.5. CONSERVATION OF SOIL, WATER AND GENETIC RESOURCES IN AGRICULTURE THROUGH NATIONAL LEGISLATION**

Respect for and implementation of all the above examined international obligations is important. However, conservation of soil, water and genetic resources in agricultural development becomes more effective if these obligations are regulated, in detail, by national agricultural or/and environmental laws.<sup>46</sup> So, too in Rwanda.

In conservation of soil, water and genetic resources in agriculture, laws comprising different types of binding legal instruments have to regulate the activities of its users and adopt sound and sustainable management decisions and strategies for the best use and management of these three components of biodiversity to sustain the ecological benefits that

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<sup>44</sup> Paragraph 1.1.4 and 6.4.

<sup>45</sup> Articles 5 (1 & 2), 6 & 7 ITPGRFA.

<sup>46</sup> Tran Thi & Huong Trang 'Legislation on genetic resources conservation in Vietnam' (2007) 4-5 available at [http://www.iucn.org/about/union/commissions/ce/ce\\_resources/ce\\_res\\_papers/#Biodiversity](http://www.iucn.org/about/union/commissions/ce/ce_resources/ce_res_papers/#Biodiversity), accessed on 16 December 2012.

they provide.<sup>47</sup> The laws should therefore be formulated in a way that induces people involved in agriculture to act in a manner that preserves the desired qualities of soil, water or genetic resources to a greater extent.<sup>48</sup> This section discusses principles and tools that should be incorporated into national legislation to ensure these aims. It will also indicate whether Rwandan legislation incorporates the relevant principles and tools. *Lacunae* in the relevant legislation will be itemized in the conclusion to this chapter. It is important to note that ‘principles express a general truth, which guides our action, serves as a theoretical basis for the various acts of our life, and the application of which to reality produces a given consequence’.<sup>49</sup> They embody legal standards, but the standards they contain are more general than commitments and do not specify particular actions.<sup>50</sup> Legal tools mean different mechanisms or techniques and procedures established in the law which are practical in nature and through which principles are implemented.

### 5.5.1 General principles to be contained in domestic legislation

To give full effect to the conservation of soil, water and genetic resources in agricultural development, domestic legislation should incorporate different general principles which are reflected in various binding and non-binding international legal instruments. The principles to be discussed hereunder are general in the sense that they apply to different members of the international community including Rwanda, and apply to different sectors and activities, and in respect of the protection of all aspects of the environment. They obviously apply to the protection of biodiversity components in agricultural development activities. Under this section, the discussion focuses on the following six general principles:

- sovereignty and responsibility;
- precaution;
- maintenance of biodiversity;
- polluter-pays;
- prevention; and

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<sup>47</sup> Michael I Jeffery, Jeremy Firestone & Karen Bubna-Litic *Biodiversity, conservation, law + livelihoods: Bridging the north-south divide* (2008) 332.

<sup>48</sup> L Christy *Legislative principles of soil conservation* cited by Michael I Jeffery, Jeremy Karen Bubna-litic op cit note 47 at 336.

<sup>49</sup> Gentini Case (1903) cited in Corrado Clini Ignazio Musu & Maria Lodovica Gullino *Sustainable development and environmental management: Experiences and case studies* (2008) 19.

<sup>50</sup> Philippe Sands et al *Principles of international environmental law* 3<sup>rd</sup> ed (2012) 189.

- public participation.

#### *5.5.1.1 Sovereignty and responsibility*

The sovereignty and responsibility principle is embodied in different binding and non-binding international, regional and national legal instruments.<sup>51</sup> This simply means that states are not only sovereign over the three biodiversity components under discussion, but are also responsible to ensure that activities conducted within their jurisdictions or control do not damage the same biodiversity components in areas beyond their national jurisdictions.<sup>52</sup> This principle is relevant to Rwanda which, like any other sovereign country, is free to decide how to manage soil, water and genetic resources for agricultural purposes; whether and to what extent it will protect such biodiversity components. It is accordingly suggested that Rwanda should make sure that such activities do not harm soil, water or genetic resources beyond its national jurisdiction.

Rwandan Environmental Framework Law incorporates the principle of sovereignty and responsibility by providing that the environment constitutes the common national heritage;<sup>53</sup> that it is the responsibility of everyone to protect, conserve and promote the environment,<sup>54</sup> and that natural resources must be exploited sustainably.<sup>55</sup> Besides, the State has the responsibility to ensure that any activity carried out on its behalf or in its capacity does not degrade the environment in another country or in regions beyond its national jurisdiction.<sup>56</sup> These general provisions cover soil, water and genetic resources and must be respected in the agricultural sector like in any other sector. In addition, both the Land Law and Water Law incorporate the principle of sovereignty and responsibility over soil and water resources by providing that the two are the common heritage of all Rwandans; the State has the supreme powers to manage them in the public's interest and it is the responsibility of everyone to ensure their protection and sustainable use.<sup>57</sup> This obviously applies to the agricultural sector too.

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<sup>51</sup> Principle 2 Rio Declaration, Principle 21 Stockholm Declaration, Articles 3 & 15 CBD, Preamble and Article 10 ITPGRFA, Article 2.3 Ramsar Convention, Preambles of the UNCCD, UNFCCC, Stockholm convention and the African Convention on the Conservation of Nature and Natural Resources.

<sup>52</sup> Principle 2 Rio Declaration; Tran Thi & Huong Trang op cit note 46.

<sup>53</sup> Article 2 Environmental Framework Law.

<sup>54</sup> Articles 3, 6 and 64 Environmental Framework Law.

<sup>55</sup> Article 45 Environmental Framework Law.

<sup>56</sup> Article 49 ((3) Environmental framework Law.

<sup>57</sup> Articles 3 & 39 Land Law and Articles 3 & 4 Water Law; See paragraphs 4.2.4.1 and 4.2.6.

### 5.5.1.2 Precautionary principle

As discussed in chapter three, the precautionary principle means that where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. It allows decision-makers to put a stop to such activities or prohibit the use of products/substances if they suspect that these may, *inter alia*, degrade, soil, surface or underground water and genetic resources. This principle must be incorporated into domestic legislation and applied according to national capabilities.<sup>58</sup> Thus domestic law pertaining to these three biodiversity components should incorporate the precautionary principle.

Particularly with regards to soil, Hannam argues that this principle is central to the scheme of ecosystem-based environmental management, and is particularly pertinent in the context of soil, given the risks involved in losing soil capability for many generations if inappropriate management regimes are put in place.<sup>59</sup> The precautionary principle is important to Rwanda where agricultural activities degrade soil, water and genetic resources - as discussed above.<sup>60</sup> However, the scientific capacity to ascertain their consequences in advance is not well developed. Therefore, the authorities responsible for making decisions about the use of these three biodiversity components need to be guided by the precautionary principle which has to be enshrined in the related laws to avoid irreversible damages that may occur.

The precautionary principle has been adopted in various international binding and non-binding legal instruments. Their incorporation in national legislation facilitates the implementation of this principle. It is important to mention that relevant domestic legislation of other countries reflect the use of the precautionary principle with regard to these three

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<sup>58</sup> Principle 15 Rio Declaration.

<sup>59</sup> Ian Hannam & Ben Bower *op cit* note 1 at 24.

<sup>60</sup> See paragraph 5.3.



biodiversity components.<sup>61</sup> The Rwandan Environmental Framework Law and the Water Law incorporate the principle of precaution, as discussed in chapter four.<sup>62</sup>

### 5.5.1.3 Maintenance of biodiversity

Given the importance of conserving soil, water and genetic resources if biodiversity conservation is to be achieved, laws governing these components of biodiversity should set as their objective the conservation of biodiversity in general and soil biodiversity, aquatic biodiversity or genetic resources diversity in particular.<sup>63</sup> Under the CBD, countries have an obligation to adopt measures necessary to conserve species diversity, genetic diversity within species and ecosystem diversity.<sup>64</sup> Such measures should be adopted in all sectors of activity likely to damage biodiversity including agriculture. Rwanda, being a member of the CBD, is obliged to ensure that laws on soil, water and genetic resources aim the conservation of biodiversity. Given the way soil, water and genetic resources are exploited for and negatively affected by agriculture as discussed above,<sup>65</sup> aiming at biodiversity conservation in laws related to these three components is necessary.

In Rwanda, the principle of maintenance of biodiversity is reflected, in a limited fashion, in the Environmental Framework Law and the Water Law<sup>66</sup> which contain few provisions aiming at the protection of biodiversity generally; they do not give much details. Additionally, the Biodiversity Law which has the main objective of biodiversity conservation obviously reflects this principle.<sup>67</sup> The provisions of these laws apply to the conservation of the three biodiversity components under discussion in the agricultural sector.

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<sup>61</sup> Principle 15 Rio Declaration, Preamble to the CBD, Article 3 UNFCCC, Article IV African Convention on the Conservation of Nature and Natural Resources. Also such measures are provided for in the Germany Federal Soil Protection Act of 17 March 1997: articles 7 and 17 (1 & 2); Ines Vogel, Claus Gerhard Bannick & Holger Böken 'The German soil protection law and regulations for the utilisation of biowaste' Paper presented at an International Conference on *Soil and compost eco-biology* (15–17 September 2004, León–Spain) at 99 available at [www.soilace.com/pdf/pon2004/9.Vogel.pdf](http://www.soilace.com/pdf/pon2004/9.Vogel.pdf), accessed on 21 November 2012); UNEP 'Legislation on access to genetic resources in Latin America and the Caribbean' available at [www.pnuma.org](http://www.pnuma.org), accessed on 16 December 2012.

<sup>62</sup> Article 7(1) Environmental Framework Law and Article 5 water Law; See paragraphs 4.2.2.3 and 4.2.6.

<sup>63</sup> Ian Hannam & Ben Bower op cit note 1 at 24.

<sup>64</sup> Preamble and Article 2 CBD

<sup>65</sup> Paragraph 5.3

<sup>66</sup> Articles 11-14 & 17, 19 and 54 (1) Environmental Framework Law; Articles 33-35 Water Law; See paragraph 4.2.6.1.

<sup>67</sup> Article 1 Biodiversity Law; See also paragraph 4.2.1.

#### 5.5.1.4 *The polluter-pays and prevention principles*

As discussed in chapter four, the polluter-pays principle serves to ensure that the cost of pollution is borne by the polluter<sup>68</sup> and the prevention principle is used to protect the environment in advance against any form of environmental damage (to soil, water or genetic resources), based on scientific evidence, rather than attempting to cure the harmful effects that certain activities, including agricultural activities, may produce on them and biodiversity.<sup>69</sup> Where the damage cannot be prevented at all, it should be minimized as much as possible.

The polluter-pays and prevention principles appear in some binding and non-binding international legal instruments and their incorporation in domestic laws governing soil, water and genetic resources is vital in the conservation of biodiversity against negative impacts of agricultural development.<sup>70</sup>

The polluter pays principle must be incorporated in soil, water and genetic resources laws to help control some agricultural production practices like introduction of pollutants (agrochemicals) and alteration of habitats and landscapes which pollute or affect these three biodiversity components. Such agricultural practices have some benefits. However, their negative impacts cannot be ignored. The polluter-pays principle therefore helps address negative impacts of agriculture such as pollution of water and soil and degradation of habitats.<sup>71</sup> Incorporation of this principle in Rwandan laws on soil, water and genetic resources is necessary this time when Rwanda is promoting the intensification of agriculture to increase productivity, ensure food security and reduce poverty by increasing the use of agrochemicals and changing some habitats like wetlands, which impact negatively the three biodiversity components under discussion. The polluter-pays principle can therefore help prevent the biodiversity harm resulting from such agricultural practices.

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<sup>68</sup>See paragraph 4.2.2; See also Vito De Lucia and Richard Reibstein 'Polluter pays principle' in C J Cleveland (ed) *Encyclopedia of Earth* (2010) available at [http://www.eoearth.org/article/Polluter\\_pays\\_principle](http://www.eoearth.org/article/Polluter_pays_principle), accessed on 23 November 2012.

<sup>69</sup> Nicolas de Sadeleer 'Environmental Principles: from political slogans to legal rules' (2005) 16 *Environmental Journal of International Law* 153 at 153.

<sup>70</sup> Principle 16 Rio Declaration, Article 14 CBD.

<sup>71</sup> Margaret Rosso Grossman 'Agriculture and the pollutorpays principle' *Electronic Journal of Comparative Law* 11.3 (2007) 1 at 2.

For the prevention principle, it is very important for Rwanda to take preventive measures -based on scientific evidence- to anticipate damage that agriculture can cause to soil, water and genetic resources, or where it has already occurred -like the way soil, water and genetic resources have been affected as discussed above- Rwandan laws related to these biodiversity components need to incorporate preventive measures to be used for the prevention of damage expansion.<sup>72</sup>

The Rwandan Environmental Framework Law and the Water Law incorporate the polluter-pays and prevention principle, as discussed in chapter four.<sup>73</sup>

#### *5.5.1.5 Public participation*

The principle of public participation is enunciated in various binding and non-binding international legal instruments,<sup>74</sup> and is important as far as soil, water and genetic resources conservation in agriculture is concerned. Soil, water and genetic resources cannot be protected effectively in Rwanda like in any other country if all stakeholders involved in their management and use, with particular emphasis on farmers, breeders, women and local communities, are not involved through established legal rights and procedures of public participation.<sup>75</sup> This, because public participation leads to, among other things, increasing the level of information in communities (information on interrelationship between soil, water and genetic resources conservation or degradation and agriculture), community empowerment, greater accountability and community solidarity (in management or taking measures to reconcile conservation of the three biodiversity components and agricultural development).<sup>76</sup> However, its application in the management of the three biodiversity components cannot be effectively invoked if it is not required by related laws. It should therefore be incorporated into the relevant domestic laws and should make provision for three components of public participation, namely:

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<sup>72</sup> Nicolas de Sadeleer *The principles of prevention and precaution in international law: two heads of the same coin?* (2010) 9.

<sup>73</sup> Article 7 (3) Environmental Framework Law and Article 5 Water Law; See also paragraphs 4.2.2.3 and 4.2.6.

<sup>74</sup> Principle 10 Rio Declaration, Article 13 CBD, Article 9.2 ITPGRFA, Article 5 (d) UNCCD, Articles 10-11 Stockholm Convention and Article 6 UNFCCC.

<sup>75</sup> Cap-Net *Basic principles of integrated water resources management* at 8; Kathleen O'Reilly 'Traditional' women, "modern" water: Linking gender and commodification in Rajasthan, India' (2006) 37 *Geoforum* 958 at 961.

<sup>76</sup> RSA *National Policy Framework for Public Participation* (2007) 17.

- access to information related to the ecological condition and the state of the soil, water and genetic resources and their interactions with agricultural activities;
- participation in the decision-making related to soil, water and genetic resources' use for agriculture; and
- access to justice.<sup>77</sup>

In Rwanda, the Environmental Framework Law and the Water Law incorporate the principle of public participation.<sup>78</sup> A fuller discussion of public participation is provided in Chapter 7.

## **5.5.2 Further legislative principles pertinent to soil, water and genetic resources legislation, exclusively**

### *5.5.2.1 Soil*

The Rio Declaration states that human beings are entitled to a healthy and productive life in harmony with nature.<sup>79</sup> Hannam and Boer argue that inherent from this Rio Declaration principle is the principle of entitlement to a right to a healthy and ecologically sustainable soil environment. It is obvious that there can be no terrestrial life without soil, the living central component in ecosystems that produces biomass, and acts as a filtering, buffering and transformative medium between atmosphere, ground water and plant cover.<sup>80</sup> Soil legislation has therefore to grant to everyone the right to a healthy and sustained soil. Once a right is established, it must be protected as much as possible.

To enjoy the right to a healthy and ecologically sustainable soil, everyone has also the responsibility to protect it. Consequently, soil legislation has to contain the principle that proclaims the basic ethical responsibility to protect and manage the soil, which means that, together and in parallel, all stakeholders at all levels (State, its administrative entities and individuals), which thus includes any agricultural soil user, are responsible for soil

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<sup>77</sup> Principle 10 Rio Declaration; Ian Hannam & Ben Bower op cit note 1 at 25.

<sup>78</sup> Articles 7 (4) & 63 Environmental Framework Law and Article 5 Water Law

<sup>79</sup> Principle 1 Rio Declaration.

<sup>80</sup> Elisabeth Zoller *Institutional aspects of international governance* (1995) 3 *Indiana Journal of Global Legal Studies* 121.

protection.<sup>81</sup> However, the soil legislation must go further and establish that this responsibility must be done in an ecologically and sustainable manner that benefits both present and future generations.<sup>82</sup> The increase in human population leads to overexploitation and degradation of soil which in turn leads to decline in food security, indicating that soil has ecological limits. Once degraded, it cannot perform its ecological functions. Therefore, the necessity to protect ecological functions of the soil should be considered in formulation of soil law<sup>83</sup> which contributes to both biodiversity conservation and agricultural development.

Further, soil legislation must contain the principle of monitoring soil health.<sup>84</sup> As mentioned above, soils has ecological limits. Once degraded, they cannot perform their ecological functions. Due to increase in human population and the increasing necessity of exploiting the soil, its ecological limits can be exceeded if no attention is paid to soil health. It is therefore important that soil law requires regular examination of soil ecological capabilities. Monitoring soil health can result in early warning if soil degradation is likely to occur. FAO and its partners have developed a list of methods and tools for monitoring soil health.<sup>85</sup> Monitoring soil health is important to Rwanda where the soils are much exploited in agriculture without proper consideration of their ecological health.

The principle of monitoring soil health implies that soil legislation establishes procedures for soil assessment, thus stipulating provisions that require:

- technical surveys of the soil environment;
- soil database development;
- evaluation of knowledge on the condition of soil;
- soil resource evaluation;
- soil classification and soil environmental impact assessment; and
- standards and guidelines for the use of soil.<sup>86</sup>

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<sup>81</sup> Swiss Federal Office for the Environment FOEN 'Soil protection in Switzerland: our vision' (2007) 7 available at <http://www.bafu.admin.ch/bodenschutz/index.html?lang=en>, accessed on 20 November 2012.

<sup>82</sup> Elisabeth Zoller op cit note 80 at 121.

<sup>83</sup> Ian Hannam & Ben Boer *Legal and institutional frameworks for sustainable soils: A preliminary report* IUCN Environmental Policy and Law Paper no. 45 (2002) at 10.

<sup>84</sup> Hurni Hans & Meyer Konrad *A World Soils Agenda. Discussing International Actions for the Sustainable Use of Soils* (2002) 18.

<sup>85</sup> FAO *Climate-smart agriculture: Policies, practices and financing for food Security, adaptation and mitigation* (2010) 38.

<sup>86</sup> Ministry of Environment of New Zealand *Environmental performance indicators: confirmed indicators for air, fresh water and land* (1998).

Lastly, soil legislation has to provide for the principle of protection of the cultural aspects of soil. The soil is an inherent part of the social environment and its cultural, spiritual and scientific values need to be protected, both for the soil's own sake as well as the life it supports in Rwanda like in any other country.<sup>87</sup>

The principle of entitlement to a healthy and ecologically sustainable soil environment is contained both in the Rwandan Constitution and the Environmental Framework Law by entitling to everybody the right to stay in a healthy and clean or balanced environment.<sup>88</sup> There cannot be a healthy and clean or balanced environment in the absence of a healthy soil and biodiversity.

#### 5.5.2.2 *Water*

The principles more specific to water are the recognition of water as a finite resource and the principle of recognition of the economic value of water. These two principles appear in the Dublin Statement on Water and Sustainable Development which resulted from the International Conference on Water and the Environment held in Dublin in 1992.<sup>89</sup> Though the Dublin Statement is not binding, it guides government activities in relation to water management in different sectors to address the problem of scarcity and misuse of fresh water which pose a serious threat to sustainable development.

The principle of recognition of water as a finite resource means that there should be integrated water management. This principle calls for a holistic approach in the management of water, since it recognises that water is used for different purposes, functions and services.<sup>90</sup> To apply this principle, water legislation has to establish the limits of the quantity of water that is allocated to different human activities within a certain period of time. The use of water in agricultural activities as a finite resource impacts biodiversity in a positive sense.

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<sup>87</sup> Ian Hannam & Ben Bower op cit note 1 at 28.

<sup>88</sup> Article 49 Constitution and Article 5 Environmental Framework Law.

<sup>89</sup> Principles 1 & 4 Dublin Statement on water and Sustainable Development (1992).

<sup>90</sup> Principle 1 of the Dublin Statement on water and sustainable development; Claudia Sadof, Karin Kemper & David Grey 'Calming global waters: managing a finite resource in a growing world' at 17 available at <http://siteresources.worldbank.org/EXTABOUTUS/Resources/Water.pdf>, accessed on 14 May 2015.

With regard to the recognition of the economic value of water, it is necessary to determine the price that a rational user of a publicly or privately supplied water resource is willing to pay. The price should be calculated according to different water uses for the satisfaction of people's needs.<sup>91</sup> Water legislation should ensure that any particular water use for agricultural purposes is associated with opportunity costs.<sup>92</sup> For effective conservation of biodiversity in the agricultural sector, water legislation should assist decision-makers, for example, to balance water demands from agricultural irrigation for food production with the need to use and conserve biodiversity (fish and aquatic biodiversity and habitats).<sup>93</sup> This principle is implemented through the use of water charges discussed further below.<sup>94</sup>

The principles of recognition of water as a finite resource and recognition of the economic value of water are relevant to Rwanda where there is a challenge of meeting the increasing multiple water demands for internal use and transboundary needs, with limited capacity and in the face of declining water availability due to ecosystems' degradation, pollution and climate change. The capacity to manage water resources in Rwanda is limited and Rwanda's water resources are severely degraded due, mostly, to land degradation resulting from different factors like pollution from point and non point sources including agricultural chemicals.<sup>95</sup> The application of the two principles is beneficial to biodiversity conservation and can be substantial if it is backed by, among other things, legislative measures. Their incorporation in the national water law is therefore necessary.

In Rwanda, the principle of recognition of water as a finite resource is partly integrated in the Rwandan water legislation. The Water Law provides for the obligation to make an inventory of water resources, to establish a master plan for the management of water resources and provides for priority in water distribution among different water uses,<sup>96</sup> which leads to integrated water management.

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<sup>91</sup> Frank A Ward & Ari Michelsen 'The economic value of water in agriculture: concepts and policy applications' (2002) 4 *Water Policy* 423 at 428.

<sup>92</sup> Roy Brouwer et al 'Economic valuation of environmental and resource costs and benefits in the water framework directive: technical guidelines for practitioners' (2009) 11 available at [www.aquamoney.org](http://www.aquamoney.org), accessed on 5 December 2012.

<sup>93</sup> Ibid.

<sup>94</sup> Paragraph 5.5.3.

<sup>95</sup> RoR *Water Resources Management Sub-Sector Strategic Plan (2011 – 2015)* (2011) 4.

<sup>96</sup> Articles 7, 27-28 Water Law.

As for the principle of recognition of the economic value of water, it is incorporated in the Water Law through the use of water charges. The Water Regulation provides for fees to be paid on the basis of the quantity of water used by people involved in industrial, mining (Rwf 40/cubic metre) and agricultural activities (Rwf 30/cubic metre).<sup>97</sup>

### 5.5.2.3 Genetic resources

The principles that are specific to genetic resources legislation are the principle of fair and equitable sharing of the benefits arising out of the utilization of genetic resources and Prior Informed Consent (PIC). These two principles are found in international conventions such as the CBD and the ITPGRFA.

Based on the right of access to genetic resources, benefits arising out of the utilization of genetic resources for agricultural purposes must be shared fairly and equitably. In sharing benefits derived from the use of genetic resources, indigenous or local communities have to be accommodated.<sup>98</sup> The benefits to be shared include, among others, results from research and development, commercial and other benefits derived from using the resources, access to and transfer of technology and participation in biotechnology. The legislation should determine how benefits resulting from the utilisation of genetic resources for agriculture are shared with farmers, breeders and other stakeholders involved in their management, which ensures motivation of their conservation.

Also, access to genetic resources for agricultural purposes is subject to prior informed consent of the country or community providing them, unless otherwise determined by that country. The principle is provided by Article 15 paragraph 5 of the CBD. The provider and user should have mutually agreed terms to ensure the fair and equitable sharing of benefits. The agreements should be based on certain principles, such as the right of the providers to require that users supply necessary information to them about who use the genetic resources for agricultural purposes, objectives of use, risks and potential risks arising from their exploitation and use. The genetic resources providers accept or refuse access based on the supplied information.<sup>99</sup>

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<sup>97</sup> Article 18 of Ministerial Order n°002/16.01 of 24/05/2013 determining the procedure for declaration, authorisation and concession for the utilisation of water *O G* n° Special of 30/05/2013.

<sup>98</sup> Tran Thi & Huong Trang op cit note 46.

<sup>99</sup> Ibid.



The principles of access and sharing the benefits arising out the utilization of genetic resources and the prior informed consent procedure are relevant to Rwanda since this country cannot isolate itself from the rest of the world where countries are dependent on each other for genetic resources to sustain food production and meet the increasing challenges of disease and climate change. Rwanda needs to both be able to contribute to and benefit from the opportunities that lie in shared access to genetic resources while conserving its genetic resources.<sup>100</sup>

The principles of fair and equitable sharing of the benefits arising out of the utilisation of agricultural genetic resources and of prior informed consent are not fully incorporated in Rwandan law. The Biodiversity Law only provides that any activity in terms of bioprospecting in and export of indigenous biological resources is subject to a permit. It also provides that before issuing such a permit, the interests of a person, the community and the State must be considered.

### **5.5.3 Legal tools of soil, water and genetic resources laws**

The laws governing soil, water and genetic resources should be established in a way that leads to shape human activity in favour of these resources and biodiversity protection in all activities, including agriculture. Therefore, to be effective these laws should, in addition to the general and specific principles set out above, provide for various legal tools aimed at ensuring compliance. Some of these legal tools are general and therefore applicable to all three components of biodiversity in agricultural exploitation, while others are specific and must be contained in either the soil, water or genetic resources legislation. Some of the tools discussed below are embodied in binding and non binding international legal instruments and their implementation through national laws is beneficial to biodiversity conservation and agricultural development.

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<sup>100</sup> RoR *State of plant genetic resources for food and agriculture in Rwanda: country report* (2013) 37.

### 5.5.3.1 General legal tools

#### *Planning*

Planning -for future spatial development and management of natural resources- is very important in the use of soil, water and genetic resources for agriculture and assists in biodiversity conservation. It helps to integrate conservation of these three biodiversity components into social and economic development and integrate the management of these three resources. With regard to soil, planning may encourage and promote economic soil uses that are beneficial or compatible with soil conservation objectives and special soil use plans.<sup>101</sup> As regards water and genetic resources,<sup>102</sup> planning helps to distribute them, according to established priorities, among different users and according to their availability. In time of scarcity, planning helps to determine and fix priorities for water and genetic resources' use.<sup>102</sup> Therefore, the laws governing soil, water and genetic resources should establish procedures that enable planning of the use of such biodiversity components at each level, the programs and procedures for their implementation and monitoring.<sup>103</sup> The related laws must also stipulate prohibitions or restrictions of any unwanted utilisation or change in utilisation of the resources' use.<sup>104</sup> Additionally, the laws must provide for the possibility of plans to be periodically reviewed to adapt to changing circumstances.<sup>105</sup>

Planning is recommended in different binding and non-binding international legal instruments<sup>106</sup> and is very important to Rwanda as a small and overpopulated country with limited land, water and genetic resources. Incorporation of the planning tool in Rwandan laws is necessary to enable Rwandan decision-makers integrate conservation of these three biodiversity components into agricultural development processes.

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<sup>101</sup> Dinah Shelton & Alexander Kiss *Judicial Handbook on Environmental Law* (2005) 40.

<sup>102</sup> Available at <http://www.cbd.int/waters/about.shtml>, accessed on 7 December 2012.

<sup>103</sup> Ian Hannam & Ben Bower op cit note 1 at 52.

<sup>104</sup> Dinah Shelton & Alexander Kiss op cit note 101 at 36.

<sup>105</sup> D Richey and J Goicochea Duclos 'General land use zoning' *PNW Ecosystem Research Consortium* at 72. available at [http://www.fsl.orst.edu/pnwerc/wrb/Atlas\\_web\\_compressed/6.LandUse\\_Cover/6c.zoning\\_web.pdf](http://www.fsl.orst.edu/pnwerc/wrb/Atlas_web_compressed/6.LandUse_Cover/6c.zoning_web.pdf), accessed on 27 November 2012.

<sup>106</sup> Principles 2, 13 & 14 Stockholm Declaration, Objective 2.34 Agenda 21, Article 6 CBD, Articles VI.3(a), VII.2 & 14.1 African Convention on Conservation of Nature and Natural Resources and Article 4.e UNFCCC.

In Rwanda, the tool of planning is provided in a general sense by the Environmental Framework Law, Land Planning and Development Law, Biodiversity Law and the Water Law as discussed in chapter four. The Environmental Framework Law gives the responsibility to the central government administration and decentralised entities for preparing a plan of action and to draft emergency plans in all domains in order to protect the environment.<sup>107</sup> This applies to planning related to all environmental issues including soil, water and agricultural genetic resources. The Land Planning and Development Law requires that land use planning and development be guided by principle of sustainable development and the principle of minimizing land development based on the excessive use of land and natural resources. The Biodiversity Law gives the responsibility to the Minister having biodiversity in his/her mandate to enact an Order setting out a plan for the management of biodiversity and its components in different bio-regions. This also applies to the management of soil, water and genetic resources impacted by agriculture as components of biodiversity. The Water Law also contains a section dedicated to planning in the water domain. It provides for the possibility of conducting a water inventory and establishing master plans of water resources' use and management.<sup>108</sup>

### *Licenses and permits*

International environmental law provides for the use of licenses and permits as a measure to conserve environment which embodies the three biodiversity components under discussion.<sup>109</sup> This tool implies that government officials have a mandate to authorise, certify or issue permits or licenses to activities or establishments that pose threats to the environment or that use natural resources. This means that the laws governing soil, water or genetic resources should oblige government officials to authorize activities that can potentially damage such biodiversity components.<sup>110</sup> Referring to the impacts of different agricultural activities and substances on soil, water and genetic resources in Rwanda as discussed at the beginning of this chapter,<sup>111</sup> the use of licenses and permits is important for the sake of their conservation in the process of agricultural development.

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<sup>107</sup> Article 48 Environmental Framework Law.

<sup>108</sup> Articles 26-31 Water Law.

<sup>109</sup> Article 9.3(a) African Convention on Conservation of Nature and Natural Resources

<sup>110</sup> Ibid at 36.

<sup>111</sup> See paragraph 5.3.

A licensing system operates on the basis of a list, or an inventory of activities, including agricultural activities, which necessitate a license because of their foreseeable potential harm to the soil, water or genetic resources.<sup>112</sup> The laws governing such biodiversity components detail the conditions under which harmful activities are subject to the authorisation regime.<sup>113</sup> Certain agricultural activities should require licenses or permits to be issued by a determined competent authority, which helps to minimize their negative impacts on soil, water or genetic resources.<sup>114</sup> The agricultural activities that may be on the list of activities subject to the licensing or permitting system, in different countries and in Rwanda, include:

- agrochemical use (import, export, sale, handling, storage, distribution, application on farm, disposal, and so on);
- water management activities (irrigation and water resources exploitation);
- wetlands' exploitation activities;
- pest management activities;
- exploitation of new unexploited lands;
- forest clearing for agriculture extension;
- introduction of new crop and animal species including GMOs;
- collection of wild plants and animals for agricultural purposes;
- farm waste management; and
- livestock and manure management, among others.<sup>115</sup>

In Rwanda, the licensing or permitting tool and its application in the conservation of soil, water and genetic resources in the agricultural sector are governed by the Environmental Framework Law, the Biodiversity Law, the Water Law, the Agrochemicals Law and the Land Planning and Development Law.

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<sup>112</sup> Ibid; Dinah Shelton & Alexander Kiss op cit note 101 at 36.

<sup>113</sup> Ian Hannam & Ben Bower op cit note 1 at 75.

<sup>114</sup> Maryland State Soil Conservation Committee 'A farmer's guide to environmental permits: your quick reference to environmental permits needed on farm' (2010) 1 available at <http://mda.maryland.gov/pdf/farmpermitguide.pdf>, accessed on 26 November 2012.

<sup>115</sup> William J Klassen 'Agriculture Environmental Assessment and Certification: Yukon-Canada' Paper presented at the IAIA11 conference on *Impact Assessment and Responsible Development for Infrastructure, Business and Industry* (Puebla – Mexico, 28 May- 4 June 2011) at 4 available at <http://www.iaia.org/conferences/iaia11/uploadedpapers/final%20drafts/Agriculture%20Environmental%20Assessment%20and%20Certification,%20Yukon,%20Canada.pdf>, accessed on 26 November 2012; Maryland State Soil Conservation Committee op cit note 114 at 18-19.; William J. Klassen op cit note 115 at 4; The paper basically focuses on soil conservation but this is very applicable to water resource as well.

The Environmental Framework Law describes the activities that cannot be carried out except if authorised by the competent authority. Such activities include introduction, importation, exportation of any animal or any plant species in Rwanda, burning forests, national parks and reserved areas, burning mountains, swamps and others, all conducted with an aim of agriculture or organizing grazing land, which degrade soil, water and genetic resources.<sup>116</sup> Also activities of watering plants, the use of swamps and wetlands and others are subject to an authorisation granted by the competent authority.<sup>117</sup>

The Water Law also subjects all operations susceptible to be harmful to waters free out-flow, to reduce the water resource and attack its quality or the aquatic environment diversity to an authorisation regime.<sup>118</sup> This has a general application and applies to agricultural activities.

In addition, the Biodiversity Law subjects any activity of bioprospecting and exportation of indigenous biological resources to a permit; which applies to agricultural animal or plant genetic resources.<sup>119</sup>

The Agrochemicals Law obliges any person intending to manufacture, import, export, sell, offer for sale, supply, store for purposes of sale, transport or exhibit anything in connection with agrochemicals to get a license<sup>120</sup> which applies directly to agriculture.

Articles 7, 10 and 11 of the Land Planning and Development Law provide that all land uses have to be in conformity with national and district land use and development master plans. Any change for land use must be authorized by the competent authority. This applies to all land uses including agricultural land use.

### *Sanctions for non-compliance*

While the international binding and non-binding instruments applicable to soil, water and genetic resources' conservation in agriculture do not prescribe sanctions for non-compliance

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<sup>116</sup> Articles 20 & 38 Environmental Framework Law.

<sup>117</sup> Article 23 Environmental Framework Law.

<sup>118</sup> Article 34 Water Law.

<sup>119</sup> Article 27 Biodiversity Law.

<sup>120</sup> Articles 17-20 Agrochemicals law.

with related laws, they oblige countries to adopt different measures necessary to implement their obligations.<sup>121</sup> This obviously covers establishment of sanctions against any breach of soil, water and genetic resources-related laws. Effective soil, water or genetic resources laws should contain provisions on the procedure for taking an action or sanctions (administrative, civil or criminal) that can be prescribed against a person or a corporation that does not comply with them, such as:

- warning;
- notice for remediation of degraded soil, water or genetic resources;
- suspension or loss of a license or a permit for an activity in relation to the use of soil, water or genetic resources;
- obligation to pay compensation for the damage caused to soil, water or genetic resources;<sup>122</sup>
- imprisonment; and
- payment of fines.<sup>123</sup>

This is important in countries like Rwanda where adopted laws should be complied with and, once breached, different measures including sanctions can apply to ensure effective compliance and enforcement. In Rwanda, the laws applicable to soil, water and genetic resources provide for sanctions against any failure to comply with them. Some provisions of the Environmental Framework Law, Land Law, Water Law, Biodiversity Law and the Penal Code determine different administrative, civil and criminal sanctions that can be prescribed against a person or corporation that breaches these laws. Such sanctions are ; suspension of activities including agricultural ones that degrade the environment in general,<sup>124</sup> a warning, cancellation of permits/licenses to conduct activities, fines, and imprisonment.<sup>125</sup>

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<sup>121</sup> Article 10 (b) CBD, Article 6.1 ITPGRFA.

<sup>122</sup> Ian Hannam & Ben Bower op cit note 1 at 78-79.

<sup>123</sup> Ibid at 77.

<sup>124</sup> Article 75 (5) Environmental Framework Law.

<sup>125</sup> Article 103 Environmental Framework Law, Articles 81-89 Water Law, Article 37 Biodiversity Law and Articles 387-390, 395, 400, 412-413, 415-416, 429-430 & 437 Penal Code..

### 5.5.3.2 Specific legal tools

#### Soil

#### Provisions on land tenure rights

‘Land tenure’ stands for a system of rights and institutions governing access to and use of land and other resources.<sup>126</sup> When the land tenure systems define clearly the property rights over land, this ensures the basis for sustainable soil management.<sup>127</sup> Property rights provide an incentive to protect the resource. People who own the land can use a large number of management strategies and adopt best soil management practices<sup>128</sup> and may sacrifice immediate income for the promise of better soil fertility and enhanced production in the future.<sup>129</sup> However, where property rights regimes are not clear or do not exist, the soil becomes a victim of overexploitation,<sup>130</sup> as, without property rights that are enforced, resources often become degraded.<sup>131</sup> People who rent the land lack the incentives to make long-term investments and cultivate it in a sustainable way;<sup>132</sup> instead they use management strategies that maximize short-term production, even if it is detrimental to future soil fertility.<sup>133</sup> However, some research studies have shown that property rights alone cannot generally guarantee the efficient management of soil.<sup>134</sup> On the other hand, insecure property rights over land do not necessarily lead to the mismanagement of the soil,<sup>135</sup> but may result from other factors like:

- insufficiency of the owned land;
- location of the concerned land;

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<sup>126</sup> Tesfu Kahsay ‘The effect of land tenure systems on soil conservation practices in Northern Ethiopia: a case study of Habru District in Amhara National Regional State (ANRS)’ Kimmage DSC series on *Research and Perspectives on Development Practice* (2011) 5.

<sup>127</sup> Andreas Neef ‘Land tenure and soil conservation practices: evidence from West Africa and South Asia’ (2001) *D E Stott R H Mohtar and G C Steinhardt (eds)* 125 at 125; Tesfu Kahsay ‘op cit note 126 at 5.

<sup>128</sup> The best soil management practices that can be used include crop rotation, terracing, fallowing, tree planting and others.

<sup>129</sup> Evan D G Fraser ‘Land tenure and agricultural management: soil conservation on rented and owned fields in southwest British Columbia’ (2004) 21 *Agriculture and Human Values* 73 at 77.

<sup>130</sup> Andreas Neef op cit note 127.

<sup>131</sup> Ruth Meinzen-Dick and Leticia Nkonya ‘Understanding Legal Pluralism in Water and Land Rights: Lessons from Africa and Asia’ in B Van Koppen M Giordano and J Butterworth (eds) *Community-Based Water Law and Water Resource Management Reform in Developing Countries* (2007) 13.

<sup>132</sup> Andreas Neef op cit note 127 at 126.

<sup>133</sup> Evan D G Fraser op cit note 129 at 73.

<sup>134</sup> Tesfu Kahsay op cit note 126 at 7.

<sup>135</sup> Andreas Neef op cit note 127 at 129.

- available crops for cultivation;
- type of household;
- age of the owner of the land; and
- labour availability and education.<sup>136</sup>

In light of the above discussion, to ensure soil and biodiversity conservation in the agricultural sector, the soil legislation should contain provisions related to land ownership rights. It can determine for example:

- the rights of landowners;
- how they are formalised (access, protection, transfer, termination);
- their use, development and occupation;
- the obligations of the landowner in relation to soil conservation;
- the structure of agricultural holdings (size, configuration, distances);
- how decisions related to land are made; and
- modes of managing conflicts over land and others.<sup>137</sup>

There is no international environmental law instrument that explicitly addresses the issue of land tenure which is considered to be a matter of exclusively national concern.<sup>138</sup> Addressing land tenure issues is important to Rwanda like any other country as far as soil conservation is concerned because the land is becoming more scarce, the human population is expanding and the big majority of Rwandans live by agriculture as discussed in chapters one and two. This leads to increased usage of land and overexploitation of soil for agricultural production with negative consequences on soil. It is felt that the establishment of a clear land tenure system can contribute to sustainable land or soil use and biodiversity conservation.

In Rwanda, the system of land tenure rights is well regulated. The rights and institutions that govern access to and use of land are clearly established in the Land Law. The

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<sup>136</sup> Evan D G Fraser op cit note 129 at 74; Tesfu Kahsay op cit note 126 at 13-14.

<sup>137</sup> Vincent Basserie & Patrick D'Aquino 'Securing and regulating land tenure: putting the issues before the tools. Some of the obstacles to coherent policies' (2011) *Briefing notes* at 3 available at [http://www.agter.asso.fr/IMG/pdf/2011\\_ctf\\_fiche-pedag\\_basserie\\_daquino\\_en.pdf](http://www.agter.asso.fr/IMG/pdf/2011_ctf_fiche-pedag_basserie_daquino_en.pdf); accessed on 16 July 2015.

<sup>138</sup> Thilo Marauhn 'Land tenure and good governance from the perspective of international law' (2011) 14 *PERJ* at 1.



Rwandan land tenure system defines the property rights over the land, which can be the basis for land and soil sustainable management and conservation.<sup>139</sup>

### Ecological soil standards

According to the Sustainable Soils Working Group's report established in 2002 to investigate the national and international dimensions of the legal protection of soils, any soil legislation should be influenced by the necessity to safeguard, qualitatively and quantitatively, the ecological functions of soils and preserve them for a long time.<sup>140</sup> Ecological soil standards should be legally established to contribute to ensuring the maintenance or improvement of ecological soil integrity. They can be used as a basis to formulate elements for soil legislation aiming at sustainable use of soil, as well as serve to evaluate the potential for any sustainability-oriented concept, or practice that may seem appropriate to meet the goal of sustainable use of soil.<sup>141</sup> Standards to be provided in soil legislation comprise the acceptable soil exploitation methods, the acceptable nutrients to be applied - where the law should fix the quantity and quality of nutrients that can be introduced in the soil environment - and standards that fix the maximum allowable level of pollution in the soil environment during normal periods.<sup>142</sup> In relation to agriculture, the ecological soil standards can determine, for example, the methods used in soil cultivation and in cropping; the quantity, quality and types of agrochemicals allowed in agriculture after considering their effects on soil and so on.

Legal establishment of ecological soil standards is crucial to Rwanda like any other country with high agricultural population and small arable land to help maintain ecological integrity of soil for a long period. As discussed in chapter 4, the Rwandan laws on chemical products regulate the manufacture, import, distribution, use, storage and disposal of agrochemicals;<sup>143</sup> they control such substances and establish a list of prohibited pollutants including some harmful agrochemicals.<sup>144</sup> This contributes to the regulation of standards of

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<sup>139</sup> Articles 4-8 Land Law.

<sup>140</sup> Ian Hannam & Ben Boer *Legal and Institutional Frameworks for Sustainable Soils: A Preliminary Report* (2002) *IUCN Environmental Policy and Law Paper No. 45* at 10.

<sup>141</sup> Ian Hannam & Ben Boer *Legal and Institutional Frameworks for Sustainable Soils: A Preliminary Report* (2002) *IUCN Environmental Policy and Law Paper No. 45* at 22.

<sup>142</sup> Dinah Shelton & Alexander Kiss *op cit* note 101 at 35.

<sup>143</sup> Article 1 Agrochemicals Law; See also paragraph 4.2.7.1.

<sup>144</sup> The Prime Ministerial Order n° 26/03 of 23/10/2008; See also paragraph 4.2.7.3.

agrochemical nutrients that have to be respected in agriculture with positive impacts on biodiversity.

### Soil conservation agreements

Policy-makers address the issue of biodiversity conservation in soils by offering voluntary incentive programs to landowners/farmers.<sup>145</sup> Soil legislation that ensures sustainable use and management of soil should provide the possibility of concluding soil conservation agreements between the state and individuals or groups of landowners and land occupiers. In soil conservation agreements, the landowner/farmers keeps full ownership of the land, but enters into a legal contract with a government department or a conservation organization in which the owner/farmer commits to manage the land or soil so as to ensure conservation.<sup>146</sup> The soil conservation agreements can be positive or restrictive.

The soil legislation should prescribe the contents of soil conservation agreements.

Mostly, such agreements:

- determine the obligations and rights of both parties (the state and individuals or groups of landowners and land occupiers/farmers);
- can require the land users/farmers to carry out specified soil conservation activities or certain ecologically sustainable land use practices;
- can require the land users/farmers to contribute towards the cost of soil conservation works and set out details of financial contributions by various stakeholders including the State and its decentralized entities; and
- can set out any other matter relating to the soil conservation, such as the implementation of soil conservation plans and so on.<sup>147</sup>

Generally, soil legislation must be established in a way that conservation agreements prohibit any agricultural activity that could potentially affect the soil. However, soil law needs to provide that each agreement is negotiated individually with the landowner/farmer,

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<sup>145</sup> Gregory M Parkhurst et al 'Agglomeration bonus: an incentive mechanism to reunite fragmented habitat for biodiversity conservation' *Ecological Economics* (2002) 1 at 1 available at <http://uwacadweb.uwyo.edu/Shogren/179agglomeration%20bonus.pdf>, accessed on 26 November 2012.

<sup>146</sup> Ian Bowles et al 'Economic incentives and legal tools for private sector conservation' (1998) 8 *Duke Environmental Law & Policy Forum* 209 at 217.

<sup>147</sup> Ian Hannam & Ben Bower op cit note 1 at 56.

and can be flexible with the possibility of exemptions. The latter are also negotiated individually, allowing people to exploit their lands.<sup>148</sup>

The success of soil conservation agreements depends on incentives to landowners who enter into such agreements. Incentives may include reductions of land use taxes, and financial and technical assistance for soil erosion control, irrigation systems development, invasive species destruction, and others.<sup>149</sup> There is no clear international legal obligation that requires countries to use soil conservation agreements. However, under the obligation of adopting measures necessary to conserve environment, which is mainly advocated in some international environmental conventions, country members can use soil conservation agreements.<sup>150</sup> This legal tool can influence Rwandans in conservation of soils in their private individual farms which is highly needed. However, this legal tool is absent from Rwandan legislation.

#### Notices of protection

Notices of protection are used where sustainable soil use limits are exceeded.<sup>151</sup> They require soil users to do or abstain from doing certain acts, which, although not provided for in the soil legislation, have been shown to be either beneficial or harmful to the soil environment.

Notices of protection are ordered by the court or the administrative soil authority in accordance with the law. They are not sanctions, but form a legal basis for further enforcement actions.<sup>152</sup> For example, some sanctions, especially fines for infractions of the soil legislation may not be enough of a deterrent, especially to large-scale farmers. Therefore it may be necessary to issue notices of protection as well. To contribute to the protection of soil and biodiversity, the soil legislation has to provide for:

- soil notices of protection;
- the competent authority to issue notices;

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<sup>148</sup> Environmental defender's office WA (Inc) 'Conservation covenants' (2006) 2 available at [http://www.edowa.org.au/files/factsheets/bhpl\\_covenants.pdf](http://www.edowa.org.au/files/factsheets/bhpl_covenants.pdf), accessed on 26 November 2012.

<sup>149</sup> Ibid at 5.

<sup>150</sup> Article 10 (b) CBD.

<sup>151</sup> Ian Hannam & Ben Bower op cit note 1 at 31.

<sup>152</sup> Timothy Swanson 'Cost-effective attainment of environmental compliance: governance solutions for environmental objectives in the people's republic of china' 13 *Research Paper* (2012) 1 at 32 available at [http://graduateinstitute.ch/webdav/site/cies/shared/publications/CIES\\_RP\\_13\\_Swanson.pdf](http://graduateinstitute.ch/webdav/site/cies/shared/publications/CIES_RP_13_Swanson.pdf), accessed on 27 November 2012.

- who can file for the notices and what protection or judicial/administrative measures he/she can get from it;
- how the notice will be enforced;
- measures that can be prescribed in the notice; and
- rules of verifying whether the land users or occupiers comply with notices.<sup>153</sup>

In Rwanda, the notices of protection are needed because Rwandan laws related to soil use cannot claim to have regulated every act that may be beneficial or detrimental to soil and biodiversity. However, the Rwandan laws governing soil do not provide for the notices of soil protection which limits the protection of biodiversity in agricultural activities.

## *Water*

### Water charges

Water charges are prices paid for discharges of pollutants into the water, based on the quantity and/or quality of the pollutant(s)<sup>154</sup> and for any other use of water, which is likely to affect its quantity or quality and should be incorporated in water legislation. They constitute the tool for implementing the principles of recognition of water as a finite and economic resource embodied in some non-binding international instrument.<sup>155</sup> Water charges are applied to internalise negative externalities of different activities that degrade water and constitute a widely used economic instrument applied by governments to ensure the control of water use and water pollution.<sup>156</sup> When applied, water charges help agricultural water users to change their behavior particularly if the change is less expensive than paying the charges.<sup>157</sup> The use of water charges is important to Rwanda where there is a challenge of meeting the increasing multiple water demands for internal use, with limited capacity and in the face of declining water availability due to ecosystems' degradation, pollution and climate change. Also Rwandan waters are severely degraded due, mostly, to land degradation

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<sup>153</sup> Ibid.

<sup>154</sup> Duncan Austin *Economic Instruments for Pollution Control and Prevention – A Brief Overview* (1999) 5.

<sup>155</sup> Principles 1 & 4 Dublin Statement on Water and Sustainable Development.

<sup>156</sup> Corinne Waelti *Water charges* available at [www.sswm.info](http://www.sswm.info), accessed on 12 December 2012; X.Tsiourtis 'Water charge, the Cyprus Experience' *Options Méditerranéennes Série A no 49* 91 at 91 available at <http://ressources.ciheam.org/om/pdf/a49/02001535.pdf> (accessed 12 December 2012).

<sup>157</sup> Ibid.

resulting from different factors including pollution from point and non point sources like agricultural chemicals.<sup>158</sup>

In Rwanda, the Water Law provides for the possibility of paying royalties calculated according to the quantity of water removed, used, or the quantity of pollution allowed to flow into the public water domain. The royalty is also paid in case of drainage or waterproofing of a humid zone or a swamp. Its calculation is based on the dried surface or the surface of waterproofed area.<sup>159</sup> To implement this provision, a ministerial regulation determines the fees to be paid on the basis of the quantity of water used and provides that thirty Rwandan francs (Rwf 30) must be paid per cubic metre of water used for agriculture.

### *Genetic resources*

#### Establishment of protected areas

The use of establishment of protected areas is advocated for in some international binding and non-binding environmental legal instruments.<sup>160</sup> Establishment of protected areas helps conserve genetic resources through protection of their ecosystems. Protected areas help to maintain the viability of and ensure the recovery and restoration of species of the agricultural genetic resources in case their ecosystems are degraded.<sup>161</sup> An effective genetic resources law provides for the possibility to establish protected areas for the benefit of genetic resources which are threatened by agricultural practices and determines the requirements and criteria for their establishment.

Rwanda needs to protect its genetic resources through the use of all possible and necessary measures including the establishment of protected areas. In Rwanda, the legally created protected areas, such as national parks, forest reserves and protected wetlands assist to protect wild genetic resources.<sup>162</sup> The Environmental Framework Law and the Biodiversity Law offer the possibility to establish protected areas for different purposes of environment

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<sup>158</sup> RoR *Water Resources Management Sub-Sector Strategic Plan (2011 – 2015)* (2011) 4.

<sup>159</sup> Article 44 Water Law.

<sup>160</sup> Article 8 (a & b) CBD, Article 5.d ITPGRFA, Agenda 21, paragraphs 14.59 (b) and 15.5 (g)

<sup>161</sup> Sue Stolton et al 'Food Stores: Using Protected Areas to Secure Crop Genetic Diversity' (2006) 20-25 available at [http://awsassets.panda.org/downloads/food\\_stores.pdf](http://awsassets.panda.org/downloads/food_stores.pdf), accessed on 4 July 2015.

<sup>162</sup> RoR op cit note 22 at 17.

and biodiversity conservation, generally including conservation against negative effects of agriculture.<sup>163</sup>

### Quota limitations

Quota limitations constitute a tool that is mostly used in management of biological resources to ensure their sustainable use. It is opposed to a system of common access where everyone has easy access to resources, can collect the quantity he/she wants. The system of open access to resources prevents rational and cautious use of biological resources.<sup>164</sup> On the contrary, the system of quota limitations limits the harvest of genetic resources to a sustainable level and assists in ensuring the maintenance of species diversity. It requires an effective management system and sound scientific information. The management system must include annual harvest quotas, consider seasonal or geographical restrictions and restriction of harvest to particular plant or animal parts or size classes.<sup>165</sup>

The tool of quota limitations assists in drawing up stock management practices in relation to genetic resources affected by agriculture. This must be established in the national genetic resources legislation which determines the number, the types and size of genetic resources to be collected. The use of quota limitations is needed for Rwanda to manage its genetic resources on a sustainable basis. Unfortunately, the Rwandan legislation does not provide for this legal tool.

#### **5.5.4 Supplementary tools**

All the above discussed legal tools to be established in laws governing the soil, water or genetic resources can be supplemented by other supplementary tools, which may be or not incorporated in the legislation, such as education, training, awareness-raising programs for sustainable use of soil, water or genetic resources in agriculture, related research and financing mechanism for such research, education and training.<sup>166</sup>

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<sup>163</sup> Articles 46, 52-52 Environmental Framework Law and Articles 4 (2) & 14 Biodiversity Law.

<sup>164</sup> Uwe Schippmann Danna J Leaman & A B Cunningham *Impact of cultivation and gathering of medicinal plants on biodiversity: Global trends and issues* (2002) 10.

<sup>165</sup> Ibid.

<sup>166</sup> Ian Hannam and Ben Bower *Drafting legislation for sustainable use of soils: a guide* (2004) IUCN Environmental Policy and Law Paper No. 52 at 61-63.

## **5.6 CRITIQUES OF THE RWANDAN SOIL, WATER AND GENETIC RESOURCES REGULATORY REGIME**

In Rwanda, apart from the Water Law containing provisions on water use and conservation, there is neither specific soil conservation law nor genetic resources conservation law. Soil and genetic resources are governed by the laws of general application discussed in chapter four, namely Environmental Framework Law, Land Law, Land Planning and Development Law and Biodiversity Law. The Environmental Framework Law protects the environment in general and obviously covers some aspects of soil, water and genetic resources conservation and has specific sections dedicated to soil and water protection. The Land Law mainly deals with ownership rights over the land and contains few provisions on soil conservation. The Land Planning and Development Law aims, among its objectives, to ensure sustainable development through proper planning for land use which indirectly contributes to soil conservation. The Biodiversity Law determines the modalities of management and conservation of biodiversity in general and applies indirectly to conservation of soil, water and genetic resources. These four laws are of general application and their relevance to soil, water and genetic resources conservation is limited as discussed hereunder to highlight both their effectiveness and weaknesses in relation to biodiversity conservation in agriculture. The discussion mainly focuses on examination of how far these four laws embody the general and specific principles and tools that any soil, water and genetic resources conservation laws must encompass to ensure that agricultural development is pursued in harmony with biodiversity conservation.

### **5.6.1 Summary of incorporation of the six general principles**

Importantly, the above general principles of precaution, maintenance of biodiversity, polluter-pays, prevention and public participation are regulated in a general sense in Rwanda. The Rwandan laws only enunciate them without giving further details to facilitate their implementation which limits their contribution in the conservation of soil, water and genetic resources in the agricultural sector. These three biodiversity components, mostly exploited for agricultural purposes are being degraded by agricultural practices despite the existence of provisions on such principles. As mentioned earlier in this chapter, the highest majority of the research participants in the fieldwork research claimed that different agricultural practices of agrochemicals' use, focus on few modern varieties and abandonment of local crop and

livestock varieties, unsustainable exploitation of wetlands and cultivation in the proximity of the water bodies continue to impact soil, water and genetic resources negatively in Rwanda.<sup>167</sup> This indicates that the discussed relevant principles are not being applied in agriculture to assist in the protection and conservation of biodiversity. Their application is difficult due to lack of detailed guiding legal provisions; this needs to be remedied urgently.

### **5.6.2 Incorporation of specific principles**

With regards to principles applicable to soil discussed above, Rwandan laws do not provide for any of the discussed elements of the principle of monitoring the health and condition of soil and the principle of protection of cultural aspects of soil. This weakens soil and biodiversity conservation in agriculture; it needs to be fixed.

For principles applicable to water, the Water Law provides for the principles of recognition of finite character of water and recognition of economic value of water. However, it does not establish the limits of the quantity of water that is allocated to different human activities including agricultural ones within a certain period of time. This has negative implications on water use and management in agriculture and inherent negative impacts on biodiversity. Also, the Water Law provides for fees to be paid on the basis of the quantity of water used by people involved in agricultural activities (Rwf 30/cubic metre) to recognise the economic value of water.<sup>168</sup> It is argued that these fees are too little and hence adequate to motivate farmers to use sustainably water resources in their agricultural activities.

As regards principles applicable to genetic resources, Rwandan biodiversity law provides for the principle of fair and equitable sharing of the benefits arising out of the utilisation of agricultural genetic resources and Prior Informed Consent. However, it does not contain detailed provisions on:

- procedures and requirements to access agricultural genetic resources;
- clear legal rules on fair and equitable sharing of the benefit arising from the use of agricultural genetic resources;
- rules on patents and other intellectual property rights in relation to agricultural genetic resources;

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<sup>167</sup> This was revealed by interviews with respondents 1, 2, 3, 5, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17 and 18.

<sup>168</sup> Article 18 of Ministerial Order n°002/16.01 of 24/05/2013 determining the procedure for declaration, authorisation and concession for the utilisation of water *O G* n° Special of 30/05/2013.



- rules on the accommodation of indigenous or local communities; and
- detailed provisions on Prior Informed Consent specifying how the Rwandan providers and users of agricultural genetic resources enter into mutually agreed terms to ensure fair and equitable sharing of benefits.

All this weakens conservation of all agricultural genetic resources in Rwanda.

### **5.6.3 Incorporation of general legal tools**

The general legal tools of planning, license or permits and sanction for non-compliance are provided in the Rwandan law. However, the tool of planning is not effectively regulated and utilized. The way the planning tool is provided in Rwandan law cannot be effective in contributing to the protection of the three biodiversity components against negative effects of agriculture because it is provided in a general sense. The Environmental framework Law provides for planning generally in environment conservation. The Biodiversity Law gives the responsibility to the Minister having biodiversity in his/her mandate to enact an Order setting out a plan for the management of biodiversity and its components in different bio-regions. This also applies to the management of soil, water and genetic resources impacted by agriculture as components of biodiversity. However, the said Order is not yet in place, which impacts negatively on the conservation of these three biodiversity components. The procedures of planning at each level and the programmes to implement the plans related to biodiversity or soil, water and genetic resources (development of plans, implementation and monitoring) are not established, which needs to be considered.

### **5.6.4 Incorporation of specific legal tools**

Among the specific legal tools of provisions on land tenure rights, ecological soil standards, soil conservation agreements and notices of protection discussed above which are applicable to soil, only the tool of provisions on land tenure right is provided in Rwandan law. However, all research participants reported that despite the establishment of land tenure rights, soil is not effectively conserved in agricultural activities due to other factors like insufficiency of the owned land which pushes some farmers to overexploit their lands and degrade the soil, and available crops which are mainly modern monocrop species that do not assist in soil conservation for they require the use of much agrochemicals and hence

contribute to soil degradation. Soil infertility is another cause of soil degradation that is occurring in Rwanda despite the existence of the system of land tenure rights as noted by all research participants.<sup>169</sup> This implies that the establishment of clear land tenure rights has to be supplemented by other legal tools discussed above which are important in the conservation of soil in agricultural activities.

Additionally, in Rwandan laws applicable to soil conservation, there are no adequate provisions on soil standards, which can include the acceptable soil exploitation methods and the quantity of nutrients that can be introduced in the soil environment. The laws on chemical products, as discussed in chapter four, regulate the manufacture, import, distribution, use, storage and disposal of agrochemicals;<sup>170</sup> they control such substances and establish a list of prohibited pollutants including some harmful agrochemicals.<sup>171</sup> This contributes to the regulation of standards of agrochemical nutrients that have to be respected in agriculture with positive impacts on biodiversity. However, such laws do not regulate the methods of using or quantity of allowable agrochemicals to be respected. This limits the protection of biodiversity against negative effects of agriculture in Rwanda. The Rwandan law may borrow from the South African legislation where, for example, regulations on the use of pesticides require farmers or pest control operators to respect the instructions provided on the labels. Such instructions include those related to the methods of using agrochemicals and the allowed quantity.<sup>172</sup> This constitutes an indirect prescription of standards that must be respected and contribute to the protection of soil which is directly affected by agrochemicals.

Besides, Rwandan legislation does not have provisions for the possibility of entering into positive or restrictive soil conservation agreements and their contents. This limits the possibility of involving landowners in activities of soil protection while it may constitute an effective tool that the law can use. The fieldwork research revealed that farmers or landowners are encouraged to conserve the soil through soil erosion control practices, use of terraces, use of organic manure as fertilisers and planting agroforestry trees.<sup>173</sup> It was however noted that the use of such practices is encouraged in policies but their

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<sup>169</sup> Interviews with all research participants.

<sup>170</sup> Article 1 Agrochemicals Law; See also paragraph 4.2.7.1.

<sup>171</sup> The Prime Ministerial Order n° 26/03 of 23/10/2008; See also paragraph 4.2.7.3.

<sup>172</sup> *SANS 10206: The handling, storage and disposal of pesticides GNR 1044 GG 33734 of 12 November 2010*

<sup>173</sup> Interview with respondents 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16 and 18

implementation is not effective.<sup>174</sup> This may result from, among other factors, the fact that the implementation highly depends on the will of the farmer or the person exploiting the soil. It is argued that the ineffectiveness in implementation of such practices can be addressed through the legal establishment of the possibility of entering into soil conservation agreements and legal provisions on incentives to encourage their use. It is recommended that Rwanda borrows from other countries' legislation like Australia and incorporate the tool of soil conservation agreements.<sup>175</sup>

Furthermore, Rwandan laws governing soil do not provide for the notices of soil protection and the lack of this tool in Rwandan legislation does not favour the conservation of soil and biodiversity in the agricultural sector. This tool is provided in some other countries' legislation and it is recommended that Rwanda follows the model of such countries like Kenya, South Africa, Botswana, Namibia and Australia. In such countries determined administrative authorities have the power to issue soil conservation orders which prohibit, regulate, require or control different agricultural activities likely to affect the soil.<sup>176</sup>

For the tool of water charges specific to water conservation, the Rwandan Water Law provides for the possibility of paying royalties calculated according to the quantity of water removed, used, or the quantity of pollution allowed to flow into the public water domain. The royalty is also paid in case of drainage or waterproofing of a humid zone or a swamp. Its calculation is based on the dried surface or the surface of waterproofed area.<sup>177</sup> To implement this provision, a ministerial regulation determines the fees to be paid on the basis of the quantity of water used and provides that thirty Rwandan francs (Rwf 30) must be paid per cubic metre of water used for agriculture. It is clear that this price is very little; it cannot make agricultural water users to be conscious about the finite characteristic of water resources. It is recommended that this fee be legally and moderately increased to reflect the full economic value of water and lead farmers to adopt efficient water use practices. In addition, the regulation does not determine the fee to be paid on the basis of agricultural

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<sup>174</sup> This was revealed by the interview with respondents 9 and 18.

<sup>175</sup> Soil and Land Conservation Act 1945 s 30 (Australia).

<sup>176</sup> Agriculture Act 9 of 197 ss 48 (1&2) and 184 (Kenya), Conservation of Agricultural Resources Act 43 of 1983 ss 6 and 7 (South Africa), Agricultural Resources Conservation Act (chap 35) ss 16 and 17 (Botswana), Soil Conservation Act 76 of 1969 s 3 (Namibia) and Soil and Land Conservation Act 1945 ss 31-39 (Australia).

<sup>177</sup> Article 44 Water Law.

pollutants discharged into water resources and this affects negatively biodiversity conservation in agriculture.

For the tools of establishment of protected areas and quota limitations used in genetic resources conservation, some limitations have been identified. The Environmental Framework Law and the Biodiversity Law offer the possibility to establish protected areas for different purposes of environment and biodiversity conservation generally, including conservation against negative effects of agriculture.<sup>178</sup> However, there are no protected areas that have been established in the agricultural ecosystems for the protection of agricultural genetic resources. The latter continue to disappear from Rwandan agricultural ecosystems due to agricultural practices. Thus the establishment of protected areas in agricultural ecosystems for the protection of genetic resources should be considered. Also, the Rwandan legislation does not provide for tool of quota limitations or anything related to this which constitutes a barrier to the effective conservation of crop and livestock genetic resources; it needs to be remedied.

## 5.7 CONCLUSION

This chapter has discussed conservation of biodiversity components namely soil, water and genetic resources in harmony with agriculture. It was found that there cannot be effective biodiversity conservation in the agricultural sector if soil, water and genetic resources are not effectively conserved. The chapter has examined how international law integrates this issue and the role of national law in conservation of such biodiversity components. Different elements –principles and tools- that national laws, which ensure conservation of the three biodiversity components, have to contain have been discussed and whether any of these tools are contained in Rwandan legislation. These principles and legal tools are embodied in binding and non-binding international instruments and national legal texts. Their importance in biodiversity conservation generally and their relevance to Rwanda have been outlined. In Rwanda many of the enumerated principles and tools are still lacking which renders ineffective the current legal framework governing the three biodiversity components. The absence of effective legal frameworks on soil, water and genetic resources conservation

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<sup>178</sup> Articles 46, 52-52 Environmental Framework Law and Articles 4 (2) & 14 Biodiversity Law.

constitutes an open door for possible biodiversity loss resulting from agricultural practices. A reform in the laws applicable to soil, water or genetic resources is recommended. It is recommended that specific soil conservation and genetic conservation laws that embody all principles and tools discussed in this chapter -some are partly provided in the current applicable laws and others do not appear in any text of law- be adopted for effective conservation of soil and genetic resources throughout agricultural activities. This will help to avoid the use of laws of general application which do not settle specific difficulties attached to soil or genetic resources conservation. In addition, the Water Law should be revised and strengthened to incorporate some of the above-discussed necessary principles and tools which are not regulated adequately for effective water conservation and protection against negative effects that result from agriculture.

Having studied the necessity of and extent of legal protection of soil, water and genetic resources against negative effects of agricultural practices in Rwanda, the following chapter deals with the necessity and measures to legally conserve crop and livestock diversity.

**CHAPTER SIX:**  
**LEGAL ASPECTS OF CONSERVATION OF CROP AND LIVESTOCK DIVERSITY**  
**IN AGRICULTURE**

## **6.1 INTRODUCTION**

Crop and livestock diversity is fundamental to global food security, sustainable development and human beings' livelihoods, in sum for both the environment and the economy. However, there is an increasing loss of crop and livestock diversified varieties worldwide as well as in Rwanda due to some agricultural practices that do not encourage diversity conservation. An additional challenge to conserve diversity is the phenomenon of climate change which in the Rwandan context in particular requires adaptation. Considering the losses that declines in crop and livestock diversity cause, a number of interventions, including the establishment of legal measures, can be adopted to reduce such declines. These include measures that establish incentives and eliminate perverse incentives for conservation of crop and livestock diversity, adaptation to climate change and encouragement of adaptive behaviors, recognise the role of local communities, support research, access to information and enhance institutional collaboration.

## **6.2 THE NECESSITY OF CONSERVING CROP AND LIVESTOCK DIVERSITY**

Conservation of crop and livestock diversity is crucial since it forms the basis for future biological evolution and assures long-term viability of populations.<sup>1</sup> Varied crop and livestock species, together with water, air, and soil form the foundation upon which agriculture is based.<sup>2</sup> Conserving diversity in crop and livestock varieties is beneficial to both the environment and the economy, which will now be analysed in greater depth.

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<sup>1</sup> Linda Laikre 'Genetic diversity is overlooked in international conservation' (2010) 11 *Conserv Genet* 349 at 349; CA Davis *Importance of Genetic resources* Excerpt from P E McGuire and C O Qualset (ed) *Genetic Resources Conservation program annual report 1985-1986* (1986) at 1.

<sup>2</sup> European Commission *Genetic Resources in Agriculture: A summary of the projects co-financed under Council Regulation (EC) No 1467/94* (2007) 5.

### 6.2.1 Benefits to the environment

Crop and livestock diversity is recognized as impacting many ecosystem functions, including productivity, resistance to invasion, disease prevalence and stability of communities.<sup>3</sup> It enhances the ability of species to adapt to changing environmental conditions as, during the process of environmental change, some crop or livestock species can adapt while others decline or become extinct. Some species have the ability to survive in new areas and occupy new ecological niches while others cannot: diversity thus allows species to exist in very different environments due to their different traits.<sup>4</sup> Moreover levels of diversity are interlinked to the ability of a species to produce substantial and robust progeny and persist in the long term.<sup>5</sup>

In agricultural systems, according to the level of crop and livestock diversity, different ecosystem services beyond the production of food, fiber and fuel can be performed and are important in the environment. These include successful crop and animal breeding, nutrients recycling, biological control of pests and diseases, regulation of hydrological processes and detoxification of noxious chemicals.<sup>6</sup>

### 6.2.2 Benefits to the economy

Crop and livestock diversity benefits societies and farmers economically by increasing their productivity in good times or helping their economies to survive in times of crisis, based on the particular traits of diverse species associated with adaptation functions.<sup>7</sup> Diversity offers

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<sup>3</sup>Christine Anne Clay *The role of species diversity and host heterogeneity in the dynamics of Sin Nombre Virus* (PhD Dissertation, University of Utah, 2007) at 12; See also R M May 'Patterns in multi-species communities' in: R M May *Theoretical ecology: principles and applications* (1976) 142–162 cited in Andrew J Hamilton 'Species diversity or biodiversity?' (2005) 75 *Journal of Environmental Management* at 91: Stability is defined as the capacity of a system to recover after a disturbance and regain its equilibrium.

<sup>4</sup> Stuart L Pimm 'The complexity and stability of ecosystems' (1984) 307 *Nature* at 321-326.

<sup>5</sup> USDA *Why we care about genetics* Vol. 1 (2006) available at [http://www.fs.fed.us/wildflowers/nativeplantmaterials/documents/genetics\\_Vol\\_1.pdf](http://www.fs.fed.us/wildflowers/nativeplantmaterials/documents/genetics_Vol_1.pdf), accessed on 15 October 2013.

<sup>6</sup> Hajjar et al 'The utility of crop genetic diversity in maintaining ecosystem services' (2008) 123 *Agriculture, Ecosystem and environment* at 261-270; M J Swift, A-M N Isac & M. van Noordwijk 'Biodiversity and ecosystem services in agricultural landscapes—are we asking the right questions?' (2004) 104 *Agriculture, Ecosystems and Environment* 113 at 114; Miguel A Altieri 'The ecological role of biodiversity in agro-ecosystems' (1999) 74 *Agriculture, Ecosystems and Environment* 19 at 19.

<sup>7</sup> Unai Pascual et al 'The economics of agrobiodiversity conservation for food security under climate change' (2011) 11 *Economia Agraria Recursos Naturales* 1 at 196; Di Falco Salvatore 'Crop genetic diversity, farm productivity and the management of environmental risk in rainfed agriculture' (2006) 33 *European Review of*

to farmers alternative choices and increases the probabilities of finding varieties adaptable to their specific economic circumstances.<sup>8</sup> It is argued that farmers value genetic and species diversity on their farms, as they know how much it minimizes economic risk, and thus enhances on-farm diversification of plant and animal production.<sup>9</sup> Crop and livestock diversity is one of the factors that ensure sustainability of agriculture and the economy as it may be the basis for exploiting the complementarities and synergisms resulting from different combinations of varied crops, trees and animals.<sup>10</sup> According to Walcot, reserves of diversity are important sources for improving agricultural organisms and, if strategically managed, can assist in controlling losses from pests and diseases.<sup>11</sup> Crop and livestock diversity also help boost the economy, as access to a diverse resource pool, associated with in-depth agricultural knowledge, will assist community farmers and commercial breeders to develop new crop and animal varieties better able to respond to future challenges, such as new pests and diseases.<sup>12</sup>

Conversely scholars argue that lack of diversity impacts negatively on the economy. Altieri points out that when the natural services of crop and animal breeding, nutrients recycling, biological control of pests and diseases, regulation of hydrological processes and detoxification of noxious chemicals are lost due to biological simplification, the economic and environmental costs become significant. Agro-ecosystems deprived of ecosystem regulating functions lack the ability to sponsor their own soil fertility and diseases control. In such instances, human interventions are needed for seed dispersal, to add chemicals and for genetic manipulation.<sup>13</sup> This implies high costs to finance such human interventions. In addition, lack of ecological services supported by diversity in crop and animal varieties incurs costs associated with a reduction in the quality of life due to decreased soil, water, and food quality when pesticide and other agrochemicals' contamination occurs.<sup>14</sup>

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*Agricultural Economics* 3 at 289; ILRI *Safeguarding Livestock diversity: The time is now* (2007) International Livestock Research Institute Annual Report 2006 at 24.

<sup>8</sup> David Carpenter 'Complementarity in the conservation of traditional and modern rice genetic resources on the Philippine Island of Bohol' in Stewart Lockie & David Carpenter (ed) *Agriculture, biodiversity and markets: Livelihoods and agroecology in comparative perspective* (2010) 99 at 109.

<sup>9</sup> D Osgood *Valuing biodiversity: Evidence from farming households in Mwea Kenya* (unpublished PhD Thesis, University of London, 1998) cited in M J Swift *et al* op cit note 6 at 126.

<sup>10</sup> Miguel A Altieri op cit note 6 at 22.

<sup>11</sup> James Walcott *Agriculture and biodiversity: connections for sustainable development* (2004) Discussion paper from the Bureau of Rural Sciences at v; ILRI op cit note 7 at 24.

<sup>12</sup> Mauricio, R Bellon 'Crop research to benefit poor farmers in marginal areas of the developing world: a review of technical challenges and tools' (2006) *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources* No. 070 cited in Unai Pascual *et al* op cit note 7 at 197-198; ILRI op cit note 7 at 24.

<sup>13</sup> Miguel A Altieri op cit note 6 at 20.

<sup>14</sup> *Ibid.*



## 6.2.2 Linkages between agriculture and loss of crop and livestock diversity

With the development of modern agriculture through modern plant and animal breeding techniques, heterogeneous traditional and low yielding crop and animal varieties have been gradually replaced by higher yielding modern varieties.<sup>15</sup> This process not only assisted in boosting agricultural production but also caused the undesired negative consequence of genetic erosion, vulnerability to pests and diseases, vulnerability to climate change and undermined, and is undermining, the sustainability of agriculture.<sup>16</sup>

### 6.2.2.1 Genetic erosion

Genetic erosion is the loss of genetic diversity in a species.<sup>17</sup> This can happen rapidly as a result of a catastrophic event or change in land use that removes large numbers of individuals and their habitat. It can also happen gradually and go unnoticed for a long time. There is genetic erosion in the case of:

- absolute loss of a crop or livestock;
- loss of a variety or combinations of different forms of a gene;
- reduction in the total number of crops or livestock (reduction in richness);
- reduction in the total number of their varieties or combinations of different forms of their genes; and
- reduction in evenness.<sup>18</sup>

While genetic erosion does not necessarily entail the extinction of a species or subpopulation, it does signify a loss of variability and thus a loss of flexibility.<sup>19</sup>

Genetic erosion is associated with agricultural development, though some controversies exist. Agriculture can be the source of genetic erosion when there is a strong

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<sup>15</sup> David Carpenter op cit note 8 at 99.

<sup>16</sup> Lori Anne Thrupp 'Linking agricultural biodiversity and food security: the valuable role of agrobiodiversity for sustainable agriculture' (2000) 76 *International Affairs* 2 at 269.

<sup>17</sup> Kelly Day Rubenstein et al *Crop genetic resources: An economic appraisal* (2005) *Economic Information Bulletin No. 2* at 12.

<sup>18</sup> USDA 'What is genetic erosion and how can it be managed?' 11 'Why we care about genetics' (2006) available at [http://www.fs.fed.us/wildflowers/nativeplantmaterials/documents/genetics\\_Vol\\_11.pdf](http://www.fs.fed.us/wildflowers/nativeplantmaterials/documents/genetics_Vol_11.pdf), accessed on 24 October 2013; V H Heywood and M E Dulloo 'In situ conservation of wild plant species, a critical global review of good practices' (2005) 11 *Technical Bulletin International Plant Genetic Resources Institute (IPGRI)* cited in FAO *The second report on the state of the world's plant genetic resources for food and agriculture* (2010) 15.

<sup>19</sup> V H Heywood and M E Dulloo op cit note 18 at 15.

focus on a few new and modern high yielding and genetically homogenous varieties of crops and livestock,<sup>20</sup> a gradual decline in the number of crops grown and livestock reared, habitats change for expansion of agriculture,<sup>21</sup> promotion of monoculture and regional specializations of crops and livestock.<sup>22</sup> This reflects deliberate ecosystems simplification by people for the purpose of producing specific goods of value to humans but which negatively leads to decline in crop and livestock diversity.<sup>23</sup> In Rwanda, genetic erosion threatens biodiversity and agricultural development has contributed to it as discussed in chapter two.<sup>24</sup> As an example, the diversity of traditional varieties of rice, and other crops and cattle such as Ankole are reported to have declined.<sup>25</sup> Also, the majority of research participants reported that they experience reduction of varieties of traditional crop species of tubers, cereals and vegetables.<sup>26</sup> The following quote is an illustration of how some of them feel about it:

Where are the varieties of traditional millet, maize (magabari, kanwa k'abanyiginya), colocasia esculenta, Irish potatoes (kurugeri, magayane, huruma) and vegetables like spiderplant, nightshade and others ?<sup>27</sup>

#### 6.2.2.2 *Vulnerability to pests and diseases*

Reduction of diversity reduces competition and provides increased space and resources for invading species. Pest epidemics tend to occur in circumstances of low genetic diversity of the host plants or livestock.<sup>28</sup> Homogenous monocultures do not possess the important ecological defense mechanisms to tolerate the impact of outbreaks of pest populations. In contrast, diverse communities resist invaders because they reduce resource availability and increase competition.<sup>29</sup> In addition, diversity reduces the intensity of effects of insects, pathogens and weeds.<sup>30</sup> It is argued that richness in plant and livestock diversity in the form

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<sup>20</sup> M J Swift et al op cit note 6 at 121 and 124.

<sup>21</sup> FAO op cit note 18 at 44.

<sup>22</sup> M van de Wouw *et al.* 'Genetic erosion in crops: concept, research results and challenges' (2009) 8 *Plant Genetic Resources: Characterization and Utilization* 1 at 5.

<sup>23</sup> M J Swift, A-M N Isac & M. van Noordwijk op cit note 6 at 121.

<sup>24</sup> See paragraphs 2.1.1.2 and 2.1.1.4.

<sup>25</sup> RoR *Fourth National Report to the Convention on Biological Diversity* (2009) 26.

<sup>26</sup> Respondents 1, 5, 7, 8, 9, 11, 15, 16, 17 & 18.

<sup>27</sup> Respondent 16.

<sup>28</sup> M J Swift, A-M N Isac & M. van Noordwijk op cit note 6 at 122.

<sup>29</sup> Chapin III et al 'Biodiversity regulation of ecosystem services' in Rashid Hassan et al *Ecosystems and Human Well Beings: Current State and trends* (2005) 1 *Island Press Washington* at 307-308; M J Swift, A-M N Isac & M. van Noordwijk op cit note 6 at 127.

<sup>30</sup> Chapin III 'Managing ecosystem Sustainably: The Key Role of Resilience' cited in F Situart Chapin III Gary P Kofinas & C Folke (ed) 'Principles of ecosystem Stewardship: resilience-based natural resource management in a changing world' (2009) *Springer Science + Business Media* at 45.

of polycultures is comparable with that of many natural ecosystems which offer, among different benefits, reduction of insect and disease incidence.<sup>31</sup>

As discussed above, agriculture development that simplified agro-ecosystems is accompanied by the wide use of agrochemicals; such chemicals reduce diversity and increase risks of pests' attacks.<sup>32</sup> In addition, an increasing use of agrochemicals to reduce weeds, pests and pathogens increases the ability of insects and weeds to resist synthetic biocides within a short period - estimated between 10 to 20 years - which require continuing investments in developing new agrochemical pesticides and their intensive use, which again reduces diversity. In addition, the use of agrochemicals degrade ecological systems and reduce the abundance of natural enemies more than the pests that are targeted.<sup>33</sup> This results in the frequent occurrence of diseases and evolution of pathogens.<sup>34</sup> It is consequently important to conserve crop and livestock diversity, for it confers some resistance to diseases specific to particular strains of crops and livestock.<sup>35</sup>

In Rwanda different crops, such as rice, maize, beans, Irish potatoes, coffee and tea, wheat and others are attacked by different diseases and pests. The practices identified as being useful in the management of such pests and diseases, in addition to the use of fungicides, include the use of resistant varieties or moderately tolerant varieties combined with varietal rotation and the application of cultural practices.<sup>36</sup> This indicates that maintaining diversity in crop species is important for Rwanda.

### 6.2.2.3 *Vulnerability to climate change*

It is argued that diversity provides ecosystem services, as discussed in chapter two<sup>37</sup> and sustains evolutionary processes that continually produce new solutions.<sup>38</sup> More diverse

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<sup>31</sup> Miguel A Altieri op cit note 6 at 20; See also Chapin III op cit note 29 at 45.

<sup>32</sup> J H Lawton and V K. Brown 'Redundancy in ecosystems' In E D Schultze and H A Mooney (ed) 'Biodiversity and ecosystem function' (1993) 99 *Ecological Studies* at 255–268 cited in Miguel J Swift et al op cit note 6 at 124.

<sup>33</sup> Chapin III op cit note 29 at 45.

<sup>34</sup> Y Y Zhu et al 'Crop variety diversification for diseases control' in D I Jarvis, C Padock and H D Cooper (ed) *Managing biodiversity in agricultural ecosystems* (2007) 320.

<sup>35</sup> Steven B Brush 'The natural and human environment in the central Andes' (1982) 2 *Mountain Res. Dev.* at 14–38 Cited in Miguel A Altieri 'The ecological role of biodiversity in agro-ecosystems' (1999) 104 *Agriculture, Ecosystems and Environment* at 21.

<sup>36</sup> REMA *The national Integrated Pest Management (IPM) framework for Rwanda* (2011) 44-8.

<sup>37</sup> See paragraph 2.4.

<sup>38</sup> Daniel P Faith et al 'Ecosystem services: An evolutionary perspective on the links between biodiversity and human well-being' (2011) 2 *Current opinion in environmental sustainability* 66 at 70.

systems may be better able to reorganize in face of climatic shifts,<sup>39</sup> as crop and livestock diversity influences the resilience and resistance of ecosystems to environmental changing conditions.<sup>40</sup> In case of rich crop and livestock diversity, some varieties will survive and become the reservoir of crop and livestock varieties for future use. Diversity provides the opportunity to retain species capable of adapting to the changing conditions. Conversely, reduction of crop and livestock diversity therefore increases vulnerability to climate change, since with limited numbers of crops and livestock, climate change is likely to cause devastation, leaving breeders and farmers without the raw material for continuous improvement of crops and farm animal breeds and survival.<sup>41</sup> Decline in crop and livestock diversity renders agricultural ecosystems, farmers, agriculture and the economy of most countries that rely heavily on agriculture more vulnerable to climate change.

In Rwanda, diversity in crop varieties and livestock breeds is declining since agriculture is focusing on the use of small number of high yielding varieties, as outlined in chapter two.<sup>42</sup> This increases the vulnerability of Rwandan agriculture, farmers and the economy to climate change, which is already threatening both biodiversity and agriculture in Rwanda.<sup>43</sup>

#### 6.2.2.4 Other losses

In addition to genetic erosion, increased vulnerability to pests and diseases, and vulnerability to climate change, decline in crop and livestock diversity has further implications. The decline in diversity requires taking adequate conservation measures, including *ex-situ* conservation measures using conservation in gene banks or plant breeders' collections as an insurance against extinction. However, it is argued that this strategy, unlike *in-situ* conservation, cannot represent all the world's crop and livestock varieties, especially those that are critical to the livelihoods of marginalized people.<sup>44</sup>

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<sup>39</sup> Unai Pascual et al op cit note 7 at 197.

<sup>40</sup> Chapin III et al 'Consequences of changing biodiversity' (2000) 405 *Nature* at 235.

<sup>41</sup> J M M Engels & F Hareya 'The role of food, agriculture, forestry and fisheries in human nutrition plant and animal gene banks' III *Encyclopedia of Life Support Systems*.

<sup>42</sup> See paragraph 2.1.1.4.

<sup>43</sup> Bernis Byamukama et al *Baseline report national strategy on climate change and low carbon development for Rwanda* (2011) x, 19.

<sup>44</sup> Adam G Drucker, Melinda Smale & Patricia Zambrano *Valuation and sustainable management of crop and livestock biodiversity: A review of applied economics literature* (2005) 14; See also K Day Rubenstein et al op cit note 17.

*Ex-situ* measures imply allocation of certain budgets to cover expenses related to the management of seed banks, gene banks or breeders' collections, which therefore impacts on the economies of countries that undertake such *ex-situ* measures. That is why the CBD calls for the *in-situ* conservation of domesticated crop and livestock varieties in their surroundings, as elaborated on in chapter three.<sup>45</sup> The total cost associated with the loss of crop and livestock diversity is likely to reduce at a very low rate. In addition, *ex-situ* materials are less likely to be used in long-term plant and animal improvement programmes.<sup>46</sup> It was proved that materials obtained from *ex-situ* conservation have low ability to reproduce themselves in harsh environments, which increases the cost of gradual production and constant multiplication of new and sufficient materials for use.<sup>47</sup>

A further loss associated with the decline in diversity comes from the abandonment of traditional varieties regardless of their ability to adapt to the lower input mixed farming.<sup>48</sup> This causes high costs, associated with agricultural inputs needed to get high productivity from modern varieties and the accompanying environmental pollution.<sup>49</sup> However, the cost can be lower if traditional crop and livestock varieties are conserved since they are known to be more diverse.

Further, the loss of diversity in traditional farming systems is accompanied by the loss of associated traditional knowledge and practices that contributed to the development of agriculture. Losing the knowledge of the roles that farmers play in conserving, improving and making valuable crop and livestock diversity necessary for use in varietal improvement activities undermines the sustainability of agriculture and economy.<sup>50</sup> To avoid such losses, the CBD requires member states to recognize traditional practices which depend on a high

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<sup>45</sup> Article 8 CBD; See paragraph 3.2.1.2.

<sup>46</sup> FAO *Community-based management of animal genetic resources* Proceedings of the Workshop held in Swaziland 7-11 May 2001.

<sup>47</sup> David Carpenter op cit note 8 at 103.

<sup>48</sup> W Ayalew et al 'Economic evaluation of smallholder subsistence livestock production: lessons from an Ethiopian goat development programme' (2003) 45 *Ecological* at 474.

<sup>49</sup> Nadesapanicker A Kumar, Anil Girigan Gopi & Parameswaran Prajeesh 'Genetic erosion and degradation of ecosystem services of wetland rice fields: A case study from Western Ghats, India in Lockie Stewart & David, Carpenter (ed) *Agriculture, biodiversity and markets: Livelihoods and agroecology in comparative perspective* (2010); Charles Perrings & Madhav Gadgil *Conserving biodiversity: Reconciling local and global public benefits* at 539 available at <http://web.undp.org/globalpublicgoods/globalization/pdfs/Perrings.pdf>, accessed on 30 October 2013.

<sup>50</sup> CBDC *Agro-biodiversity feeds the world: Status report on agro-biodiversity in Africa* (2009) at 37 available at [http://www.planttreaty.org/sites/default/files/agrobiodiv\\_africa.pdf](http://www.planttreaty.org/sites/default/files/agrobiodiv_africa.pdf), accessed on 29 October 2013.

degree of crop diversity and high levels of animal or breed diversity, as elaborated on in chapter three.<sup>51</sup>

Moreover, loss of diversity has implications related to human health. A decline in crop and livestock diversity entails a decline in food varieties with related effects on nutrition as seen in chapter two.<sup>52</sup> It is well known that diets based on a diversity of food species promote health and can contribute in the protection against diseases;<sup>53</sup> and that agricultural biodiversity provides humans with plants and roots for medicines.<sup>54</sup> Lack of crop and livestock diversity can therefore be associated with significant monetary expenses needed to resolve human health issues.

Rwanda suffers all these additional losses and costs. First, *ex-situ* conservation programmes are carried out in Rwanda in the attempt to avoid genetic erosion, which entails financial costs associated with the management of seed centres and gene banks. All the different concerns about *ex-situ* conservation, such as the inability to conserve all species, continuing decline of species diversity, low ability of *ex-situ* materials to reproduce themselves and the need to have constant multiplication of materials under *ex-situ* conservation programmes, are raised in Rwanda. Some research participants reported that when they grow crop materials obtained from the Rwanda Agricultural Board, it is difficult to grow such materials in the future. They often do not perform well which push them to keep on buying new materials with inherent negative impacts on their economies.<sup>55</sup> Second, traditional crop and livestock varieties are gradually being replaced by modern varieties. This affects the ability to adapt to low input farming systems. Farming communities, as reported by some of the respondents, have to rely heavily on the use of agrochemicals when they grow non- diversified new varieties. This has inherent consequences of pollution and impacts on human health.<sup>56</sup> Third, the decline of crop and livestock diversity has negative implications on the human nutrition of Rwandans. Fourth, replacement of traditional crop

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<sup>51</sup> Article 8 (j); See paragraph 3.2.1.2.

<sup>52</sup> Paragraph 2.4.1; UNDP *Benefits of diversity* (1992) cited in Lori Ann Thrupp 'Linking agricultural biodiversity and food security: the valuable role of agrobiodiversity for sustainable agriculture' (2000) 76 *International Affairs* 2 at 273.

<sup>53</sup> UNCBD *Biodiversity and global health: The importance of biodiversity to human health* (2010) *COP 10 Policy brief* available at <http://www.cbd.int/doc/health/cohab-policy-brief1-en.pdf>, accessed on 29 October 2013.

<sup>54</sup> Available at <http://www.biodiv.org/>.

<sup>55</sup> Respondent 7.

<sup>56</sup> Respondent 7 & 8.

and livestock varieties is associated with the loss of related traditional knowledge about the role of farmers in varietal improving activities, which affects sustainability of Rwandan agriculture and economy.<sup>57</sup> In Rwanda, conservation of crop and livestock diversity is therefore a necessity for a more sustainable agricultural system.

### **6.3 LEGAL TOOLS FOR CONSERVATION OF CROP AND LIVESTOCK DIVERSITY**

As discussed in chapter one and two, under Rwandan legislation, crop and livestock diversity is not adequately protected. Rwandan laws discussed in chapter four are not diversity conservation-oriented.<sup>58</sup> However, as all respondents asserted, monoculture is promoted and systems of land consolidation and regionalisation of crops have been established. Citizens are required to plant homogeneous and new crop varieties, which are considered highly profitable. They are motivated to use new seed varieties distributed by the Rwandan government and mixture with traditional varieties is prohibited. This led to abandonment of traditional crop varieties, which were diverse and could adapt to the changing conditions of their environment, resulting in their loss. In addition, traditional livestock species too are disappearing due to the marginalization of traditional production systems and associated local breeds.<sup>59</sup> This constitutes a great threat to animal genetic diversity resources.<sup>60</sup>

It is necessary to establish legal tools that contribute to the conservation of diversity in crop and livestock varieties, such as adjustment of national incentives for crop and livestock diversity and recognition of the role of local communities. These will be discussed below.

#### **6.3.1 Adjustment of national incentives for crop and livestock diversity conservation**

Lack of legal establishment of incentives that encourage farmers to conserve crop and livestock diversity contributes to putting more pressure on crop and livestock diversity in

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<sup>57</sup> RoR op cit note 25 at 26.

<sup>58</sup> See paragraphs 1.1.2, 2.3.4 and 2.3.5.

<sup>59</sup> All respondents; Grands lacs Hebdo of Monday 14 September 2009 available at [http://www.rnanews.com/index.php?option=com\\_content&task=view&id=1923&Itemid=34](http://www.rnanews.com/index.php?option=com_content&task=view&id=1923&Itemid=34), accessed on 11 March 2014; RoR op cit note 25 at 19.

<sup>60</sup> The Secretariat of the Convention on Biological Diversity *Sustainable Agriculture and Sustainable use of Agricultural Biodiversity: Concepts, Trends and Challenges* (2010) 64.

Rwanda. Incentives can be subsidies, tax discounts, credits and market standards.<sup>61</sup> To conserve crop and livestock diversity, the adjustment of incentives is needed and there are two approaches to consider: generating incentives for conservation of crop and livestock diversity and discouraging perverse incentives against crop and livestock diversity conservation.<sup>62</sup>

### *6.3.1.1 Generation of incentives for crop and livestock diversity conservation*

The Food and Agriculture Organisation (FAO) states that diversity can be promoted by providing incentives to maintain a heterogeneous set of crop varieties in production, particularly rare landrace varieties.<sup>63</sup> This can work the same for traditional or local animal breeds. The CBD obliges country parties to adopt incentive measures that support biodiversity conservation in all sectors including agriculture, as outlined in chapter three.<sup>64</sup> The main incentives that can be used include facilitating niche markets for traditional crop and livestock products, providing crop and animal breeding programmes that increase productivity of local varieties and breeds, and legal support of exchange of traditional crop and livestock varieties.<sup>65</sup> These incentives will be unpacked in more detail below. However, Rwandan laws make no provision for any of these incentives, despite being a member party to the CBD.

### *Legal support of access to niche markets by diverse traditional crops and livestock*

Niche markets are defined as groups of consumers within the larger marketplace who have similar demographic, buying behavior, and/or lifestyle characteristics.<sup>66</sup> Niche market development may be a means to increase financial profitability and thus competitiveness of

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<sup>61</sup> Ibid at 276; See also FAO ‘Global strategy for the management of farm animal genetic resources’ available at <http://www.fao.org/ag/againfo/programmemes/en/lead/toolbox/Indust/LossAgEA.htm>, accessed on 30 October 2013. According to FAO other factors that support loss of crop and livestock diversity are focus of producers on short-term benefits at the expense of longer-term social and ecological or environmental factors and disparities in resource distribution and disrespect for local knowledge and livestock management practices.

<sup>62</sup> Charles Perrings & Madhav Gadgil op cit note 49.

<sup>63</sup> FAO *The state of food and agriculture: paying farmers for environmental services* (2007) 27.

<sup>64</sup> Article 11 CBD; See also paragraph 3.2.1.2.

<sup>65</sup> ILRI op cit note 7 at 71.

<sup>66</sup> Dawn Thilmany ‘What are niche markets? What advantages do they offer?’ available at <http://ag.arizona.edu/arec/wemc/nichemarkets/01whatarenichemarkets.pdf>, accessed on 31 October 2013.



local or traditional crop and livestock varieties, recognized to be more diverse.<sup>67</sup> The products obtained from the use of local crop and livestock varieties may be promoted through establishment of eco-labeling and certification requirements to indicate the characteristics or traits of these agro-biodiversity products.<sup>68</sup>

To support markets that promote traditional crop and livestock varieties and conserve diversity, tax and commercial laws can play a big role. Tax law, for example can exempt farmers who produce traditional crop and livestock products and their sellers from paying some taxes at the market. In Rwanda, all agricultural and livestock products, except processed ones are exempted from the value added tax.<sup>69</sup> Here, the exemptions apply to all agricultural products produced from traditional and modern crop and livestock varieties. There is no special treatment accorded to agricultural products obtained from traditional crop and livestock varieties. However, as the latter are marginalised, this means that, they cannot compete on the market and will continue to be abandoned with inherent negative impacts on crop and livestock diversity.

Commercial laws can support crop and livestock diversity by determining good prices for traditional crop and livestock products. Good prices should be those that capture the value of products from traditional crop varieties and livestock breeds to ensure diversity. In Rwanda, the market prices are fixed based on demand-and-supply rules of the market.<sup>70</sup> Mostly, agricultural products obtained from the use of traditional crop and livestock varieties are marginalised on the market which discourages farmers from conserving them. When farmers/users of traditional crop and livestock varieties do not receive good returns from the market, they become discouraged from developing new varieties of their own, which leads indirectly to the erosion of diversified traditional varieties.<sup>71</sup> Some research participants

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<sup>67</sup> Guillaume P Gruère, Alessandra Giuliani & Melinda Smale 'Marketing underutilized plant species for the benefit of the poor: a conceptual framework' (2006) 27 ; FAO *Harvesting nature's diversity* (1993) available at <http://www.fao.org/docrep/004/v1430e/V1430E04.htm#ch3>, accessed on 31 October 2013.

<sup>68</sup> Michael Hermann & Thomas Bernet 'The transition of maca from neglect to market prominence: Lessons for improving use strategies and market chains of minor crops' (2009) 1 *Agricultural Biodiversity and Livelihoods Discussion Papers*.

<sup>69</sup> Article 2(13) of the law n° 02/2015 of 25/02/2015 modifying and complementing law n° 37/2012 of 09/11/2012 establishing the value added tax *O G* n° 11 bis of 16/03/2015.

<sup>70</sup> Article 3 of the Law n°15/2001 OF 28/01/2001 governing the organisation of internal trade *O G* n° 3 of 1/2/2001.

<sup>71</sup> Jeffrey A McNeely 'How traditional agro-ecosystems can contribute to conserving biodiversity' in Patricia Halladay and D A Gilmour (ed) *Conserving biodiversity outside protected areas: The role of traditional agroecosystem* (1995) at 26.

revealed that they abandoned some traditional crop varieties of beans because they are not valued at the market.<sup>72</sup> This requires adequate adjustment of market prices for agricultural products obtained from traditional varieties to motivate farmers conserve them, which is beneficial to diversity conservation.

In addition, crop and livestock diversity can be incentivised through facilitated access to loans and credits to farmers of minor and traditional crops and livestock, those growing crops consumed locally and those rearing livestock for products consumed locally.<sup>73</sup> This helps farmers who keep such traditional varieties and breeds to be competitive in the market against the economies of scale of farmers who produce modern crop and livestock products from uniform varieties. However, research participants reported that, in Rwanda, farmers who are facilitated in having access to loans and credits are those that use modern crop and livestock varieties which are considered as more productive compared to traditional varieties. This is intended to promote agricultural productivity.<sup>74</sup> However, support to traditional crop and livestock varieties have also to be reconsidered in order to prevent their abandonment and loss of crop and livestock diversity.

#### *Legal promotion of crop and animal breeding programmes using diverse traditional varieties*

As canvassed under chapter two, crop and animal breeding programmes using traditional varieties require involvement of rural people in research and development of integrated farm management systems as recommended by FAO and the Conference of the Parties to the CBD (COPs 3).<sup>75</sup> In this context, legal support should be offered to farmers or other plant and livestock breeders who develop traditional crop varieties and livestock breeds for dissemination. FAO, in its International Cooperative Framework for Sustainable Agriculture and Rural Development, recommended the encouragement of demand and promotion of production of indigenous crop and animal varieties. It also recommended the establishment of links between formal and farmer-saved systems and fostering the emergence of local seed enterprises to integrate diverse varieties' promotion, as discussed in chapter two.<sup>76</sup> Promoting breeding efforts among farmers is another measure that the International Treaty of Plant

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<sup>72</sup> Respondent 8.

<sup>73</sup> Jeffrey A McNeely op cit note 71.

<sup>74</sup> All respondents.

<sup>75</sup> See paragraphs 2.6.1 and 2.6.2.

<sup>76</sup> Paragraph 2.6.1.

Genetic Resources for Food and Agriculture requires member states to adopt in order to maximize intra- and inter-specific variation of plant varieties, as studied in chapter three.<sup>77</sup>

The applicable legal mechanisms to apply in this situation may include legally supported access to credits by farmers or other people engaged in breeding activities that use diverse traditional crop and livestock varieties. Access can be supported by removing unnecessary requirements to obtain the loans and this should be ensured by the law. This can motivate farmers or other interested people or organisations to be engaged in activities of selecting and breeding traditional crop and livestock varieties. The law can also support diversity by fixing the purchasing cost for seeds and breeds obtained through such breeding programmes at affordable prices to facilitate easy accession by different farmers. It is acknowledged that breeding programmes which maintain the essential components of diversity contribute much to meet future production needs and biodiversity conservation.<sup>78</sup> In Rwanda, there is no clear legal support to farmers engaged in breeding activities that use diverse traditional crop and livestock varieties. Though research participants reported that some farmers collaborate with the RAB in development of seeds, this is still limited. Few farmers intervene in breeding activities and their intervention mostly consists of receiving seeds from RAB and assist in their multiplication.<sup>79</sup> There is no clear strategy of supporting individual farmers' efforts of multiplying their traditional crop and livestock varieties. This needs to be legally supported to contribute to diversity conservation.

#### *Legal support of exchange of traditional crop varieties*

In Rwanda, as research participants reported, farmers are allowed to use, sell and save their seeds and breeds to be used for reproduction.<sup>80</sup> However, this does not have a clear legal support. There is a need to strengthen exchange of farmers' traditional crop varieties through legal provisions. The rwandan law has to be clear on the rights of farmers of traditional crop varieties they have developed or discovered themselves. The entitlement to exclusive rights constitutes an encouragement to conserve the developed or discovered varieties and contributes to diversity conservation. It is in this context that the ITPGRFA calls for the

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<sup>77</sup> Article 6 ITPGRFA; See paragraph 3.2.2.2.

<sup>78</sup> Jeffrey A McNeely op cit note 71 at 27.

<sup>79</sup> Respondent 8.

<sup>80</sup> This was confirmed by all research participants.

recognition of farmers' rights, as discussed in chapter three.<sup>81</sup> The cost of obtaining intellectual property rights over developed or discovered varieties by farmers must be fair which means that the law has to fix the cost of the whole process of farmers' rights registration at an affordable price. Without such legal support, farmers with insufficient means may be hindered from claiming their rights.<sup>82</sup> In Rwanda, the Intellectual Property Rights Protection Law does not apply to discoveries of plants and genetic resources in general to encompass those discoveries performed by farmers over their traditional diverse varieties.<sup>83</sup> They are supposed to be governed by a related special law which is not yet in place. This has negative implications on the conservation of diversity.

### 6.3.1.2 Discouraging perverse incentives against genetic diversity conservation

The second element to consider in adjusting national incentives for crop and livestock diversity conservation is elimination of perverse incentives. The latter include subsidies to uniform varieties and agrochemicals. Subsidies are identified as critical drivers to the loss of crop and livestock diversity<sup>84</sup> because they are provided mostly to farmers of high yielding crop and animal varieties with intention to increase agricultural production. Costs of seeds, breeds and agrochemicals are reduced and farmers increase their revenues as they are supported to produce in larger quantities.<sup>85</sup> This encourages the increasing use of agrochemicals, with their polluting effect and discourages conservation of more diverse local varieties with the effect of narrowing diversity.<sup>86</sup> The CBD does not only envisage incentives, but also disincentives like high rate of taxation for activities that damage biodiversity, as discussed in chapter three.<sup>87</sup> Also, the ITPGRFA calls for the elimination or minimization of threats to plant genetic resources for food and agriculture, also discussed in

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<sup>81</sup> Paragraph 3.2.2.2.

<sup>82</sup> David Carpenter op cit note 8 at 112.

<sup>83</sup> Article 289 Intellectual Property Rights Protection Law.

<sup>84</sup> Lori A Thrupp *Conservation and sustainable use of agricultural biodiversity: A Sourcebook* at 26 available at <http://www.eseap.cipotato.org/UPWARD/Publications/Agrobiodiversity/pages%20020-032%20%28Paper%203%29.pdf>, accessed on 4 November 2013.

<sup>85</sup> Secretariat of the Convention on Biological Diversity *Incentive measures for the conservation and sustainable use of biological diversity: Case studies and lessons learned (2011)* CBD Technical Series No. 56 at 7.

<sup>86</sup> Adam G Drucker & Luis Carlos Rodriguez 'Development, intensification and the conservation and sustainable use of farm animal genetic resources' in Andreas Kontoleon, Unai Pascual & Melinda Smale (ed) *Agrobiodiversity conservation and economic development* (2009) 92-109 cited in Unai Pascual et al 'The economics of agrobiodiversity conservation for food security under climate change' (2011) 11 *Economia Agraria y Recursos naturales* 1 at 199.

<sup>87</sup> Paragraph 3.2.1.2.

chapter three.<sup>88</sup> It can be argued that this includes the elimination of perverse incentives that threaten crop diversity.

In Rwanda, there is a high priority attached to achieving growth in agricultural output and food self-sufficiency. To this end, agricultural policies promote the use of high-yielding varieties and agrochemicals via direct subsidies on uniform seed varieties, agrochemicals and artificial insemination.<sup>89</sup> As discussed above,<sup>90</sup> subsidizing uniform varieties and agrochemicals causes the abandonment of traditional diverse varieties, which do not require much agricultural inputs, but have lower yields. Some research participants reported that they prefer growing the uniform varieties subsidised by the government instead of using traditional varieties due to economic reasons.<sup>91</sup> This is not beneficial for the diversity conservation. Therefore, eliminating such subsidies contributes to the conservation of crop and livestock diversity. Elimination can be done by stopping the free provision of seeds and breeds of uniform varieties, stopping the payment of half of the prices of agrochemicals on behalf of farmers who grow selected uniform varieties and through the fixation – by commercial laws- of proper prices that cover the real cost of seeds and breeds for uniform varieties and the real cost of agrochemicals on the market. This will create even market competition for both practices, which in turn can motivate farmers to conserve crop and livestock diversity found in traditional varieties.<sup>92</sup>

Furthermore, the Rwandan Value Added Tax law,<sup>93</sup> exempts agricultural inputs from this form of tax.<sup>94</sup> This constitutes another perverse incentive to the excessive use of agrochemicals and the abandonment of traditional or local varieties. Elimination of this perverse incentive and the legal establishment of moderate tax on agricultural inputs can assist in reducing excessive use of agrochemicals. The taxes will increase the market prices of agrochemicals and discourage users from applying huge quantities of agrochemicals. Also, the establishment of prices for new seeds and breeds of uniform varieties will fix the real cost of their products on the market, which may render local varieties more competitive

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<sup>88</sup> Paragraph 3.2.2.2.

<sup>89</sup> MINAGRI *Strategic plan for the transformation of agriculture in Rwanda- Phase II (PSTA II)* (2009) 56-60

<sup>90</sup> Paragraph 6.2.2.

<sup>91</sup> Respondent 16.

<sup>92</sup> Paragraph 6.3.1.1.

<sup>93</sup> Law n° 37/2012

<sup>94</sup> Article 6 (14 and 15.h) of the Law n°37/2012 of 09/11/2012 establishing the Value Added Tax as amended up to date *O. G* n° Special of 05/02/2013.

and encourage their use and conservation and consequently contribute to the conservation of crop diversity.

### 6.3.2 Recognition of the role of local communities

Once incentives that encourage traditional farming practices have been established and perverse incentives abolished, Rwandan local community farmers should be involved in designing, planning, implementing and monitoring the implementation of agricultural practices likely to affect crop and livestock diversity. This, to ensure diversity conservation and sustainability of agriculture. The role of local communities is recognized through legal provisions which support the protection of traditional agro-ecosystems and the associated knowledge as recognized in the CBD examined in chapter three.<sup>95</sup> It is acknowledged that species found in local communities have greater intra-varietal diversity than modern species.<sup>96</sup> Based on their experience, local communities develop cropping and breeding practices that are favorable to their specific conditions and which demonstrate their excellent capability to manage intra-specific diversity of traditional varieties, which include native or wild species and naturalized ones.<sup>97</sup> Local people therefore have to be legally recognized in agricultural development activities and be given the opportunity to set their own development agenda. Even if this does not guarantee success, it puts responsibility firmly in the hands of those who will earn the benefits and pay the costs. Local communities will behave in their self-interest if empowered to do so.<sup>98</sup> This is done through allowing public participation of local communities, as detailed in chapter seven.

Though the role of local communities should be recognized through legal provisions, the Rwandan legislation is not adequately developed to ensure full recognition of the local communities' role. Also the fieldwork research findings revealed that local communities are not involved in agricultural practices that encourage the crop and livestock diversity. Most of research participants reported that they are, instead, called to participate in practices that are monoculture promotion-oriented such as growing and rearing few more productive varieties.

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<sup>95</sup> Article 8 CBD; See paragraph 3.2.1.2.

<sup>96</sup> Doris Mutta, Lori A Thrupp & A Simons 'Integrating biodiversity concerns into national policies, plans and strategies in Eastern Africa' at 18 available at <https://www.cbd.int/doc/case-studies/agr/cs-agr-wri.pdf>, accessed on August 2011.

<sup>97</sup> Ibid.

<sup>98</sup> Jeffrey A McNeely op cit note 71.

They are encouraged to reduce the use of different traditional varieties which are not productive.<sup>99</sup> This is detrimental to conservation of crop and livestock diversity. More details on this aspect are provided in chapter seven.

To recognize the role of local communities effectively, some legal tools need to be applied to conserve crop and livestock diversity. They include:

- the establishment, by the law, of the obligation to involve local communities in research and development programmes that use traditional varieties;
- attribution to local communities of exclusive or shared intellectual property rights over newly discovered varieties under breeding programmes that use traditional varieties as the ITPGRFA calls for the protection and promotion of such rights over plant genetic resources for food and agriculture as seen in chapter three;<sup>100</sup> and
- the necessity for local communities to participate in planning and decision-making processes related to the introduction of new crop and livestock varieties and the replacement of traditional varieties, as stipulated in the CBD.<sup>101</sup>

Apart from the principle of public participation provided in the Environmental Framework Law as discussed under chapter four, Rwandan law makes no provision for any of the discussed tools to ensure that the role of local communities is given full effect in this regard. This needs to be remedied urgently.

In recognizing the role of local communities, women must be specifically recognized. They are managers of biodiversity in and around farming systems who can make important contributions and have a promising role in research, development and conservation of crop and livestock diversity, as confirmed in a plant breeding project undertaken in Rwanda in 1994.<sup>102</sup> In this project, women collaborated with scientists in breeding beans to establish those that suit local needs. Together, they identified the characteristics needed to improve the

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<sup>99</sup> All research participants.

<sup>100</sup> Article 9.2(a, b and c) ITPGRFA; See paragraph 3.2.2.2.

<sup>101</sup> Article 8 (j) CBD; See also paragraph 3.2.1.2.

<sup>102</sup> L Sperling & P Berkowitz 'Partners in selection: Bean breeders and women bean experts in Rwanda' (1994) available at <http://library.cgiar.org/bitstream/handle/10947/5701/bean.pdf?sequence=1> (accessed 23 July 2015).

beans. They ran experiments; conducted trials and made decisions on the basis of the trial results. It was found that varieties selected by women performed better than those selected by scientists over four seasons.<sup>103</sup> Though all research participants confirmed that women are recognised in all agricultural development initiatives due to the Rwanda gender policy, this does not currently contribute much to the conservation of crop and livestock diversity. As mentioned above, the tendency is to involve local farmers whether men or women in the use of monoculture practices. Efforts to support the use of traditional diverse varieties are limited which has negative impacts on crop and livestock diversity. Conservation of crop and livestock diversity assists in achieving sustainable agriculture as it helps agriculture to cope with environmental and climate changing conditions.

## **6.4 DIVERSITY IN CROP AND LIVESTOCK VARIETIES AND ADAPTATION TO CLIMATE CHANGE**

Climate change impacts agriculture as well as crop and livestock diversity. However, agriculture contributes to climate change and bad management of crop and livestock diversity undermines the ability to adapt to climate change. It is important to establish, amongst other things, legal mechanisms that discourage agricultural practices from contributing to climate change and the decline of crop and livestock diversity, while promoting those practices assisting in crop and livestock diversity in order to increase the capacity to adapt to climate change.

### **6.4.1 Interrelationship between agriculture, biodiversity and climate change**

Agriculture is essentially a man-made adjunct to natural ecosystems and is weather and climate dependent. It is also a significant source of anthropogenic emissions of greenhouse gases that cause climate change.<sup>104</sup> Climate change is recognized as one of the main threats to biodiversity due to the impacts of changes at gene, species and ecosystem levels that it generates. Biodiversity also suffers from different measures taken by governments in the process of adapting to climate change. However, good conservation of biodiversity can assist in adaptation to climate change. Therefore, there is an urgent need to conserve biodiversity in

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<sup>103</sup> Ibid.

<sup>104</sup> Anita Wreford, Dominic Moran & Neil Adger *Climate change and agriculture: Impacts, adaptation and mitigation* (2010) 17.



agriculture to be able to face climate change. The following paragraphs discuss impacts of climate change on agriculture and biodiversity, as well as impacts of agriculture on climate change, the role of crop and livestock diversity conservation in adaptation to climate change and how the law can help to conserve crop and livestock diversity in agriculture and increase capacity to adapt to climate change.

#### *6.4.1.1 Effects of climate change on agriculture*

Generally, climate-related changes, namely changes in variability, seasonality, mean precipitation and water availability, heavy rains and flooding, prolonged drought and the emergence of new diseases and pathogens impact agriculture directly and indirectly.<sup>105</sup> Direct impacts include suppression of growth, killing crops and livestock, damages to crops and disruptions of calving or lambing. Indirect effects include alteration of pollinators' behaviour and outbreaks and range expansion of pests and disease.<sup>106</sup>

Rwanda too experiences climate-related events, which adversely affect agriculture as confirmed by some research participants. They reported to experience droughts, floods and unpredictable raining patterns. All this cause reduction in agricultural production, erosion, landslides and destruction of plants or crops in swampy and river zones.<sup>107</sup>

#### *6.4.1.2 Effects of agriculture on climate change*

Agriculture is a major source of global greenhouse gas emissions.<sup>108</sup> Agricultural greenhouse gas emissions come from several sources, such as agricultural soil management, enteric fermentation, manure management, carbon dioxide from fossil fuel consumption and others.<sup>109</sup>

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<sup>105</sup> Ibid at 21; See also D L Donahue 'Agriculture and forestry' in M B Gerrard and K Fischer (ed) *The Law of adaptation to climate change: US and international aspects* 1<sup>st</sup> Edition (2012) at 352-353.

<sup>106</sup> D L Donahue op cit note 105 at 352.

<sup>107</sup> Respondents 1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17 18.

<sup>108</sup> Anita Wreford, Dominic Moran & Neil Adger op cit note 104 at 79.

<sup>109</sup> Eugene Takle & Don Hofstrand 'Global warming – agriculture's impact on greenhouse gas emissions' (2008) *AgDM Newsletter* available at <http://www.extension.iastate.edu/agdm/articles/others/TakApr08.html>, accessed on 11 November 2013.

The increased use of nitrogen fertilizers applied in the production of crops that consume high amounts of nitrogen, such as corn, contributes to the greenhouse gas emissions.<sup>110</sup> Also, during the normal animal digestive processes, the animal's digestive systems ferment feed and methane is produced as a by-product, which is emitted by the exhaling and belching of the animal.<sup>111</sup> In addition, anaerobic decomposition of manure produces methane when manure is stored as a liquid or slurry in lagoons, ponds, tanks or pits. Methane emissions increase as the number of large-scale livestock confinement systems increases. Moreover, greenhouse gas emissions come from combustion of gasoline and diesel fuel when they are used in agricultural operations. Another source of greenhouse gas agricultural emission is, for example, cultivation of rice in flooded areas, where atmospheric oxygen is prevented from entering the soil. Therefore, the soil organic matter decomposes under anaerobic conditions and produces methane that escapes into the atmosphere.<sup>112</sup>

In Rwanda, the main greenhouse gases that are produced are carbon dioxide, methane and nitrogen hemioxide coming from agriculture, energy, industrial processes, wastes and land use change and forestry. The agricultural sector alone is currently considered to contribute almost two-thirds of total land use, land use change and forestry emissions of GHG. The agricultural greenhouse gas emissions come from five different sources, namely enteric fermentation and manure management from livestock, burning of the savannah, burning of agricultural residues, cultivated soils and flooding rice fields.<sup>113</sup> It was noted that emissions from agriculture increased by nearly 1.5 times and this remains a challenge considering that agriculture constitutes the major source of livelihood and contributor to growth in Rwanda.<sup>114</sup> Therefore Rwanda is vulnerable to climate change, which calls attention to the development and legal support of agricultural practices, including the conservation of crop and livestock diversity which contribute to adaptation to climate change.

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<sup>110</sup> Ibid.

<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

<sup>113</sup> Seton Stiebert *Republic of Rwanda: Greenhouse gas emissions baseline projection* (2013) 7.

<sup>114</sup> REMA *Guidelines for mainstreaming climate change adaptation and mitigation in the agricultural sector : Sustaining Rwanda's food security and economic productivity through effective and timely climate change adaptation and mitigation* (2011) at 12-13; REMA *Atlas of Rwanda's changing environment: implications for climate change resilience* (2011) 86; REMA *Guidelines to mainstream climate change adaptation and mitigation in the energy and infrastructure sector: Building a climate resilient infrastructure and energy sector for Rwanda* (2011) at 10-11.

## 6.4.2 Climate change and biodiversity conservation

Climate change is an additional threat upon other stresses of biodiversity, like pollution, overuse of biodiversity and invasive alien species. Climate change affects individual species, ecosystems and human well-being. However, healthy biodiversity contributes to climate change adaptation and mitigation due to the ecosystem services it supports.<sup>115</sup> Therefore, in adapting to climate change, conservation of crop and livestock diversity must be a priority. Agricultural practices that constitute the major driver of diversity loss must be controlled and adoption of sustainable agricultural practices that ensure crop and livestock diversity constitutes a key mechanism to adapt to climate change. Such practices become effective when they are legally supported.

### 6.4.2.1 Effects of climate change on biodiversity

Climate change affects natural biodiversity as well as agricultural biodiversity. Changes in environment like changes in temperature, in precipitation, the rise of temperature, the rise of sea levels and increased occurrence of extreme weather-related events constitute the main factors that cause reduction in diversity of crops and livestock.<sup>116</sup>

Some species and ecosystems can adapt naturally to changing conditions, but others are unable to cope under certain levels of climate change.<sup>117</sup> Climate change alters ecosystem distribution and composition. Some ecosystems shift their locations and some species migrate from one ecosystem to another due to their ability to be tolerant or not to warmer or drier conditions or wet conditions. It causes changes in population status and species distribution. Some species are likely to increase and replace others in this scenario, while others are likely to suffer decline and become extinct, especially those that are less tolerant and are incapable of migrating to new locations.<sup>118</sup> Further, there is rising concern that

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<sup>115</sup> Secretariat of the Convention on Biological Diversity *Connecting biodiversity and climate change mitigation and adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change* (2009) CBD technical Series No. 41 at 3; See also A Campbell et al. *Review of the literature on the links between biodiversity and climate change: Impacts, adaptation and mitigation* (2009) CBD technical Series No. 42 at 5.

<sup>116</sup> Kotschi Johannes 'Coping with climate change and the role of agrobiodiversity' (2006) available at <http://www.tropentag.de/2006/abstracts/full/625.pdf>, accessed on 12 November 2013.

<sup>117</sup> Secretariat of the Convention on Biological Diversity op cit note 115 at 8.

<sup>118</sup> Campbell A et al *Review of the literature on the links between biodiversity and climate change: Impacts, Adaptation and Mitigation* (2009) CBD technical Series No. 42 at 23-28.

changes in species composition also lead to changes in the physical and trophic structure of ecosystems, with resulting effects on ecosystem function and composition.<sup>119</sup>

Rwanda too experiences climate change-related events that affect her biodiversity. Particularly ecosystems changes in montane habitats are among the most vulnerable, because climate change will cause climatic zones (and species) to move.<sup>120</sup> For example, in Volcanoes National Park, mountain gorillas have been observed shifting from lower altitudes to higher altitudes during dry seasons. This can be considered as a precursor of what will happen in all ecosystems affected by climate change, as species typically respond to climatic stressors by migrating and shifting their ranges to areas with more favorable conditions.<sup>121</sup> In search of effective responses to the effects of climate change, one has to consider that biodiversity is not only a victim; more importantly, it is crucial to coping with climate change.

#### 6.4.2.2 *The role of crop and livestock diversity in adaptation to climate change*

Adaptation is defined as the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.<sup>122</sup> Adaptation to climate change takes place through adjustments to reduce vulnerability or enhance resilience in response to observed or expected changes in climate and associated extreme weather events, and is necessary in physical, ecological and human systems.<sup>123</sup>

Biodiversity is recognized to be intimately connected to climate change adaptation based on the links between ecosystems and human livelihoods. Ecosystems provide a number of services that sustain human well-being, such as provisioning services, regulating

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<sup>119</sup> Ibid at 12-23.

<sup>120</sup> Stockholm Environment Institute *Economics of Climate Change in Rwanda* (2009) 26.

<sup>121</sup> Abel Musana & Alphonse Mutuyeyezu *Impact of climate change and climate variability on altitudinal ranging movements of mountain gorillas in Volcanoes National Park: Rwanda externship report* (2011) 23; Stockholm Environment Institute op cit note 120 at 26.

<sup>122</sup> Richard J T Klein et al 'Inter-relationships between adaptation and mitigation' in M L Parry *et al* (ed) *Climate change 2007: Impacts, adaptation and vulnerability: contribution of Working Group II to the Fourth Assessment*

*Report of the Intergovernmental Panel on Climate Change* (2007) 750.

<sup>123</sup> W Neil Adger et al 'Assessment of adaptation practices, options, constraints and capacity' in M L Parry *et al.* (ed) *Climate Change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (2007) 720.

services and supporting services, as discussed in chapter two.<sup>124</sup> Biodiversity enhances ecosystem capacity to recover (resilience) and adapt to the impacts of climate change.<sup>125</sup> It is recognized to be responsive to different external factors depending on its levels.<sup>126</sup> Species richness, species evenness, species composition, interactions among species and the spatial and temporal variation influence the capability to adapt to changing environment.<sup>127</sup> Biodiversity plays a crucial role in adapting to climate change especially in agriculture,<sup>128</sup> where maintenance of crop and livestock diversity leads to the protection of a larger gene pool from which new genotypes of both domesticated and wild species adapted to changing climatic and environmental conditions can arise.<sup>129</sup> It is argued that intact, non-intensively managed ecosystems, and high-diversity agricultural systems, may cope better with long-term climatic variability than biologically impoverished and man-made low-diversity ecosystems.<sup>130</sup> In contrast, loss of crop and livestock diversity renders the human society more vulnerable due to reduction of options for change.

Adaptation to climate change in agriculture is facilitated by, among other things, the use of different crop and livestock varieties, and mixed cropping. The two are currently being used in some countries to increase the chances that at least one crop will survive and produce a harvest in case of severe climate changes.<sup>131</sup> Many traditional farmers use diverse crops, not to maximize productivity but to decrease the chances of crop failure in a bad year.<sup>132</sup> Another strategy used by farmers to adapt to climate change is the use of currently under-utilized indigenous varieties, which can help to maintain diverse and more stable agro-ecosystems that provide alternative food and income sources. Also, developing climate-tolerant crop and livestock varieties and genotypes, such as those tolerant to drought, heat, disease and other harsh conditions, facilitates the adaptation of farmers to climate change. This often depends on locally-used varieties and crop wild relatives that constitute sources of characteristics that

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<sup>124</sup> Paragraph 2.4.

<sup>125</sup> Secretariat of the Convention on Biological Diversity *Interlinkages between biological diversity and climate change: Advice on the integration of biodiversity considerations into the implementation of the United Nations Framework Convention on Climate Change and its Kyoto Protocol* (2003) *CBD Technical Series No. 10* at 78.

<sup>126</sup> *Ibid* at 26.

<sup>127</sup> Chapin et al op cit note 40 at 234-235.

<sup>128</sup> Secretariat of the Convention on Biological Diversity *Review of the literature on the links between biodiversity and climate change: Impacts, adaptation and mitigation* (2009) *CBD Technical Series No. 42* at 60.

<sup>129</sup> Intergovernmental Panel on Climate Change *Climate Change and Biodiversity* (2002) *IPCC Technical Paper* at 43; A Lane and A Jarvis *Changes in climate will modify the geography of crop suitability: Agricultural biodiversity can help with adaptation* (2007) *4 SAT eJournal* 1 at 1.

<sup>130</sup> Secretariat of the Convention on Biological Diversity op cit note 115 at 26.

<sup>131</sup> *Ibid* at 60.

<sup>132</sup> Chapin et al op cit note 40 at 238.

contribute to drought or flood tolerance or the ability to withstand highly variable climate conditions. These strategies of adaptation to climate change can be used when crop and livestock diversity is conserved and they become effective when they are supported by the laws.

### **6.4.3 Legal tools for conservation of crop and livestock diversity and adaptation to climate change**

In Rwanda, there is no specific law on climate change adaptation. Scattered legal provisions from Environmental Framework Law, Biodiversity Law, Water Law and Forest Law examined in chapter four can facilitate, to a limited extent, adaptation to climate change in agriculture with the positive impacts on conservation of crop and livestock diversity.<sup>133</sup> These laws apply generally to environment, biodiversity, water and forest ; they do not adequately contribute to the conservation of diversity in crop and livestock species to strengthen adaptation to climate change in agriculture; which needs to be fixed. The law can facilitate crop and livestock diversity conservation and consequently facilitate adaptation to climate change through imposition of obligations, conferment of rights and regulating behaviors and activities pertinent to agriculture, which aggravate loss of crop and livestock diversity and climate change. It can:

- establish measures eliminating perverse incentives of diversity loss and climate change;
- provide incentives for adaptive behavior that promote crop and livestock diversity conservation;
- promote research and access to climate change information; and
- establish collaboration between institutions in charge of agriculture, biodiversity conservation and climate change.

#### *6.4.3.1 Elimination of perverse incentives of climate change*

Some agricultural laws create incentives that increase vulnerability to climate change. In Rwanda, there is no specific agricultural law containing such incentives. However, there are

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<sup>133</sup> Articles 11 & 17 Environmental framework Law; Articles 1 & 3 Biodiversity Law; Article 5 Water Law and Article 21 Forest Law.

some agricultural policies that discourage individuals from adopting practices or behaviors leading to climate change adaptation. These include the rice cultivation policy and the policy on seeds and agrochemicals' subsidies.

The rice policy aims to attain self-sufficiency in rice production in Rwanda, and to be well-positioned to compete on local and regional markets, with significant improvements in quality and value. It establishes different objectives, including expanding the area under rice cultivation through development of new marshlands and diversification of the ecosystems under which rice is grown, and improving the access to and distribution of agricultural inputs, such as seeds and agrochemicals to smallholder rice growers. A ministerial report of 2010 confirmed that rice has become a major food crop in Rwanda with considerable production increases since 2000. This increase is mainly due to a parallel increase in the area under rice cultivation.<sup>134</sup> Though Rwanda has adopted a regulation<sup>135</sup> on the use of wetlands mainly composed of marshlands, the rice cultivation areas were expanded into wetlands and rice farmers have been facilitated with access to agrochemicals, which increases marshland pollution. It is widely recognized that the capacity of a natural resource to sequester carbon and facilitate adaptation to climate change is inherently dependent on its integrity. Wetlands' degradation therefore exacerbates vulnerability to climate change.<sup>136</sup> Some respondents reported that they experience the problem of wetland drainage to expand rice growing area.<sup>137</sup> This has positive impacts of rice production increase but it causes degradation of wetlands' functioning with resultant implications for adaptation to climate change.

With regards to the policy on seeds and agrochemicals' subsidies, to implement the Crop Intensification Programme - aimed at increasing agricultural productivity in high-potential food crops - farmers get fertilisers through vouchers. The vouchers give farmers agrochemicals at a 50% subsidy and they get seeds for free. They are obliged to plant one crop over vast areas using fertilizers and improved seeds. These subsidies encourage increased use of agrochemicals and widespread mono-cropping, which causes pollution and

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<sup>134</sup> MINAGRI *Enabling self-sufficiency and competitiveness of Rwanda rice: Issues and policy options* (2010) 11.

<sup>135</sup> Ministerial Order N° 008/16.01 of 13/10/2010 establishing the list of swamps and their limits and regulating their management and use. It provides for three categories of Rwandan wetlands namely: wetlands that are fully protected (they cannot be exploited), wetlands partially protected (those that can be exploited under certain conditions and after being permitted) and wetlands that are not protected at all (which are fully exploited).

<sup>136</sup> REMA *Atlas of Rwanda's changing environment: Implications for climate change resilience* (2011) 39.

<sup>137</sup> Respondents 1, 3, 9, 18,

undermines crop species' abilities to cope with new pests and diseases. The law has therefore to intervene in order to protect crop and livestock diversity. It can limit the quantity of agrochemicals used in agriculture; the quantity must be fixed at levels that ensure prevention of water and soil pollution and limit greenhouse gas emissions from agriculture.

In addition, subsidies that incentivize farmers to abandon traditional crop and livestock varieties towards modern varieties have to be regulated. As discussed above, traditional varieties are more diverse than modern varieties and require lower quantities of agrochemicals and their diversity assists in adaptation to climate change.<sup>138</sup> Subsidies to modern varieties must be moderated. Moreover, the use of traditional varieties has to be legally encouraged as a priority instead of promoting modern varieties involving the risk of losing traditional ones, as recommended in the CBD.<sup>139</sup> In Rwanda, research participants reported that when they use traditional varieties, they do not receive any particular support.<sup>140</sup> However, the encouragement of their use is urgently needed.

#### *6.4.3.2 Provision of incentives for adaptive behaviors*

The Rwandan Environmental Framework Law states that any activity aiming at controlling soil erosion and drought may receive support from the National Fund for Environment, thus providing indirect legal support for conservation of crop and livestock diversity and adaptation to climate change.<sup>141</sup> However, there are other adaptation practices -beneficial to biodiversity conservation- that farmers should be encouraged to adopt. These include cultivation of a higher diversity of crops, the use and maintenance of traditional crop and livestock varieties, the use of best traditional agricultural practices and associated traditional knowledge, soil and water management and organic farming. The research participants reported that, among these practices, they are encouraged to use improved varieties and practice organic farming which are beneficial to the conservation of crop and livestock diversity. However, research participants reported that they are encouraged in policies but implementation depends on the farmers' will since there is no policy or legal incentive provided to support such practices.<sup>142</sup> This needs to be remedied. Incentives may be in the

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<sup>138</sup> Paragraph 6.3.1.1.

<sup>139</sup> Article 8 (j) CBD.

<sup>140</sup> All research participants.

<sup>141</sup> Article 71 Environmental Framework Law.

<sup>142</sup> Respondent 1, 4, 6, 8, 9, 12, 16, 18.



form of financial rewards or grants to farmers involved in such agricultural practices, facilitation of easy access to loans to such farmers and legal support for the enjoyment of rights associated with knowledge of traditional indigenous crop and livestock varieties and traditional or local agricultural practices that traditional communities may possess. The Rwandan legislation should provide for the basis of granting such rewards or grants and the requirements to be complied with by the farmer in order to qualify for them. It is necessary also to determine the procedure to be followed when applying for the provided rewards or grants and the necessity to report on the progress of activities that constitute the basis of financial rewards or grants. The legislation has to plainly state what will happen if the assisted farmer has not fulfilled his/her promise. The legislation has further to clearly establish easy conditions for access to loans by farmers intending to become involved in such agricultural practices.

#### *6.4.3.3 Legal promotion of research and access to climate change information*

Both the authorities and all citizens must have sound information on climate change to make the right decisions about strategies to take as response measures to climate change. Understanding climate change and its impacts scientifically is of great necessity in order to decide on the best available adaptation strategies, such as the appropriate crop to plant or livestock to rear, when to plant and what management strategies to employ during the growing season.<sup>143</sup> This implies strong legal support of ongoing scientific research.<sup>144</sup> The law has therefore to support research and access to information on climate change by farmers or all individuals involved in agriculture and crop and livestock diversity conservation.

The UNFCCC obliges member countries to strengthen scientific and technical research and systematic observation, which assists in the adoption of measures appropriate to crop and livestock diversity conservation, as discussed in chapter three.<sup>145</sup> The law can support research by authorizing or providing financial support to people engaged in research on measures of agricultural adaptation to climate change, strategies that take into consideration the role of crop and livestock diversity and the necessity for their conservation.

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<sup>143</sup> B Michael Gerrard & Katrina, Fischer Kuh *The Law of adaptation to climate change: US and international aspects* (2012) at 358.

<sup>144</sup> R Uhel and S Isoard 'Regional adaptation to climate change: a european spatial planning challenge' (2008) 25 *infoRegio Panorama* at 12.

<sup>145</sup> Article 4.1 (g) and 5 UNFCCC; See paragraph 3.2.6.2.

The law can also provide for the possibility to reward individuals that have conducted quality research regarding the adaptation of agriculture to climate change and biodiversity conservation, but should establish criteria for rewarding researchers. Moreover, the law can establish the State's, or its entities', obligations regarding such research, thereby encouraging a greater State focus on research.

As far as access to information is concerned, farmers need to have easy access to such information to build their adaptive capacity. To have a strong access to climate change information, the law has to clearly state which institution is in charge of gathering the information and informing the public. The law has to make it an obligation for such institution to spread the information periodically, based on the principle of openness, but allowing for exceptions to protect some justified individuals and the national interests. In addition, the law has to make it a right for all individuals involved in agricultural activities to request any climate change-related information held by any individual or authority who has the obligation to disclose it, unless covered under the exceptions.

In Rwanda, the existing institutional and legal framework informs the structure for environmental data, including climate change data management, data flows and reporting. The Constitution of Rwanda provides for the right to information and also entitles every citizen to a healthy and satisfying environment.<sup>146</sup> The Environmental Framework Law indicates that every person has the right to information on the state of the environment.<sup>147</sup> In addition, the Access to Information Law obliges public organs and some private bodies to release information to the public.<sup>148</sup> Further the Law creating the Rwanda Environment Management Authority (REMA) requires it to undertake research, investigations, studies and other relevant activities in the field of environment and disseminate the findings.<sup>149</sup> This covers the responsibility to gather climate change-related information and its dissemination to the public. However, one of the key challenges to the dissemination and use of climate change-related information in agricultural adaptation is the lack of adequate climate change information available and an efficient means of information dissemination. The respondents revealed that they mostly do not get the accurate climate change information ; the information

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<sup>146</sup> Articles 34 and 49 of the Rwandan Constitution as amended to date.

<sup>147</sup> Article 7 (4) Environmental Framework Law.

<sup>148</sup> Law No 04/2013 of 8 February 2013 relating to Access to Information *O G* n° 10 of 11 March 2013.

<sup>149</sup> Article 3 (5) of the law n°63/2013 of 27/08/2013 determining the mission, organization and functioning of Rwanda Environment Management Authority (REMA) *O G* n° 41 of 14/10/2013.

is only provided during preparation of cropping seasons (not always) and it is not communicated efficiently to the farmers and sometimes it is provided very late.<sup>150</sup> One respondent expressed it in the following terms :

The information on climate change comes from the meteorological department in the Ministry of Infrastructure. However, this information does not reach farmers effectively. In addition, the information given is, most of the time, not accurate and is not provided in details.<sup>151</sup>

Current infrastructure is often not as reliable or powerful, since Rwanda has insufficient and an inadequate number of meteorological stations for climate data collection. However, it is hoped that with the recently acquired radar to be stationed in Bugesera which is believed to have high capacity to predict precipitation and climate-related changes, climate change information consideration and dissemination in Rwanda will improve.<sup>152</sup>

#### *6.4.3.4 Legal promotion of institutional collaboration*

Promoting institutional collaboration is an attempt to encourage consensus and cooperation among the multiple actors. Institutional collaboration in environmental matters tend to abandon the adversarial, command-and-control style of governance embodied in conventional environmental policies, which have left many environmental problems unresolved while at the same time inflaming large amounts of costly legal and administrative conflict.<sup>153</sup>

In this research, collaboration is recommended between institutions in charge of agricultural development, biodiversity conservation and climate change adaptation in Rwanda. Collaboration is needed to integrate crop and livestock diversity conservation and adaptation to climate change into agricultural development programmes or/and integrate diversity conservation and agriculture development into adaptation to climate change programmes. The institutional collaboration may be achieved through a multi-sectoral approach, which implies involvement of the three sectors of biodiversity conservation, agriculture and adaptation to climate change. The importance of applying a multi-sectoral approach is that the three sectors would have cross-cutting issues that they must address in

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<sup>150</sup> Respondents 1, 4, 6, 10, 11.

<sup>151</sup> Respondent 18.

<sup>152</sup> The radar was launched on 30/06/2015.

<sup>153</sup> Mark Lubell 'Collaborative Environmental Institutions: All talk and no action?' (2004) 23 *Journal of Policy Analysis and Management* 3 at 549

cooperative consultations.<sup>154</sup> Collaboration has to be considered during planning, decision-making procedures and implementation of developmental plans as developed by each of the three sectors. In planning, the three sectors have to work hand-in-hand in order to adopt action plans that consider different aspects of crop and livestock diversity conservation, agriculture development and climate change adaptation. This may help to prevent adoption of plans that solve problems on one side while causing other problems on the other side. In decision-making, authorities from the three institutions can draw their conclusions from various knowledge systems and experiences and develop a common understanding and policies that solve problems holistically.<sup>155</sup> In implementation, stakeholders from the three sectors need to consider if their actions will achieve the intended objectives without causing side effects in any one or all of the three sectors concerned in this study.

In Rwanda, the collaboration of institutions in charge of agriculture, biodiversity and climate change matters is not well legally established and performed as discussed in chapter four. Also, the fieldwork data revealed that the collaboration is not much observed in the practice. One respondent expressed it in the following terms :

At the district level, we, workers from the environment and biodiversity sector do not regularly meet with workers from agriculture sector. May be at the highest level, officials from the two sectors meet, but at this level, we do not necessarily and regularly meet.<sup>156</sup>

In Rwanda, agriculture is vested in the Ministry of Agriculture and Animal Resources, while biodiversity conservation and climate change are vested in the powers of REMA- a public institution that operates under the Ministry of Natural Resources. As discussed in chapter four, REMA has the responsibility to establish relationships and cooperate with national and international institutions and organizations and any other bodies that may help it to fulfill its mission.<sup>157</sup> This shows that REMA has the possibility to ensure collaboration with the Ministry of Agriculture, which adopts strategies and policies and initiates programmes for agricultural development and which is involved in the management of crop and livestock species in agricultural activities. However, the law does not indicate the means

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<sup>154</sup> Namanji Stella ‘The multi-sectoral approach to biodiversity conservation for sustainable agro ecosystem’ available at <http://apf-uganda.ning.com/profiles/blogs/the-multisectoral-approach-to-biodiversity-conservation-for>; accessed on 21 November 2013.

<sup>155</sup> Carl Folke et al ‘Adaptive governance of social-ecological systems’ (2005) 30 *Annu. Rev. Environ. Resourc* at 441.

<sup>156</sup> Respondent 5.

<sup>157</sup> Article 3 (11) of the law n°63/2013 of 27/08/2013 determining the mission, organization and functioning of Rwanda Environment Management Authority (REMA) *O G* n° 41 of 14/10/2013.

necessary to facilitate the required institutional collaboration to avoid tensions that may arise and impact crop and livestock diversity. Such tensions may be related, for example, to increased use of agrochemicals, which is likely to increase greenhouse gas emissions and cause decline in crop and livestock diversity; uncontrolled promotion of modern crop and livestock varieties, which may negatively impact crop and livestock diversity; and the uncontrolled introduction of flood or heat tolerant crop and livestock varieties, which may be introduced to adapt to climate change and boost agriculture while contributing at the same time to decline in crop and livestock diversity. It would produce better results if the law requires compulsory and mutual consultations between REMA and other institutions like the Ministry of Agriculture when they wish to decide on issues that are cross-cutting between them. This could help in achieving win-win situations of developing agriculture, conserving crop and livestock diversity and adapting to climate change, thereby reaching the goal of food security, biodiversity conservation and building capacity to adapt to climate change.

## **6.5 CONCLUSION**

This chapter has examined the importance of conserving crop and livestock diversity in agriculture to ensure harmony between agricultural development and biodiversity conservation. It was found that diversity in crops and livestock is beneficial to both the environment and economy. Diversity impacts many ecosystem functions, such as productivity, resistance to invasion, disease prevalence and disability and enhances the ability to adapt to climate change. Diversity in crops and livestock should be conserved to avoid risks that may result in genetic erosion, such as vulnerability to pests and diseases, vulnerability to climate change and other risks. The chapter has found that crop and livestock diversity is not effectively protected under Rwandan law. This hinders adequate adaptation to climate change and effective conservation of biodiversity throughout the agricultural sector. It was argued that, to be sustainable and cope with climate change conditions, any agriculture has to maintain or protect species diversity through adjustment of incentives to crop and livestock diversity conservation, recognition of the role of local communities, promotion of research and access to information, promotion of agricultural practices that are diversity conservation-oriented and promotion of institutional collaboration using, among other things, legal measures.

Having outlined the importance of conserving crop and livestock diversity in agriculture and the legal measures that need to be adopted in Rwandan law, the next chapter discusses the importance of public participation in contributing to the prevention of tensions between biodiversity conservation and agricultural development.

**CHAPTER SEVEN:**  
**PUBLIC PARTICIPATION IN RECONCILING BIODIVERSITY CONSERVATION**  
**AND AGRICULTURAL DEVELOPMENT**

## **7.1 INTRODUCTION**

Biodiversity is a critical aspect of the environment and a public good. The public must be informed about it, participate in any decision-making process that would affect it and, inherently, have access to justice for its protection.<sup>1</sup> This chapter discusses the necessity of public participation in reconciling biodiversity conservation and agricultural development. It examines elements of public participation, the persons included in its process, mechanisms of inclusion and which particular agriculture-biodiversity related issues would require public participation. The special consideration of traditional communities' participation and the necessity of protecting their traditional agricultural and biodiversity-related knowledge is elaborated on and finally different incentives that motivate the public to participate in biodiversity conservation and agriculture are examined.

## **7.2 GENERAL INTRODUCTION TO PUBLIC PARTICIPATION**

Public participation is reflected in principle 10 of the Rio Declaration, which states:

Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available.

Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

This principle was later incorporated in a number of international conventions. As later detailed by the Aarhus Convention, which applies in Europe, public participation has three complementary elements that must be ensured for successful environmental protection:

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<sup>1</sup>Jonathan Poisner "A civic republican perspective on the national environmental policy act's process for citizen participation" (1996) 26 *ENVTL L* 53 at 53.

access to environmental information, public participation in decision-making processes, and access to justice.<sup>2</sup>

### **7.2.1 Importance of public participation in harmonising biodiversity conservation and agricultural development**

The importance of public participation generally lies in the protection of legitimate interests, enforcement of environmental laws, achieving sustainable development and building local capacity. It specifically lies in enhancing sustainable agricultural production and consumption as regards interlinkages between biodiversity conservation and agricultural development.

#### *7.2.1.1 Protection of legitimate interests*

With public participation, the environment, as a major public legitimate interest, is protected,<sup>3</sup> as are the environmental legitimate interests of local communities. A decision-maker cannot be familiar, under all circumstances, with the socio-economic and environmental needs of all community members.<sup>4</sup> He/she needs diversified information from different people to be able to achieve better or sustainable solutions to environmental problems.<sup>5</sup> The public needs to participate to raise local-specific needs and public values and therefore protect their legitimate interests with regards to environmental protection.<sup>6</sup> This covers protection of biodiversity against negative impacts from agricultural development.

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<sup>2</sup> Article 1 of the Aarhus Convention on Access to Information, Public participation in Decision-Making and Access to Justice in environmental matters done at Aarhus, Denmark on 25 June 1998.

<sup>3</sup> Carol Harlow 'Public law and popular justice' 1 (2002) 65 *Modern Law Review* 1 at 14.

<sup>4</sup> A du Plessis 'Public participation, environmental governance and fulfilment of environmental rights' 2 (2008) *PER* 1 at 7.

<sup>5</sup> Jona Razzaque *Participatory rights in natural resources management: the role of communities in South Asia* in Jonas Ebbeson and Phoebe Okowa (ed) *Environmental law and justice in context* (2009) at 119, 127.

<sup>6</sup> A du Plessis op cit note 4 at 12; See also Jona Razzaque op cit note 5 at 118, 120; Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Preamble; Kirsten Mikadze 'Public participation in global environmental governance and the Equator principles: potential and pitfalls' 12 (2012) 13 *German Law Journal* 1386 at 1392; Donald Zillman, Alastair Lucas & George Pring *Human rights in natural resource development: public participation in the development of mining and energy resources* (2002) 22; Nancy Perkins Spyke 'Public participation in environmental decision-making at the new millenium: structuring new spheres of public influence' 2 (1999) 26 *Boston College Environmental Affairs Law review* 263 at 270-271.



### 7.2.1.2 *Strengthening enforcement, compliance and implementation of laws, policies and decisions*

If the public has participated in the formulation of policies and laws and decision-making, it assumes ownership of them and their resulting outcomes.<sup>7</sup> For example, participation in setting agriculture and biodiversity laws and policies or in taking decisions over related issues leads to greater legitimacy and creates a sense of ownership and responsibility. This stimulates thoughtful and smart biodiversity and agriculture-related behavior and strengthens compliance, enforcement and implementation of related laws, policies and decisions.<sup>8</sup>

### 7.2.1.3 *Means of achieving sustainable development and building local capacity*

Sustainable development implies the integration of economic, social and environmental factors that require changes of individual actions towards sustainability.<sup>9</sup> Such changes are possible in case of effective public participation.<sup>10</sup>

For local capacity building, public participation empowers participants through co-generation of knowledge with researchers and increases their capacity to use such knowledge. Participants learn from each other through the development of new relationships and transforming adversarial relationships.<sup>11</sup> Integration of local knowledge with the scientific

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<sup>7</sup> Jona Razzaque op cit note 5 at 118; Ian Kapoor 'Towards participatory environmental management' (2001) 63 *Journal of Environmental Management* 269 at 272.

<sup>8</sup> George Pring & Susan Y Noé 'The emerging international law of public participation affecting global mining, energy, and resources development' in Donald Zillman, Alastair Lucas & George Pring (ed) *Human rights in natural resource development: public participation in the development of mining and energy resources* (2002) 23 ; Jane Holder & Maria Lee *Environmental protection, law and policy* 2 ed. (2009) 96; Ian Kapoor 'Towards participatory environmental management' (2001) 63 *Journal of Environmental Management* 269 at 272; A du Plessis op cit note 4 at 12, 26; Donna Craig & Michael Jeffery *Non-lawyers and legal regimes: Public participation for ecologically sustainable development* in David Leary & Balakrishna Pisupati (ed) *The future of international environmental law* 103 at 110; Kirsten Mikadze op cit note 6 at 1393.

<sup>9</sup> Sally Eden 'Public participation in environmental policy : considering scientific, counter-scientific and non-scientific contributions' 5 (1996) *Public Understand Sci.* 183 at 186.

<sup>10</sup> *The role of communities in environmental decisions: communities speaking for themselves* Available at <http://www.lawteacher.net/environmental-law/essays/role-of-communities-in-environmental-decisions.php#ixzz367Obpuel> (Accessed 15 July 2014).

<sup>11</sup> D J Greenwood, I Harkavy & W F Whyte 'Participatory action research as a process and as a goal' (1993) 46 *Human Relations*; C Okali J Sumberg & J Farrington 'Farmer participatory research — Rhetoric and reality' 3(1994) 51 *Agricultural Systems*; Phil Macnaghten & Michael Jacobs 'Public identification with sustainable development: Investigating cultural barriers to participation' (1996) 7 *Global Environmental Change* Cited in Mark S Reed 'Stakeholder participation for environmental management: A literature review' (2008) 141 *Journal of Biological Conservation* 2417 at 2420; Ian Kapoor op cit note 8 at 271.

knowledge during public participation processes empowers participants,<sup>12</sup> and they attain a sense of belonging towards their community and their environment.<sup>13</sup>

#### *7.2.1.4 Enhancing sustainable agricultural production and consumption*

Public participation contributes to achieving sustainable agricultural production and consumption,<sup>14</sup> since it implies the involvement of concerned actors that intervene in the fields of biodiversity conservation and agriculture, such as businesses, governments, communities, farmers, households and others. Once these different actors are involved in planning, policy and law establishment, decision-making and implementation, they become aware of the problems related to agricultural production and biodiversity conservation. Through participation, these people learn and can be influenced easily towards adopting sustainable agricultural production and consumption behaviours.<sup>15</sup>

Sustainable agricultural production means that present generations have to choose agricultural production practices that maintain the ability to produce agricultural commodities, maintain a decent standard of living for the farmer, and allow future generations of farmers to produce and maintain a decent standard of living in a healthy environment.<sup>16</sup> This implies adoption of agricultural practices that maintain biodiversity, which gives to human beings food security in both the present and in future, and has supported and still supports agriculture development.<sup>17</sup> Sustainable agricultural production

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<sup>12</sup> Julie Ingram 'Are farmers in England equipped to meet the knowledge challenge of sustainable soil management? An analysis of farmer and advisor views' (2008) *86 Journal of Environmental Management* 214 at 216-217; See also David Zillman, Alastair Lucas & George Pring op cit note 6 at 22.

<sup>13</sup> 'The role of communities in environmental decisions: communities speaking for themselves' available at <http://www.lawteacher.net/environmental-law/essays/role-of-communities-in-environmental-decisions.php#ixzz367Obpuel>, accessed on 5 July 2014.

<sup>14</sup> J Newig *Does public participation in environmental decisions lead to improved environmental quality? Towards an analytical framework* (2007) 55.

<sup>15</sup> FAO *Biodiversity for food and agriculture: contributing to food security and sustainability in a changing world:*

Outcomes of an Expert Workshop held by FAO and the Platform on Agrobiodiversity Research (14–16 April 2010, Rome, Italy) (2011) 45 available at [http://www.fao.org/fileadmin/templates/biodiversity\\_paia/PAR-FAO-book\\_lr.pdf](http://www.fao.org/fileadmin/templates/biodiversity_paia/PAR-FAO-book_lr.pdf), accessed on 8 July 2014); Mark S Reed 'Stakeholder participation for environmental management: A literature review' (2008) 141 *Journal of Biological Conservation* 2417 at 2421; B D McIntyre et al 'International assessment of agricultural knowledge, science and technology for development (IAASTD) : synthesis report with executive summary' (2008) at 30 available at [http://apps.unep.org/publications/pmidocuments/-Agriculture%20at%20a%20crossroads%20-%20Synthesis%20report-2009Agriculture\\_at\\_Crossroads\\_Synthesis\\_Report.pdf](http://apps.unep.org/publications/pmidocuments/-Agriculture%20at%20a%20crossroads%20-%20Synthesis%20report-2009Agriculture_at_Crossroads_Synthesis_Report.pdf), accessed on 8 July 2014.

<sup>16</sup> David L Debertin & Angelos Pagoulatos 'Production practices and systems in sustainable agriculture' available at <http://www.uky.edu/~deberti/test/sust.htm>, accessed on 7 July 2014.

<sup>17</sup> [http://en.wikipedia.org/wiki/Biodiversity\\_and\\_food](http://en.wikipedia.org/wiki/Biodiversity_and_food), accessed on 23 September 2011; See paragraph 2.5.1.

also attempts to minimize pollution, wind and water erosion or any other type of biodiversity degradation.<sup>18</sup>

Sustainable agricultural consumption requires adjustments of national economic policies to make sure that agricultural goods and services reflect environmental and biodiversity costs.<sup>19</sup> Consumption of agricultural goods and services is maximised on condition it nurtures biodiversity services and quality of biodiversity resources over time.<sup>20</sup> Therefore, public participation influences sustainable agricultural production and consumption.

## 7.2.2 Who is included? Mechanisms of inclusion and elements of public participation

### 7.2.2.1 Who is included? Mechanisms for inclusion

Knowing which component of the public that must participate and in which ways the participation is to be carried out is crucial to determining the type and impact of public participation.<sup>21</sup> Besides, determination of the participatory methods is critical to avoid meaningless or ineffective participation.

With regards to who can participate, the point of departure is the public. The term ‘public’ is understood as one or more natural or legal persons and their associations, organizations or groups.<sup>22</sup> Not the whole public as defined here should participate; it is the public consisting of a number of people reacting to a perceived interest.<sup>23</sup> It is the part of the population affected by the consequences of environmental decisions and, as such, should be able to effectively influence their outcomes.<sup>24</sup> It may be composed of active and passive

<sup>18</sup> David L Debertin & Angelos Pagoulatos op cit note 16.

<sup>19</sup> Symposium: *Sustainable consumption* (9-20 January 1994) available at <http://www.iisd.ca/consume/oslo004.html>, accessed on 8 July 2014.

<sup>20</sup> E Salim *The challenge of sustainable consumption as seen from the South* In Symposium: *Sustainable consumption* (19-20 January 1994) available at <http://www.iisd.org/susprod/principles.htm> (accessed 8 July 2014).

<sup>21</sup> I Kapoor op cit note 9 at 274.

<sup>22</sup> Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Article 2.4; UNEP Guidelines for the development of national legislation on access to information, public participation and access to justice in environmental matters.

<sup>23</sup> A N Bram ‘Public participation provisions need not contribute to environmental injustice’ (1996) 5 *Temp. Pol. & Civ. Rts. L. Rev* 145 at 149.

<sup>24</sup> *Ibid.*; See Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Article 2.5; UNEP Guidelines for the development of national legislation

stakeholders; it can include the experts and the non-experts in the field concerned.<sup>25</sup> As an example, in deciding upon pollution issues resulting from agricultural activities, the public involved is the category of individuals affected by pollution directly or indirectly, meaning the victims of pollution and the category of people engaged in polluting activities (polluters)<sup>26</sup> such as farmers, traders and consumer of agricultural inputs that cause pollution and traders or consumers of agricultural products produced in polluting ways, the governmental departments intervening in such matters and the surrounding communities.

As regards mechanisms for inclusion, the number and variety of engagement mechanisms are large and growing.<sup>27</sup> Different authors listed different and varied participation mechanisms.<sup>28</sup> National legislation determines the specific mechanisms to use for effective public involvement; mechanisms which may vary depending on the issue to be decided. Although it is difficult to determine the precise number of mechanisms of public participation, they can be classified in three categories from a functional perspective.

The first category comprises mechanisms that perform the function of education and information, such as public meetings, drop-in centers, public publicity on television, newspapers or through other mass-media communication tools, such as radios, internet and so on.<sup>29</sup> The second category comprises mechanisms that perform the function of review and reaction, like public hearings.<sup>30</sup> The last category comprises mechanisms that perform the function of interaction and dialogue, such as workshops, citizens' juries, consensus conferences, task forces and so on.<sup>31</sup> Other participation mechanisms may include lobbying, public advocacy, protests, solicitation of public comments, service on advisory or review boards and so on;<sup>32</sup> the list is not exhaustive. Litigation can also be considered as a form of

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on access to information, public participation and access to justice in environmental matters; See also M S Reed 'Who's in and why? A typology of stakeholder analysis methods for natural resource management' (2009) 90 *Journal of Environmental Management* 1933 at 1934.

<sup>25</sup> S Eden op cit note 13 at 183 -199.

<sup>26</sup> M S Reed op cit note 22 at 1934.

<sup>27</sup> G Rowe & L J Frewer 'A typology of public engagement mechanisms' 2 (2005) 30 *Science, Technology, & Human Values* 251 at 256.

<sup>28</sup> J Rosener 'A cafeteria of techniques and critiques' (1975) *International Journal of Public Sector Management* 16-19 Cited in G Rowe & L J Frewer op cit note 25 at 256; New Economic Foundation *Participation Works!* (1999).

<sup>29</sup> P Wilkinson 'Public participation in environmental management: A case study' (1976) 16 *Natural Resources Journal* 117 at 119; G Rowe & L J Frewer op cit note 25 at 278.

<sup>30</sup> Ibid; M Manju *The sites of new knowledges: citizens' participation in environmental decision-making* available at <http://www.ritimo.org/article948.html> (accessed 22 July 2014).

<sup>31</sup> G Rowe & L J Frewer op cit note 25 at 281; P Wilkinson op cit note 27 at 119.

<sup>32</sup> R Ramlogan *Sustainable development: towards a judicial interpretation* (2011) 163.

participation mechanism of last resort.<sup>33</sup> The above mentioned participatory mechanisms are ideally applied in environmental matters, including interactions between biodiversity conservation and agricultural development.

In Rwanda, as seen in chapter four, the laws allow public participation in environmental protection. Persons with an interest or stake in both the Environmental Impact Assessment (EIA) process and outcomes of the project undergoing EIA are allowed to participate through public hearing.<sup>34</sup> Outside an EIA process, the Rwandan law does not regulate how the public can be involved in decision-making about environmental or biodiversity issues. However, public representation through decision-making processes of decentralized entities, which applies to all matters including biodiversity and agriculture-related matters, is generally applicable as reported by research participants. They said that in meetings that discuss different subjects including those related to biodiversity and agriculture, they are represented by elected leaders of decentralized entities and farmers' cooperatives.<sup>35</sup> However, this method cannot ensure effective participation in environmental/biodiversity decision-making, since the public representatives in decentralized entities may not be those affected by environmental problems or those that can influence environmental/biodiversity decisions. Public hearings and representation through decentralized entities do not fit in all circumstances. There are other mechanisms such as workshops, focus groups, community roundtable dialogue, and others which apply differently in varied circumstances and help to ensure effective public involvement and protection of environment and biodiversity in agriculture like in any other sector. Such mechanisms need to be provided under Rwandan law.

#### *7.2.2.2 Elements of public participation*

##### *Access to environmental information*

Access to environmental information is the first and fundamental element of the three integrative elements of public participation.<sup>36</sup> Without adequate access to information about

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<sup>33</sup> A N Bram op cit note 20 at 154.

<sup>34</sup> Article 9 of the Ministerial Order n° 003/2008 of 15/08/2008 relating to the requirements and procedure for environmental impact assessment.

<sup>35</sup> Respondents 5, 6, 7, 8, 10, 12, 14, 16, 17.

<sup>36</sup> A Postiglione *Global environment governance: The need for an International Environmental Agency and an International Court of the Environment* (2010) at 36.

activities with potential negative impacts on the environment, the concerned individuals cannot engage in the decision-making procedures; they can neither be aware of environmental decisions under consideration nor have all necessary information to contribute meaningfully to a discussion of a proposed project.<sup>37</sup>

In Rwanda, the Environmental Framework Law provides that every person has the right to be informed of the state of the environment as discussed in chapter four.<sup>38</sup> In addition, the Law n° 04/2013 of 08/02/2013 relating to Access to Information gives the right to everyone to access information held by public organs and some private bodies.<sup>39</sup> This law allows respect for confidentiality when publication of the requested information may destabilise the national security, impede the enforcement of law or justice, interfere with individual privacy without being of public interest, violate the legitimate interests of trade secrets or other intellectual property rights or obstruct actual or contemplated legal proceedings against the management of public organ.<sup>40</sup> Information is defined broadly to include environmental information.<sup>41</sup> However, given the technicalities related to environmental information, lack of precise legal definition of environmental information may hinder adequate access to it. The public will typically know only the very minimum that interests them in their daily lives and will not even feel interested in asking environmental information. Currently, many people believe that the Access to Information Law applies to journalists. Besides, the Access to Information Law does not establish remedies available if the organ holding information refuses to provide it. Lack of clear legal specifications on these two issues constitutes a big barrier to access to environmental information and protection of the environment and biodiversity, which is necessary in all sectors including agriculture.

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<sup>37</sup> D Craig & M Jeffery op cit note 10 at 116; J Holder & M Lee op cit note 10 at 101; B Barton 'Underlying concepts and theoretical issues in public participation in resources development' 77 at 157 in D Zillman A Lucas & G R Pring (eds) *Human rights in natural resource development: Public participation in the sustainable development of mining and energy resources* (2002); E Petkova et al. *Closing the gap: Information, participation, and justice in decision-making for the environment* at 1-10 available at <http://www.cepal.org/dmah/noticias/paginas/5/10895/DocWRI.pdf> (accessed 17 July 2014); See also J Razaque 'Human rights to a clean environment: Procedural rights' in M Fitzmaurice D Ong & P Merkouris (eds) *Research handbook on international environmental law* (2010) 284 at 289-292 Cited in K Mikadze op cit note 7 at 1403.

<sup>38</sup> Articles 7(4) and 63 (1).

<sup>39</sup> Article 3, paragraph 1 of the Law n° 04/2013 of 08/02/2013 relating to Access to Information O G n° 10 of 10/03/2013.

<sup>40</sup> Article 4, paragraph 1 Access to Information Law.

<sup>41</sup> Article 2 (1) defines information as facts, thing intended to be done, speeches in reports, documents to be published, pictures, mails, opinions, advices, press releases, circulars, orders, logbooks, contracts, papers, samples and any other material of public interest held by public organs and some private bodies.

*Participation in environmental decision-making*

Once the public has received enough environmental information, its participation in decision-making is vital.<sup>42</sup> The public concerned should have the opportunity to participate in all decision-making phases and throughout the program cycle: from design to implementation to evaluation.<sup>43</sup> The public should be involved as early as possible and have time to submit important comments. The decision-makers then must consider the public comments and once a decision has been made, the public must be informed along with reasons and considerations upon which the decision is based.

Public participation in decision-making mostly applies in the process of an Environmental Impact Assessment (EIA). Public involvement in an EIA constitutes a valuable source of information on key impacts, potential mitigation measures and the identification and selection of alternatives.<sup>44</sup>

In Rwanda, the Constitution obliges all citizens to participate, through work, in the development of the country; to safeguard peace, democracy, social justice and equality and to participate in the defense of the motherland.<sup>45</sup> It also provides that every individual has the right to protect, safeguard and promote the environment.<sup>46</sup> A combination of the two provisions provides a clear constitutional basis for the right to public participation in decision-making. Besides, the Environmental Framework Law provides that every person has the right to take part in the decision-taking strategies aimed at protecting the environment, and has to be represented in decision-making organs on environmental issues as elaborated on in chapter four.<sup>47</sup> Additionally, the Ministerial Order regulating the requirements and procedure for environmental impact assessments provides for the possibility of the public to participate in an EIA procedure through a public hearing when necessary as seen earlier in this chapter.<sup>48</sup> This reflects a big step made by the Rwandan government in ensuring public

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<sup>42</sup> D Banisar et al *Moving from principles to rights: Rio 2012 and ensuring access to information, public participation, and access to justice for everyone* (2011) 2.

<sup>43</sup> I Kapoor op cit note 9 at 274.

<sup>44</sup> M I Ibrahim *The role of public participation in environmental impact assessment: a case study from Egypt* Paper presented at the Conference on impact of large coastal mediterranean cities on marine ecosystems (Alexandria, Egypt 10-12 February 2009).

<sup>45</sup> Article 47.

<sup>46</sup> Article 49.

<sup>47</sup> Articles 7 (4) & 63 (3).

<sup>48</sup> Article 6.

participation in environmental management covering all aspects and sectors including biodiversity and agriculture. However, the research findings revealed that public participation in Rwanda, as regards interactions between agriculture and biodiversity conservation is not effective. The public is involved in a very limited number of situations and there are no efficient mutual discussions between the government officials and local people. Most of the interviewees reported that local communities or their representatives are only called in the meetings during the preparation of cropping seasons. In other periods, they are not adequately involved. In addition, they reported that, most of the time, they are called to be informed about decisions already made. One respondent expressed it clearly as follows :

They only come at the beginning of the cropping season and tell us what we must do according to what they have planned in their performance contracts.<sup>49</sup>

This evidences lack of mutual consultations between government officials and local people. The community representatives do not get time to discuss and raise their concerns, views and priorities. This result from lack of adequate legal provisions that give details on the procedure of the public participation in biodiversity and agriculture-related matters. It is recommended that new legal provisions on the procedure of public participation in environmental or biodiversity management be adopted. Such legal provisions should:

- be clear on when the public is to be involved noting that early participation from planning and designing to decision-making and implementation leads to a success ;
- specify the time provided to the public to give comments, views, priorities and concerns ;
- available remedies in case that time or the whole participation process is not respected ;
- clarify how public comments, views and concerns are considered in decision-making and how it is reported to the public after making the decision ; and
- Extend the list of participatory methods in addition to public hearing and representation through decision-making of decentralised entities.

Further, to participate, the public must be able to influence the decisions. Therefore, new legal provisions should provide for the possibility to educate or train the public if the decision to make is highly complex like biodiversity conservation and agriculture interrelated issues.

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<sup>49</sup> Respondent 6.



### *Access to justice*

Access to justice is the third element of public participation.<sup>50</sup> It facilitates the public's ability to enforce their right to participate, to be informed, and to hold regulators and destroyers accountable for environmental harm.<sup>51</sup> Access to justice focuses on one or more of three distinct adjudication possibilities: to challenge the refusal of access to environmental information, to seek the prevention of and/or damages for environmentally harmful activities, and to enforce environmental laws directly.<sup>52</sup> In access to justice, three elements must be considered: standing, which determines who has rights to go to court; the resources necessary to bring an action; and the remedies to be provided.<sup>53</sup> For effective access to justice, the public must be informed about the procedures used in courts of law and any other relevant bodies in relation to environmental issues; and decisions taken by courts or such other relevant bodies must be publicly available and should be timeously and effectively enforced.<sup>54</sup>

In Rwanda, the right to access to justice in environmental matters is still problematic, as the right to file a case before court is based on a personal injury suffered by the victim.<sup>55</sup> Rwandan judicial law does not recognize the right to go to court in case of damage caused to the public at large, and most of the time, environmental damages and damages to biodiversity are of public concern; it is often difficult to prove personal injury by way of damages to biodiversity. For instance, how can one prove personal injury in case of lake or river pollution resulting from agrochemicals run-offs?

### **7.2.3 Biodiversity conservation and agriculture-related matters requiring public participation**

There are some agricultural issues that affect biodiversity conservation and which can be effectively handled, using public participation.

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<sup>50</sup> J Holder & M Lee op cit note 10 at 114.

<sup>51</sup> J Razzaque op cit note 5 at 120; D Banisar et al. op cit note 38 at 2.

<sup>52</sup> G R Pring & S Y Noé op cit note 8 at 44.

<sup>53</sup> J Holder & M Lee op cit note 10 at 116.

<sup>54</sup> Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice, Article 9.4-5; UNEP guidelines for the development of national legislation on access to information, public participation and access to justice in environmental matters, Guideline 22-24.

<sup>55</sup> Article 2 and 3 of the Law n° 21/2012 of 14/06/2012 relating to the Civil, Commercial, Labour and Administrative Procedure *O G* n° 29 of 16/07/2012.

### 7.2.3.1 Introduction of new plant and animal species and agrochemicals

Introductions of new plant and animal species and agrochemicals for agricultural purposes are reported to be the major sources of biodiversity degradation. Introduction of new plant and animal species is the major source of new invasive and alien species and accompanying new diseases or pests which threaten biodiversity and human health.<sup>56</sup> Also, introduction of the agrochemicals is a source of biodiversity loss due to their capacity to cause water and soil pollution with the potential to reach the food chain with resultant human health risks.<sup>57</sup> It is argued that public participation constitutes an important tool that can help to minimize all these impacts. It can help to prevent, conduct early detection, rapid response to new alien and invasive species and control and management of existing ones, and can help to empower the public to manage and use agrochemicals sustainably; which benefits biodiversity.<sup>58</sup>

The concerned public must have the opportunity to comment and raise its concerns, because it must raise its voices in all matters that affect its livelihood. Introduction of new plant and animal species and agrochemicals affect the concerned public's livelihoods and biodiversity in the following ways:

- new introduced species can come with new pests without their natural enemies, and therefore can become invasive in their new homes;
- they can damage the new habitats;
- consumers may resist agricultural products they believe to have been produced in ways that negatively impact biodiversity and products that are risky (Genetically Modified Products);
- increased production costs associated with the control of pests and diseases introduced with new plants and animals and the use of agrochemicals affect the public;

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<sup>56</sup> S Simons & M De Poorter *Best practices in pre-import risk screening for species of live animals in international trade: Proceedings of an Expert Workshop on Preventing Biological Invasions* (2008) at 6-8; OIE 'Improving wildlife surveillance for its protection while protecting us from the diseases it transmits' (Editorials from the Director General, 16 October 2008) available at <http://www.oie.int/for-the-media/editorials/detail/article/improving-wildlife-surveillance-for-its-protection-while-protecting-us-from-the-diseases-it-transmit/> (accessed 28 July 2014).

<sup>57</sup> See paragraph 1.1.1.

<sup>58</sup> British Columbia Ministry of Agriculture, Food and Fisheries *Invasive alien species: no rest from new pests* available at <http://www.agf.gov.bc.ca/cropprot/ias.pdf> (accessed 28 July 2014); E Dowdeswell 'A case study in innovative environmental governance' in C Bruch (ed) *The New 'Public': The globalization of public participation* (2002) 81-94 at 89.

- the public is concerned with the issue of intellectual property rights;
- the necessity to recognize biodiversity through voluntary or mandatory green labelling; and
- introduced agrochemicals cause pollution, and so on.<sup>59</sup>

Where the concerned public has participated in policy-making and decision-making regarding introductions of agrochemicals and new plants and animals, including GMOs, it is enabled to participate in the management of the risks that may result from such introductions. Public participation can also lead to the reduction of agrochemicals' use; easy adoption of safe and environmentally sound use practices and hence conservation and protection of biodiversity in agricultural activities.

In the case of GMOs, public participation serves as a legal tool for realizing the potential and avoiding the risks of modern biotechnology. It may be applied at the level of policy-making and regulatory decision-making processes. It then helps decision-makers to get the best information and be able to evaluate the benefits and risks that GMOs may present and it can ensure transparency and accountability in decision-making.

Although it is debatable how much the concerned public can contribute to policy-making and decision-making on the introduction or importation of new plants and animals, especially in case of GMOs (a highly technical and science-based concept), it is argued that the public cannot be excluded. The public has some advantageous information and it is affected by the decision or is requested to implement related policies, laws and decisions. Therefore, it should be encouraged to participate. Successful participation depends on adequate information provision and communication, as well as the use of appropriate participatory mechanisms.<sup>60</sup> Communication with the concerned public must be done through understandable and appropriate formats in order for it to have access to unbiased and comprehensible information on the nature and consequences of new introduced species. In

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<sup>59</sup> R Black & I Kireeva 'International biosecurity framework to protect biodiversity with emphasis on science and risk assessment' in S Lockie & D Carpenter (ed) *Agriculture, biodiversity and markets: Livelihoods and agro-ecology in comparative perspective* (2010) 77-98 at 91.

<sup>60</sup> FAO *Summary document of the FAO e-mail conference: 'Public participation in decision-making regarding GMOs in developing countries: How to effectively involve rural people'* (2005) available at <http://www.fao.org/biotech/logs/C12/summary.htm> (accessed 30 November 2011).

addition, the participatory mechanisms should be effective to consider every segment of the concerned public, including rural people, traditional or local communities and women.<sup>61</sup>

Public participation with regards to introduction of new plant and animal species, including GMOs and introduction of agrochemicals is recognized in international environmental conventions, such as the Convention on Biological Diversity,<sup>62</sup> the Cartagena Biosafety Protocol,<sup>63</sup> and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA),<sup>64</sup> the Rotterdam Convention,<sup>65</sup> and the Stockholm Convention,<sup>66</sup> discussed under chapter three.<sup>67</sup>

In Rwanda, as discussed in chapter four, the Environmental Framework Law provides that the introduction and importation of any animal or any plant of any species in Rwanda is subject to special rules.<sup>68</sup> Also, the Biodiversity Law states that introductions of alien and invasive species or organisms and genetically modified organisms are subject to obtaining prior permission.<sup>69</sup> In addition, the Seed Law subjects imported seeds to specific controls.<sup>70</sup> These provisions reflect a step made to ensure control of introduction and importation of new plant and animal species for agricultural and other purposes to avoid threats to biodiversity. However, it is not clear if the public is allowed to participate in decision-making related to such introductions since the laws are silent on this issue. In addition, the Agrochemicals Law requires registration and authorization before introducing any new agrochemical in Rwanda. The Ozone Depleting Substances Regulation requires authorization before importing ozone depleting substances, which include pesticides, rodenticides, fungicides and herbicides. However, these laws are silent about how the public can participate in the authorization processes. All this shows limited proper public participation in relation to introduction of new plant and animal species, including GMOs and agrochemicals, intended for agriculture and this is a challenge in biodiversity conservation. Respondents reported that they are mostly called to participate through representation of elected leaders of decentralised entities

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<sup>61</sup> Ibid.

<sup>62</sup> Articles 8 (j) & 14.1(a) CBD.

<sup>63</sup> Article 23 Cartagena Biosafety Protocol.

<sup>64</sup> Article 9.2 (c) ITPGRFA.

<sup>65</sup> Article 15 Rotterdam Convention; Paragraph 3.2.4.2.2.

<sup>66</sup> Article 10 Stockholm Convention; Paragraph 3.2.5.2.3.

<sup>67</sup> Paragraphs 3.2.1 and 3.2.2.

<sup>68</sup> Article 20 Environmental Framework Law; Paragraph 4.2.2.4.

<sup>69</sup> Article 18 and 24 Biodiversity Law; Paragraph 4.2.3.5.

<sup>70</sup> Article 10 Seed Law; Paragraph 4.2.8.1.

and farmers' cooperatives during preparation of cropping seasons. Here they discuss on how agricultural activities will be conducted during concerned cropping season. They really do not participate in planning, they intervene in implementation of what was planned before.<sup>71</sup> This leads to ineffective integration of biodiversity conservation into agricultural activities.

The law should establish clear guidance on public participation which should first be invoked in planning for introduction of new crop and livestock varieties and agrochemicals. At this stage, representatives of different concerned groups of biodiversity conservationists, farmers and agriculturalists must be represented so that their needs, views, concerns and priorities be raised during discussions held at this level. It is in planning discussions that benefits and risks of introducing new species and agrochemicals should be explained, debated and decisions be made in consideration of public comments and views. Public participation should also be invoked in some types of authorisations and environmental impacts assessments or risk assessment in relation to introductions of new species and agrochemicals.

#### *7.2.3.2 The use of soil, water and genetic resources*

The involvement of the public in the management of soil, water and genetic resources helps to ensure their sustainable use and management<sup>72</sup> as an involved public is likely to take better decisions leading to sustainability.<sup>73</sup> In respect of all these three biodiversity components, the public is affected, being both perpetrators and victims of degradation of these resources. Unsustainable agricultural practices degrade soil, water and genetic resources but the public also has the responsibility to contribute to the conservation of such biodiversity components.<sup>74</sup> Therefore, it needs to participate in any soil, water or genetic resources-related planning, policy and law formulation, implementation and decision-making on related matters. The public needs to:

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<sup>71</sup> This was revealed by the interview with respondent 6.

<sup>72</sup> G Ozerol 'Institutions of farmer participation and environmental sustainability: a multi-level analysis from irrigation management in Harran Plain, Turkey' 1 (2013) 7 *International Journal of the Commons* 73 at 74, 81.

<sup>73</sup> S Hophmayer-Tokich *Public participation under the EU Water Framework Directive – processes and possible outcomes: A preparatory paper for NOLIMP workshop on public participation and cost-effectiveness analysis* at 3.

<sup>74</sup> As discussed under chapter five (paragraph 5.2.2), such practices include unsustainable use of agrochemicals, specialization of production systems, overgrazing intensification, abandonment of mixed cropping systems, reduction in number of used species, conversion of natural ecosystems like wetlands for agriculture and so on.

- be informed about ecological conditions and the state of the soil, quantity or quality of water and genetic resources and the impacts of agricultural practices on these three resources;<sup>75</sup>
- be informed about sustainable techniques of soil, water and genetic resources management in agriculture;<sup>76</sup>
- be consulted timeously; and
- have opportunity to raise concerns, values and priorities related to interactions between agriculture and soil, water or genetic resources' management.<sup>77</sup>

All this leads to adoption of sustainable agricultural practices which conserve soil, water genetic resources and aquatic ecosystems in agriculture, with inherent positive impacts on biodiversity and on the feeding of future generations.<sup>78</sup> Public involvement is consequently necessary to foster better decisions and social acceptance and it should always be incorporated in soil, water or genetic resources laws as examined in chapter five.<sup>79</sup>

In international law, the general provisions on public participation found in some international environmental law instruments regulate public participation as regards the use of soil, water and genetic resources in agriculture as discussed in chapter three. The CBD calls for public participation in assessment of projects and programs affecting biodiversity including those related to agricultural use of soil, water and genetic resources.<sup>80</sup> The ITPGRFA requires protection of farmers' rights, including the right to participate in decision-making on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.<sup>81</sup> The UNCCD calls for public participation in efforts to combat desertification and mitigate the effects of drought, which applies to efforts of managing soil, water and genetic resources in agriculture with the purpose of combating desertification.<sup>82</sup> The Rotterdam Convention calls for public participation in chemical handling and accident

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<sup>75</sup> See more details in paragraph 5.3.2; E D Ongley *Control of water pollution from agriculture* (1996) *FAO Irrigation and Drainage Paper 55* available at <http://www.fao.org/docrep/W2598E/w2598e04.htm#non%20point%20source%20pollution%20defined> (accessed 7 December 2012).

<sup>76</sup> Principle 10 Rio Declaration; See also I Hannam & B Bower *Drafting legislation for sustainable use of soils: a guide* (2004) *IUCN Environmental Policy and Law Paper No. 52* at 25.

<sup>77</sup> See further details in paragraph 5.2.1; H Hans 'Current international actions for furthering the sustainable use of soils' (2002) 61 *Sumposium paper no. 1855* at 1.

<sup>78</sup> *Ibid.*

<sup>79</sup> S Hophmayer-Tokich *op cit* note 83 at 3-4; See paragraph 5.2.4.2.

<sup>80</sup> Article 13 and 14 CBD.

<sup>81</sup> Article 9.2(c) ITPGRFA.

<sup>82</sup> Article 5 (d) UNCCD.

management.<sup>83</sup> Lastly, the Stockholm Convention calls for public awareness and education about effects of persistent organic pollutants and the available safe alternatives.

Agrochemicals that are among POPs degrade soil, water and genetic resources. Although this provision does not call for participation in decision-making, education and awareness constitute the basis for public involvement and adoption of more sustainable agricultural management or use of POPs with inherent positive impacts on biodiversity.

In Rwanda, public participation with regards to the use of soil, water and genetic resources is limited. The provisions of the Environmental Framework Law and those of the Ministerial Order n° 003/2008 of 15/08/2008 relating to the requirements and procedure for EIA discussed in chapter four, which provide for public participation in the protection of the environment apply to the use of the three components of biodiversity and are supplemented by some provisions regulating the use of water.<sup>84</sup>

As regards the use of soil and genetic resources, apart from the general provisions of the Environmental Framework Law and the Ministerial Order n°003/2008 of 15/08/2008, there is no other legislation that gives clear indication on public participation in matters related to their use and management. It is unclear whether the public can participate in planning, establishing policies and laws on soil or genetic resources' use in agriculture and there is no specific procedure of how the public must be involved in related decision-making.

As regards the use of water, in addition to the provisions of the Environmental Framework Law and the Ministerial Order n°003/2008 of 15/08/2008, the Water Law provides for the creation of a national water consultative commission and the hydrographic basin committees at different levels. The latter intervene in the management of water resources, as discussed under chapter four.<sup>85</sup> The composition of such commission and committees expresses recognition of public participation. The hydrographic committees comprise different people from different sectors, like State administration, departments in charge of water, agriculture and animal resources, land, urbanization, urban development, forest, environment and natural resources, representatives of women, youth, farmers,

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<sup>83</sup> Article 15 Rotterdam Convention.

<sup>84</sup> Articles 7 (4) and 63 Environmental Framework Law and Article 9 of the Ministerial Order n° 003/2008 of 15/08/2008. More details are provided under paragraph 4.2.2.3.

<sup>85</sup> Paragraph 4.2.5.

agricultural and domestic water users, non-governmental organizations operating in the domain of water and representatives of the private sector,<sup>86</sup> all of whom can provide different inputs in the management and use of water. In case they discuss issues related to water use in agriculture, biodiversity issues can be raised and sectors likely to be affected are represented.

The laws governing soil and genetic resources need to be revised to integrate public participation of the people from agriculture and biodiversity conservation sectors.

### 7.2.3.3 Considerations of climate change adaptation

Climate change adaptation issues in the biodiversity and agricultural sectors need to be subject to public participation because conservation of diversity in crop and livestock species -which contributes to climate change adaptation in agriculture- mainly relies on *in-situ* conservation practiced by the public; mainly farming communities. The involvement of communities or the public is necessary to build resilience to climate change events.

Communities must become aware, not only that they could be facing problems from climate change in their daily lives, but also that, by participating in the development of adaptation strategies, they can play a part in the solution to these problems. There must be connection of actions necessary for climate change adaptation to people's needs, concerns and priorities and that is where public participation comes in.<sup>87</sup> As most adaptive actions tend to be context- and place- specific, requiring a knowledge-base, tailored to local settings, public involvement is necessary.<sup>88</sup> Given the highly technical nature of climate change issues, related information should be translated into more simple and less technical language for the public to be able to participate effectively.

Under international law, the UNFCCC obliges country parties to promote education, training and public awareness related to climate change itself and its effects, and encourages the widest participation in adaptation processes.<sup>89</sup> This implies incorporation of public

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<sup>86</sup> The water consultative commission is established by the Prime Minister's Order n°143/03 of 24/05/2013 which determines its organization, functioning and composition. Hydrographic basin committees are established by the Ministerial Order n°005/16.01 of 24/05/2013 determining the organization and functioning of hydrographic basin committees at the District and Sector level *O G* n° Special of 30/05/2013

<sup>87</sup> A N Holstein *Participation in climate change adaptation* 2 (2010) GRaBS Expert Paper at 4.

<sup>88</sup> R Few K Brown & E L Tompkins 'Public participation and climate change adaptation: avoiding the illusion of inclusion' 1 (2007) 7 *Climate Policy* 46 at 47.

<sup>89</sup> Articles 4 (i) and 6 UNFCCC.



participation in different initiatives aiming at adaptation to climate change in the area of agriculture and biodiversity conservation. In this connection, the Fifth Assessment Report of the Intergovernmental Panel on Climate Change asserts that public participation is one of the important mechanisms to undertake and inform adaptation planning and implementation.<sup>90</sup> The CBD also calls for public participation in activities aiming at conserving biodiversity in general to include all initiatives related to adaptation to climate change to safeguard biodiversity.<sup>91</sup>

In Rwanda, public participation related to climate change adaptation issues is governed by the general provisions of the Environmental Framework Law and the Ministerial Order n°003/2008 of 15/08/2008 on EIA like all other environmental issues. The participation of the public in climate change adaptation is therefore not clearly developed.

To achieve effective public participation in biodiversity and agricultural development related matters, it is necessary to recognize participation of all categories of people and recognise all forms of knowledge, including traditional knowledge.

### **7.3 RECOGNITION OF TRADITIONAL AGRICULTURAL KNOWLEDGE AS A MEANS OF PUBLIC PARTICIPATION IN BIODIVERSITY CONSERVATION AND AGRICULTURAL DEVELOPMENT MATTERS**

Traditional knowledge is defined as the totality of all knowledge and practice, whether explicit or implicit, used in the management of socio-economic and ecological facets of life; knowledge held by members of a distinct society and sometimes acquired by means of inquiry particular to that society and related to the culture itself or the local environment in which they live.<sup>92</sup> It also means ideas developed by traditional communities and indigenous peoples, in a traditional and informal way, as a response to the needs imposed by their physical environments and that serve as a means of cultural identification.<sup>93</sup> Traditional knowledge is dynamic and changes over time as the needs of the local people change.

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<sup>90</sup> IPCC *Climate change 2014: Impacts, adaptation, and vulnerability* (2014) at 878.

<sup>91</sup> Articles 13 and 14 CBD.

<sup>92</sup> Joseph M Wekundah 'Why protect traditional knowledge?' *African Technology Policy Studies Network Biotechnology Trust Africa Special Paper Series No. 44* (2012) at 8.

<sup>93</sup> N P de Carvalho 'From the Shaman's hut to the patent office: A road under construction' in C Mcmanis (ed) *Biodiversity & the law: Intellectual property, biotechnology & traditional knowledge* (2012) 241 at 243.

### 7.3.1 Traditional knowledge and conservation of biodiversity

It is acknowledged that traditional knowledge constitutes a repository of alternative choices that keep biological diversity growing in a healthy way.<sup>94</sup> Traditional communities have cared for, conserved and used both plants and animals. They have improved the value of plant genetic resources through continuous selection of the best adapted varieties and have accumulated, observed, selected, multiplied, traded and kept variant plant and animal varieties.<sup>95</sup> Traditional communities have crucial information on the role that species play in ecologically sustainable systems,<sup>96</sup> and on the behavior of complex ecological systems, which have provided to them a diversity of natural resources for many decades. They therefore acknowledge that biodiversity supports different ecological services, discussed in chapter two and were even motivated to restore biodiversity in degraded ecosystems.<sup>97</sup> For that purpose, they developed specific practices on conservation and enhancement of biodiversity.<sup>98</sup> Because of knowledge of the environments in which they live, traditional communities can identify the causes of plants and animals' extinction, causes of degradation of land, water and ecosystems and they try to look for solutions to such problems through their first-hand experience learnt by 'trial and error'.<sup>99</sup> Such solutions cannot therefore be overlooked, because they have been used for many centuries and generated good results. Traditional knowledge should therefore be considered, conserved and protected to in turn conserve biodiversity. Conditions that enable traditional communities that nurtured biodiversity to continue doing so should be secured.<sup>100</sup> This requires, among other things, that traditional communities holding such knowledge should participate in all initiatives of biodiversity conservation.

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<sup>94</sup> V D Nazarea 'Local knowledge and memory in biodiversity conservation' (2006) 35 *Annu. Rev. Anthropol* 317 at 318.

<sup>95</sup> J M Wekundah op cit note 108 at 11.

<sup>96</sup> M Gadgil F Berkes & C Folko op cit note 112 at 156.

<sup>97</sup> See paragraph 2.5.

<sup>98</sup> M Gadgil F Berkes & C Folko op cit note 112 at 151.

<sup>99</sup> S Eden op cit note 13 at 192; R J Coombe 'The recognition of indigenous Peoples' and community traditional knowledge in international law' (2002) 14 *St. Thomas Law Review* 275 at 279.

<sup>100</sup> R J Coombe op cit note 120 at 279.

### 7.3.2 Traditional agricultural knowledge and biodiversity conservation

Traditional communities of farmers depend on their practices of using and conserving wild and domesticated plants and animals, soil, water and ecosystems.<sup>101</sup> As examples, resource-poor farmers breed local crop varieties for improved production using informal innovation systems based on traditional knowledge by using mostly their own taxonomy, encouraging introgression, selecting, hybridizing, field testing recording data and naming their varieties.<sup>102</sup> In addition, traditional communities have knowledge of soil types, pests, pathogens, rainfall and temperature patterns, crop genotypes, irrigation techniques, soil amendments, planting patterns, and pest and weed control and so on.<sup>103</sup> They have knowledge of the practice of rotation, which contributes to biodiversity conservation as an indirect effect of maintaining the general productivity of the habitat.<sup>104</sup> Further, traditional farmers hold knowledge of methods that maintain soil fertility, prevent the loss of topsoil, hold water in the soil and produce stable harvests. Such methods are characterized by a high degree of biodiversity. Moreover, they have knowledge of the use of multi-cropping, which facilitates pest control, provides shade and windbreaks, and reduces erosion, contributing consequently to biodiversity conservation. It is necessary to integrate the knowledge about these best traditional practices in different agricultural initiatives for biodiversity conservation.

In Rwanda, the majority of respondents reported the existence of some traditional agricultural knowledge that help in achieving both biodiversity conservation and agricultural production. These include traditional ways of conserveing the soil through shifting cultivation and the use of organic manure, hand pruning of diseased plant parts to fight against crop diseases, multicropping, the use of natural plants in treating their livestock's diseases, the use of natural positive selection to select seeds or breeds for future use and others.<sup>105</sup> However, the respondents revealed that some of these traditional agricultural practices like shifting cultivation, which are beneficial to biodiversity conservation and whose knowledge must be recognised, cannot be applied today due to the population growth on a

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<sup>101</sup> D M Warren *Indigenous knowledge, biodiversity conservation and development: Keynote address at the International Conference on Conservation of biodiversity in Africa: Local initiatives and institutional roles* (30 August-03 September 1992).

<sup>102</sup> Ibid.

<sup>103</sup> S B Brush 'The demise of 'Common heritage' and protection for traditional agricultural knowledge' in (Charles C McManis (ed) *Biodiversity & the law* (2012) 297 at 302.

<sup>104</sup> M Gadgil F Berkes & C Folko op cit note 112 at 153-154. Rotation consists of periodical resting of the land or a certain ecosystem used in crop farming, grazing or fishing for a certain period.

<sup>105</sup> Respondents 1, 6, 7, 8, 12, 16, 17, 18.

limited land resource.<sup>106</sup> If this is difficult to use today, the knowledge about the rest of the traditional agricultural practices that are biodiversity friendly has to be integrated and conserved through involvement of rwandan farmers holders. However, the research participants reported that their conservation is encouraged in policy but the implementation is not effective.<sup>107</sup> This results, among other factors, from lack of enforceable legislation.

Traditional agricultural knowledge can lead to sustainable agriculture and assist in establishment of *in-situ* agro biodiversity conservation measures because traditional farmers have relied on agro biodiversity and have their own way of nurturing it for the benefit of future generations. Therefore, traditional agro biodiversity measures can constitute the basis for establishment of today's *in-situ* conservation measures of biodiversity found in agro-ecosystems.<sup>108</sup>

Conservation of traditional agricultural knowledge is recognized by international environmental conventions canvassed in chapter three such as the CBD, ITPGRFA and the African Convention on the Conservation of Nature and Natural resources. It is recognised as being important in biodiversity conservation.<sup>109</sup>

In Rwanda, traditional knowledge in general, including traditional agricultural knowledge that contributes to conservation of biodiversity, is protected in a very limited fashion. The Biodiversity Law provides that, before granting a permit for bioprospecting and export of indigenous biological resources, consideration shall be given to traditional uses of the indigenous biological resources and knowledge of or discoveries about the indigenous biological resources.<sup>110</sup> This means that before permitting any research, collection and utilization of biological and genetic resources, the traditional agricultural knowledge held by local communities should be considered; and this implies their involvement. In addition, the Rwandan Intellectual Property Protection Law states that the protection of discovery of plants, genetic resources, traditional knowledge and folklore is granted by a related special law, which is not yet in place.<sup>111</sup> It is very clear that traditional agricultural knowledge is not

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<sup>106</sup> Respondent 6.

<sup>107</sup> Respondent 9.

<sup>108</sup> J M Wekundah op cit note 108 at 12; R J Coombe op cit note 120 at 279.

<sup>109</sup> Article 8(j) CBD, Article 9 ITPGRFA and Article XVII African Convention on Conservation of Nature.

<sup>110</sup> Article 28 Biodiversity Law.

<sup>111</sup> Article 289 Intellectual Property Protection Law.

fully protected by the Rwandan legal framework, which negatively affects biodiversity. This needs to be fixed.

Beyond the use of provisions on access to information, participation in decision-making, access to justice, recognition and protection of traditional knowledge, it is necessary to have incentive mechanisms that can encourage public participation and ensure biodiversity conservation in agricultural development.

## **7.4 INCENTIVES FOR PUBLIC PARTICIPATION IN BIODIVERSITY CONSERVATION AND AGRICULTURAL DEVELOPMENT**

### **7.4.1 Economic incentives (and disincentives)**

Two categories of economic incentives that can be applied to motivate farmers to contribute to biodiversity conservation in their daily farming activities are discussed: rewarding farmers' efforts to conserve biodiversity and setting the prices of agricultural products produced in biodiversity-friendly ways.

#### *7.4.1.1 Rewarding farmers' efforts of biodiversity conservation*

Farming communities apply different practices that provide biodiversity conservation services and which should be economically supported. Some farmers refrain from using some areas to conserve biodiversity. Such areas can be purchased or put under concessions by governments, organisations or private individual conservationists who pay farmers to keep them out of production or reduce agricultural activities in such areas. However, this method is expensive.<sup>112</sup> Also some farmers conduct sustainable agricultural activities and manage their lands in biodiversity friendly ways. They can be paid for adopting best practices such as conservation tillage, non-till cropping, organic agriculture, agroforestry, extensive grazing systems, maintenance of crop and livestock diversity, and restoration of degraded agricultural

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<sup>112</sup> S J Scherr J C Milder & S Shames 'Paying for biodiversity conservation in agricultural landscapes' in S Lockie & D Carpenter (ed) *Agriculture, biodiversity and markets: Livelihoods and agroecology in comparative perspective* (2010) 229 at 235 & 238; See also R Rice 'Conservation concessions: Concept description' Paper presented to the Fifth World Parks Congress held in Durban-South Africa (September 2003) available at <http://www2.gsu.edu/~wwwcec/special/RichardRiceConcessionDescription.pdf> (accessed 13 August 2014).

lands.<sup>113</sup> This can be done through subsidies or grants paid to encourage farmers to produce more goods and conserve biodiversity.<sup>114</sup> Additionally, farmers conduct practices that provide other ecosystem services, either incidentally or intentionally like planting trees, increasing soil organic matter, adopting agro forestry systems and eschewing the burning of forests and crop residues.<sup>115</sup> The latter may aim at other ecosystem services like carbon storage, watershed services, landscape beauty, salinity and pest control services, which have biodiversity conservation co-benefits.<sup>116</sup> They should therefore be paid for their efforts.

Farmers benefit from these different payments. They get additional sources of income which support them financially on the path towards sustainable agriculture and provide other biodiversity conservation benefits, such as restoration of native vegetation, which combats landslides, soil erosion and so on.<sup>117</sup> However, there are some constraints in the use of rewards to farmers' efforts to conserve biodiversity. Rewards may cause reduction of food production.<sup>118</sup> It is also difficult to value biodiversity and establish a payment tariff because the nature of biodiversity itself is complex (how can one measure a pest control service for example?). In addition, transaction costs between farmers and buyers are high. Besides, sometimes a farmer's ability to provide biodiversity conservation services depends on their neighbors' land use and management. Further, lack of accessible information about potential buyers and sellers, business models and prices complicates the use of rewards.<sup>119</sup>

Compensating farmers for their biodiversity conservation efforts needs to go in parallel with discouraging farmers involved in biodiversity degradation. This can be achieved through the application of taxes and charges. As examples, taxes on agrochemicals can discourage their excessive use and reduce their polluting effects on biodiversity. Water

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<sup>113</sup> Ibid.

<sup>114</sup> I Bräuer *et al.* *The use of market incentives to preserve biodiversity* (2006) at 32.

<sup>115</sup> S J Scherr J C Milder & S Shames *op cit* note 113 at 235.

<sup>116</sup> Smith *et al* 'Agriculture' In *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (B Metz *et al* ed.) (2007); See also R Lal 'Carbon Sequestration' 1492(2008); 363 *Philosophical Transactions of the Royal Society B: Biological Sciences*; See again S J Scherr Jeffrey C. Milder & S Shames *op cit* note 113 at 239.

<sup>117</sup> S Milder & Inbar 'Paying farmers for stewardship' in (S J Scherr and J A McNeely (ed) *Farming with Nature: The science and practice of ecoagriculture*) (2007); See also Sara J Scherr Jeffrey C Milder & S Shames 'op cit note 113 at 240.

<sup>118</sup> S J Scherr Jeffrey C Milder & S Shames *op cit* note 113 at 241.

<sup>119</sup> Ibid at 242-243; See also S Milder & Inbar *op cit* note 146; C Bracer *Organization and governance for fostering pro-poor compensation for environmental services: CES scoping study* Issue ICRAF Working Paper no. 39 (2007) at 27.

charges for water withdrawal in agricultural activities can also reduce the mismanagement of water resources, and so on.<sup>120</sup>

#### 7.4.1.2 Consideration of biodiversity value in market prices

Consideration of biodiversity value in market prices helps achieve conservation goals at lower costs and promotes productivity and innovation.<sup>121</sup> Biodiversity value can be considered in market prices with the use of eco-labeling and provision of information.<sup>122</sup> With eco-labeling, for example, consumers may prefer to buy the agricultural commodities produced in biodiversity friendly ways or in respect of certain environmental standards. This can motivate farmers to apply such methods if commodities produced in such ways are valued on the market. However, the success of eco-labeling depends highly on consumers' choices, which in turn depend on consumers' awareness, education and access to information. This implies that the producers are responsible to give clear and understandable information on relationships between production methods and biodiversity conservation. Commercial laws can assist in the establishment of prices that capture the value of biodiversity.

Under international law, the CBD requires parties to adopt economic and other socially sound measures that act as incentives for sustainable use of biodiversity,<sup>123</sup> which include measures of rewarding farmers' efforts to conserve biodiversity and consideration of the value of biodiversity in market prices.

In Rwanda, the use of incentives in biodiversity conservation is not adequately regulated. The Environmental Framework Law provides that people who conduct activities that conserve the environment, like soil erosion and drought control, pollution prevention and afforestation, may receive grants from the National Fund for Environment as discussed in

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<sup>120</sup> I Dickie & G Tucker *The use of market-based instruments for biodiversity protection – The case of habitat banking: Technical Report for European Commission DG Environment* (2010) at 33-34; I Bräuer *et al* op cit note 115 at 31.

<sup>121</sup> S Lockie & R Tennent 'Market instruments and collective obligations for on-farm biodiversity conservation' in S Lockie and D Carpenter (ed) *Agriculture, biodiversity and markets: Livelihoods and agroecology in comparative perspective* (2010) 287 at 289.

<sup>122</sup> *Ibid.*

<sup>123</sup> Article 11 CBD.

chapter four.<sup>124</sup> Such activities can be performed by farmers in their agricultural activities and contribute to biodiversity conservation. However, according to the wording of this law, which uses the word “may” in this regard, the provision of such grants is not compulsory; it depends on the discretion of the granting authority. In addition, persons who undertake activities that promote the environment are subject to reduction on taxable profits in respect of taxation laws.<sup>125</sup> This can apply to farmers who produce agricultural products in biodiversity-friendly ways. However, in Rwanda, the value of biodiversity is not legally considered in market prices, which are fixed based on demand-and-supply rules of the market.<sup>126</sup>

In addition to economic incentives, other incentives in terms of intellectual capacity building can help enhance public involvement in biodiversity conservation within agricultural development as discussed below.

#### 7.4.2 Empowering agriculturalists

Agriculturalists need to be empowered through awareness-raising, education and research. It is recognized that some, but not all, individual characteristics of agriculturalists affect their decision to participate in agricultural measures that help conserve biodiversity. Educated and informed farmers are more likely to participate than uninformed or uneducated farmers. Information and education are therefore considered as predictors of participation.<sup>127</sup> Farmers must be informed or educated on:

- the interactions between agriculture and biodiversity health;
- the importance of conserving biodiversity in agro-ecosystems;
- damaging agricultural practices and alternative best practices;
- the roles they can play; and
- benefits and risks of adopting sustainable agricultural approaches.

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<sup>124</sup> Articles 71-73, paragraph 1 Environmental Framework Law; See also Article 2 of the Law n°16/2012 of 22/05/2012 determining the organization, functioning and mission of the National Fund for Environment (FONERWA) *O G* n°26 of 25/06/2012.

<sup>125</sup> Article 73, paragraph 2 Environmental Framework Law.

<sup>126</sup> Article 3 of the Law n°15/2001 OF 28/01/2001 governing the organisation of internal trade *O G* n° 3 of 1/2/2001.

<sup>127</sup> R Siebert ‘The ‘green box’ multifunctionality and biodiversity conservation in Europe’ in (S Lockie and D Carpenter (ed) *Agriculture, biodiversity and markets: Livelihoods and agroecology in comparative perspective* (2010) 269 at 274.



Acquiring all this information can influence farmers to adopt best practices. Education here includes formal and informal education from schools, short or long-term trainings, campaigns, farmer-field-schools, and others which help agriculturalists attain the right information. However, this depends on the availability of adequate institutions and the use of appropriate information dissemination methods. Additionally, access to varied research results related to interactions between biodiversity conservation and agricultural development equip agriculturalists with the best skills for biodiversity conservation.

Under international law, the conventions like the CBD, ITPGRFA, UNCCD, Rotterdam Convention, Stockholm Convention and the UNFCCC, as discussed in chapter three, all contain provisions on research, education and awareness-raising in general, which directly or indirectly applies to biodiversity conservation in agricultural development.

In Rwandan, the Environmental Framework Law obliges the public and private institutions and individuals to sensitize, in their capacities, environmental problems and the State has the responsibility to promote environmental education as discussed in chapter four.<sup>128</sup> This is a general obligation encompassing sensitisation of biodiversity problems resulting from agriculture and how they should be avoided. However, the implementation of this obligation depends on the capacities of public and private institutions and their level of consideration of biodiversity problems in their programs. In Rwanda, education in relation to the importance of biodiversity is limited as outlined in chapter four. The respondents revealed that farmers are sensitised on some environmental problems by environmental officers who, sometime, visit them in their villages; they are also trained about sustainable agricultural practices through farmer field schools. However, they reported that such trainings are not regular and not sufficient.<sup>129</sup> They need to be regularly updated about new trends in agriculture-biodiversity interactions to enable them act in the interests of both agricultural development and biodiversity conservation. This can be achieved, if it is specifically required by the environmental legislation.

Besides, as mentioned in chapter four, REMA has the responsibility to conduct studies, research and investigations in the field of environment.<sup>130</sup> It is responsible for

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<sup>128</sup> Article 42 and 58 Rwanda Environmental Framework Law; See more details in paragraph 4.2.2.6.

<sup>129</sup> Respondents 2, 3, 4, 5, 6, 7, 10, 13, 14, 15, 17, 18.

<sup>130</sup> Article 3 Law establishing REMA; See also paragraph 4.3.1.3.

promoting research on different biodiversity issues.<sup>131</sup> This provision applies to research on agricultural trends and activities that can affect biodiversity. In addition, the Rwanda Agricultural Board (RAB) has responsibility to carry out research aimed at agricultural and animal husbandry development.<sup>132</sup> Besides, these institutions, to a certain extent, conduct public education and awareness programs, in fulfillment of their mandates. Their researches can motivate individuals' participation in biodiversity conservation in agriculture. However, their researches are limited as they depend on available finances and human resources. The research findings revealed that researches on interactions between agricultural development and biodiversity conservation are limited in Rwanda. Some research participants expressed the need for in-depth researches in this field like the research on interactions between the use of agrochemicals and soil or water pollution and interactions between the use of agrochemicals and disappearance of some crop and animal species like bees.<sup>133</sup> The Rwandan laws also do not motivate individual researchers, who may play a big role if they are encouraged. This needs to be legally motivated.

## 7.5 CONCLUSION

The basis of this chapter has been that without sound public participation decisions in biodiversity conservation and agricultural development will not have the desired effects. Public participation informs the public about possible tensions between the two sectors and enables it to contribute to adoption of sustainable, effective and implementable decisions. This chapter has shown different matters related to interactions between biodiversity and agriculture, which need to be handled with the use of public participation. Besides, it was shown that integration of knowledge of and participation of some groups of individuals, like traditional communities need special consideration due to their vulnerability, their knowledge and the roles they play in agriculture development and biodiversity conservation. This chapter argued that to conserve biodiversity in agriculture, it is important to go beyond application of public participation procedural rights and apply economic and capacity-building incentive mechanisms to promote effective public participation and adequate conservation of biodiversity in agriculture. It was found that international environmental law acknowledges the importance of public participation in conservation of biodiversity in

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<sup>131</sup> Article 12. 1 (a, b and c) Rwanda Biodiversity Law; See also paragraph 4.2.3.4.

<sup>132</sup> Article 4 Law establishing RAB; See also paragraph 4.3.1.5.

<sup>133</sup> Respondents 13, 14, 18.

agricultural development but countries including Rwanda are obliged to adopt detailed related legislation. Rwanda has made a great step to ensure public participation, but the field work research findings revealed that public participation is still ineffective and it was found that some legal limitations still exist. There is an urgent need for adoption of more detailed legal provisions on public participation in environment and biodiversity conservation throughout agricultural development activities.

## ***CHAPTER EIGHT: CONCLUSION***

### **8.1 INTRODUCTION**

This study has established that Rwandan regulatory framework seeking to reconcile biodiversity conservation and agricultural development is ineffective. The existing legal measures that apply to this field are inadequately developed and are scattered among unconnected instruments. Also the institutions that intervene in this field are uncoordinated. They aim to fulfill their responsibility in an unintegrated way without aiming to achieve both production and conservation. Currently, more emphasis is put on agricultural development and modernization to eradicate hunger and poverty without considering impacts that agricultural practices have on biodiversity. Conservation of biodiversity in agricultural ecosystems is not a priority in Rwanda. This is even observed in different related policies discussed. As a result, biodiversity continues to be affected by agricultural practices despite little guidance offered by environmental policies and little protection offered by some environmental laws. The study maintained that protection of biodiversity in agricultural landscapes is currently important for the sake of both conservation and production. The study maintains that in Rwanda there is an urgent need for development of a coherent legal framework that balances agricultural production and biodiversity conservation. This will contribute to biodiversity conservation, sustainability of agriculture and sustainable improvement of the well-being of Rwandan population.

### **8.2 SUMMARY OF FINDINGS AND CONCLUSIONS**

#### **8.2.1 Chapter two**

After an introductory chapter, chapter two provided a historical background of the development of tensions between biodiversity conservation and agricultural development in Rwanda. The research findings revealed that Rwanda's rich natural and agricultural biodiversity has declined gradually due to many causes including those related to agricultural development which has been being pursued without being accompanied by adequate legal and policy mechanisms that are biodiversity conservation-oriented. It was found that the way land tenure and land use system have developed contributed to biodiversity degradation. Up to 2005, land tenure and use system was mainly regulated by customary law and was

characterized by lack of secured land rights which led to overexploitation of the lands with negative impacts on soil and biodiversity. In 2005, a detailed written land law was enacted with the main objective of regulating land ownership rights. The 2005 land law was repealed by the 2013 land law which currently regulates land ownership and management in Rwanda. The 2005 and 2013 land laws initiated the concept of land consolidation in agriculture to improve land management and productivity. However, it was found that land consolidation may have negative impacts on biodiversity since it promotes the farming of homogenous crops over vast areas which leads to reduction in crop varieties. Though the land law requires land owners to exploit their lands in accordance with conservation laws and regulations, the research findings revealed that land and soil conservation continue to be a problem and biodiversity continues to be affected since the land law does not provide for legal mechanisms and standards of soil conservation.

It was also found that the system of water use for agriculture in Rwanda has been characterized by poor legislation either in terms of water management or water conservation. It put much emphasis on water supply and not adequately concerned with water conservation. Besides, the research findings revealed that agricultural intensification in wetlands to increase arable land has caused and still causes water pollution and biodiversity loss.

In addition, it was found that agricultural development was and is still characterized by a continuous increase of introduction and use of agrochemicals, new crop and livestock varieties, promotion of monoculture and crop specialisation. The research findings revealed that these practices are not governed by proper biodiversity conservation-oriented legislation to control them and prevent their impacts on biodiversity.

Moreover, the research findings revealed that climate change problems aggravate tensions between agricultural development and biodiversity conservation in Rwanda as there are no proper legal mechanisms addressing climate change adaptation.

Chapter two revealed that different socio-economic factors like poverty and factors associated to regional laws and policies requirements are additional factors contributing to the development of tensions between biodiversity conservation and agricultural development in Rwanda. The interviews revealed, for example, that some farmers overexploit the soil because they are poor and do not have sufficient arable lands or any other survival means.

However, it is argued that reduction or elimination of tensions between agricultural development and biodiversity conservation in Rwanda is a necessity because without biodiversity, agriculture cannot be sustainable.

### **8.2.2 Chapter three**

Chapter three discussed the international legal framework for biodiversity conservation in agriculture as laid down in different multilateral environmental agreements that contribute to reconciling exploitation and conservation, which Rwanda has ratified. Such conventions address biodiversity *per se*, plant genetic resources used for food and agriculture, desertification, potentially toxic substances, climate change, wetlands, nature and natural resources. It was found that the either positive or negative way some of their obligations are formulated lead to inclusion of the issue of reconciling biodiversity conservation and agricultural development in their implementation. Their main obligations that are relevant to this issue range from sustainable use of biodiversity components to adoption of *in-situ* and *ex-situ* conservation measures, establishment of incentive measures to promote biodiversity conservation in agricultural landscapes, public participation, impact assessment requirement, proper consideration of handling biotechnology, aiming for sustainable development, elimination or restriction of certain dangerous agrochemicals, and consideration of climate change adaptation in agricultural development and biodiversity consideration.

The research findings revealed that most of these obligations are not adequately implemented in Rwanda. Different implementation steps have been made but there is still a need for strong implementation guided by effective and clear legal rules.

### **8.2.3 Chapter four**

Chapter four dealt with analysis of Rwandan policy, regulatory and institutional regime for biodiversity conservation and agricultural development. The chapter sought to provide insights into the existing policy and legal framework for protection of biodiversity against negative impacts from agricultural development. The research findings revealed that the Rwandan biodiversity and agriculture related policies do not guide adequately how agricultural development can be pursued in harmony with biodiversity conservation. It was found that some policies are general and do not give detailed guidance of how biodiversity

can be protected in agricultural activities. Others put much emphasis on increasing agricultural production without paying particular attention on impacts of some agricultural practices on biodiversity. In addition, the research findings revealed that the legal regime in terms of reconciling biodiversity conservation and agricultural development is inadequately developed.

It was found that that Rwanda has different laws of general and sectoral application which apply to the conservation of biodiversity and help to minimize impacts of agriculture on biodiversity. The examined laws mainly regulate the use and management of environment and biodiversity in general, land, water resources, forests, seeds and agrochemicals. They also prohibit some agricultural practices that damage biodiversity. Besides, they provide for general principles of environmental law and legal tools that are necessary in preventing tensions between biodiversity conservation and agricultural development. Additionally, they establish responsibilities of individuals, the State and different public institutions whose respect contributes to biodiversity conservation and agricultural development. All this show a good step made in Rwanda with regard to biodiversity conservation. However, it was found that the existing Rwandan environmental laws are not effective; they are disparate and inadequately developed. They lack different legal elements necessary to ensure biodiversity conservation in harmony with agricultural development and some of them lack implementing regulations. It was argued that they should be revised to incorporate necessary elements and contribute to both biodiversity conservation and agricultural development.

In chapter four, different public and private institutions which intervene directly or indirectly in the areas of biodiversity conservation and agricultural development in Rwanda were discussed. Such institutions intervene in areas of environment, agriculture, investment, management and use of natural resources, standardization, education and research. It was found that their interventions spread across competing activities and interests and no real coordination of their efforts is provided to manage trade-offs and win-win situations which renders their intervention ineffective. It was argued that regulation of cooperative governance is needed to pull together their efforts.

#### 8.2.4 Chapter five

Chapter five dealt with the issue of conservation of soil, water and genetic resources, the biodiversity components mostly exploited for agricultural development. In Rwanda, there cannot be conservation of biodiversity in the agricultural sector without conservation of soil, water and genetic resources. However, it was argued that Rwandan environmental law is very limited as regards the sustainable use and conservation of soil, water and genetic resources in the agricultural sector. The research findings revealed that different agricultural practices like unsustainable use of agrochemicals, specialization of production systems, abandonment of mixed and inter-cropping system, reduction in number of used crop and livestock varieties, conversion of natural ecosystems and high demand of water for agriculture; all put much pressure on these three biodiversity components in Rwanda.

The chapter outlined different principles that any laws attempting to support biodiversity conservation and agricultural development should embody. Some of these principles are embodied in binding and non-binding international instruments which can guide the adoption of national legislation on soil, water and genetic resources. Others are incorporated in national legislation and their incorporation in Rwandan law can contribute to achieving both agricultural development and soil, water and genetic resources conservation. They include sovereignty and responsibility, precaution, maintenance of biodiversity, polluter-pays, prevention, public participation, proclaiming ethical responsibility to protect and manage the soil, entitlement to a healthy and ecologically sustainable soil environment, monitoring soil health and protection of the cultural aspects of soil, recognition of water as a finite resource and of recognition of the economic value of water, fair and equitable sharing of the benefits arising out of the utilisation of genetic resources and prior informed consent. The research findings revealed that except the principle of monitoring soil health and condition and the principle of protection of cultural aspects of soil, the rest of the principles are incorporated in Rwandan legislation. However, chapter five established that even those principles that are incorporated in the Rwandan law are regulated in a general way, mostly only enunciated without further necessary details that prescribe how they can be implemented. It was argued that their enunciation only does not contribute a lot in the conservation of soil, water and genetic resources throughout agricultural development activities.



In addition, chapter five discussed different general and specific legal tools that any legislation attempting to ensure sustainable use of soil, water and genetic resources must prescribe. These are planning, license and permits, sanctions for failure to respect the laws governing such biodiversity components, provisions on land tenure, ecological soil standards, soil conservation agreements, notices of protection, water charges, establishment of protected areas and quota limitations. While some of these legal tools are enshrined in different binding and non-binding international legal instruments, others appear in some domestic laws. Their incorporation in Rwandan legislation is important for the conservation of soil, water and genetic resources in agricultural development processes. It was revealed that Rwandan environmental legislation incorporates these legal tools except the tools of ecological soil standards, soil conservation agreements, notices of protection and quota limitations. It was argued that this constitutes a limitation to the protection of soil, water and genetic resources against negative effects of agricultural development; it needs to be remedied.

### **8.2.5 Chapter six**

Chapter six examined the issue of conserving diversity of crop and livestock varieties because its loss entails loss of the basis of future biological evolution, sustainability of agriculture and capacity to adapt to climate change in the Rwandan agricultural sector. The research findings revealed that crop and livestock diversity is threatened in Rwandan agriculture, and Rwandan law in this regard is not effectively developed. Chapter six explored legal tools that can be used to maintain diversity in crop and livestock varieties in Rwanda. It was indicated that legal adjustment of incentives for conservation of diversity in crop and livestock varieties and recognition of the role of local communities in diversity conservation constitutes the critical tools that need to be embodied in Rwandan biodiversity conservation-oriented laws. Two approaches to consider in incentive adjustment under Rwandan law namely generating incentives for conservation and discouraging perverse incentives against crop and livestock diversity were explored.

Incentives should mainly aim the conservation of traditional crop and livestock varieties which are recognised to be more diverse than modern varieties. They should also promote climate change adaptive behaviours and promote research and access to climate change information. It was claimed that tax laws, commercial, economic and financial laws

can assist in this by ensuring facilitated access to markets of traditional varieties and recognition of their value in fixing market prices for agricultural products. It was also found that legal promotion of crop and animal breeding programs using traditional varieties and legal support of exchange of traditional crop varieties and livestock breeds are other incentive mechanisms that have to be legally recognised for conserving crop and livestock diversity in Rwanda. Perverse incentives to be discouraged are those that promote, without being properly regulated, the use of homogenous varieties and increased use of agrochemicals. Chapter six further argued that Rwandan law has to promote collaboration between institutions in charge of agriculture, biodiversity and climate change.

### **8.2.6 Chapter seven**

Chapter seven dealt with the necessity of public participation in preventing the tensions between biodiversity conservation and agricultural development in Rwanda. It was argued that there are specific issues related to interlinkages between biodiversity conservation and agricultural development which should be decided or handled with integration of public participation in planning, law and policy elaboration, decision-making and implementation. These are introduction of new crop and livestock varieties and agrochemicals, the use of soil, water and genetic resources and issues related to climate change adaptation. These issues have been identified as the main sources of tensions between biodiversity conservation and agricultural development in Rwanda. They affect the public in different ways, it was therefore argued that the concerned public must participate in related planning, policy and law establishment, decision-making and implementation.

Chapter seven revealed that the Rwandan environmental legislation contains few provisions on public participation, which are mostly of general application and which do not give all details or important elements that promote effective public participation. The research findings revealed that even where the concerned public is called to participate, it is involved mostly in the phase of implementation.

It was additionally argued, in chapter seven, that any public participation that attempts to effectively ensure conservation of biodiversity in harmony with agricultural development should ensure integration of local or traditional biodiversity and agricultural knowledge.

However, it was found that in Rwanda traditional biodiversity and agricultural knowledge does not receive effective legal protection.

It was further asserted that to ensure effective public participation, it is important to go beyond provisions on public participation procedural rights and establish legal economic and human empowerment incentive mechanisms. Economic incentives are built upon the necessity to value efforts of farmers in biodiversity conservation and the necessity to value biodiversity through market prices. Human empowerment incentives are based on promotion of farmers' education and awareness and promotion of research. The research findings revealed that the use of economic and human empowerment incentives under Rwandan environmental legislation is not effectively developed to assist in reconciling biodiversity conservation and agricultural development. It was argued that more detailed legal provisions are needed to support effectively the use of such incentives and motivate people involved in agricultural activities to participate in conservation of biodiversity and agricultural development.

### **8.3 RECOMMENDATIONS**

The following recommendations are formulated.

#### **8.3.1 Legal and policy regimes that recognise and accept integration of biodiversity conservation and agricultural development**

The research findings revealed that, in Rwanda, there is a great difference between how people relate to agriculture and how they approach biodiversity conservation. The need for food is an unquestionable empirical fact. However, the continuing and growing demand for agricultural products and ecosystem services in Rwanda require reconsideration of the relationships between agricultural production and biodiversity conservation which implies integration of biodiversity conservation and agricultural development. In different chapters of this study, it was found that Rwandan laws are ineffective to facilitate such integration. A law reform in two approaches is consequently recommended: Revision of the existing environmental laws and adoption of new specific environmental laws.

### *8.3.1.1 Revision of existing laws*

Laws to be revised are the Environmental Framework Law, Biodiversity Law, Land Law, Water Law, Agrochemicals Law, Seed Law, Tax Law, Economic and Financial Law and Commercial Law.

#### *Environmental Framework Law*

It is recommended that the Environmental Framework Law be revised and incorporate the new legal provisions that guide effective public participation in planning, establishment of policies and laws, decision-making and in implementation. As discussed in chapters four and seven, the research findings revealed that in Rwanda the public interested in agricultural and biodiversity related decisions and policies do not participate fully due to lack of clear guiding legal provisions. New provisions that regulate clearly the public participation procedure should be adopted. Such legal provisions should determine:

- the time of participation;
- time reserved for collection of public inputs;
- available remedies in case of failure to respect the participation process;
- means of integrating public inputs; and
- different participatory methods.

Besides, it is recommended that this Law extends the list of incentivised agricultural conservation practices. New legal provisions should provide for incentives to, for instance, conservation tillage, non-till cropping, organic agriculture, agroforestry, extensive grazing systems, maintenance of crop and livestock diversity, restoration of degraded agricultural areas and eschewing the burning of forests and crop residues. The Law cannot enumerate such activities. It should establish that people who, in their agricultural activities, undertake activities aiming at biodiversity conservation can receive financial or economic support from the National Fund for Environment. The new provisions should therefore establish requirements and criteria to qualify for such support.

In addition, given the prominent role of research in biodiversity conservation through agricultural activities, adoption of new legal provisions that support related scientific research is recommended. The research findings revealed that in Rwanda researches on

interrelationships between agricultural development and biodiversity conservation are very limited. Legal establishment of incentives, such as research grants or rewards, to public or private individuals researching in the field of environment and biodiversity conservation is consequently recommended.

Moreover, it is recommended that the Environmental Framework Law institutes the system of cooperative governance. New legal provisions that requires mutual consultations and information sharing between governmental departments in charge of environment/biodiversity and those in charge of development sectors should be adopted. New legal provisions should determine the procedures to follow in implementation of cooperative governance.

Furthermore, the Environmental Framework Law should embody the ecosystem approach. The latter is an effective strategy that ensures integrated management of land, water and living resources and promotes conservation and sustainable use in an equitable way.<sup>1132</sup> An ecosystem approach will assist in reaching a balance between the use of the soil, water, crop and livestock genetic resources for agricultural purposes and biodiversity conservation in Rwanda. New legal provisions which require consideration of the conservation of these three biodiversity components in planning for development (including planning for agricultural development), monitoring the use of such components to evaluate the impacts of developmental activities (including those from agriculture) on their conservation and consideration of their conservation in all decision-making bodies should be established.

### *Biodiversity Law*

For the Biodiversity Law, it is recommended that implementing regulations it provides be adopted. They include Regulation required by Article 11 which should establish mechanisms and indicators to determine the conservation status of various components of biodiversity including those used in agriculture and any positive or negative trends affecting their conservation status. It is recommended that these mechanisms and indicators be adopted and be annexed to this law. Also Regulation required by Article 16 establishing the list of

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<sup>1132</sup> Secretariat of the Convention on Biological Diversity *The ecosystem approach (CBD Guidelines)* (2004) 6.

threatened species needs to be adopted. As discussed in chapter five, the fieldwork data revealed different agricultural crop and livestock species which are declining in Rwanda. The establishment of a list of threatened agricultural crop and animal species in need of protection is recommended and should be annexed to the Biodiversity Law. Moreover, the biodiversity management plans required by Article 5 have to be developed. It is recommended that specific plans on the management of biodiversity in agricultural ecosystems be established and start being implemented.

### *Land Law*

As regards the provisions of the Land Law, their revision is recommended to regulate in details land consolidation and land use for agricultural purposes. The current Land Law focuses on ownership rights and regulates land consolidation with the main objective of increasing productivity; there is no effective concern to the impacts of such practice on biodiversity. It is recommended that its legal provisions be detailed and provide for effective land consolidation mechanisms aiming at sustainable land use and biodiversity conservation.

### *Water Law and Regulations*

The Water Law needs to be revised in order to apply the principle of sustainable management and consideration of impacts of agriculture on water resources basing on the principle of recognition of water as a finite resource and recognition of its economic value. New provisions should establish the requirement for maintenance of good quality and quantity of water by agriculturalists. It is also recommended that the use of impact assessment be legally strengthened in the agricultural exploitation of wetlands. It was found that impact assessment only applies if agriculture conducted in wetlands uses agrochemicals. However, there are other agricultural practices that affect water and wetlands' biodiversity resources; and the interviews reported wetlands' degradation as a result of various agricultural practices. It is therefore recommended that the impact assessment be extended to other different agricultural activities likely to affect water and wetlands biodiversity. In addition, it was found that the current water charges provided in the Water Regulations are not adequate for the prevention of water degradation (in quantity and quality) caused by agricultural activities. The existing charges should be moderately increased and charges for water pollution by agricultural inputs need to be established.

### *Agrochemicals Law*

As discussed in chapter two and five, the interviews revealed that agrochemicals harm rwandan biodiversity while their use is continuously increasing. It is recommended that the Agrochemicals Law be strengthened by establishment of new legal provisions that support and promote capacity building in agrochemicals' use and handling by farmers and promote continuous reduction in their use. New provisions should require that farmers or people involved in agrochemicals' use be informed on impacts (negative and positive) of newly introduced agrochemicals before any use; require that farmers be trained on their use (sound methods of use and quantity limits); and promote scientific research towards reduction, to the extent feasible, of the use of agrochemicals. In addition, it is recommended that the regulations provided in the Agrochemicals Law which will facilitate its implementation be enacted. These are Regulations governing agrochemicals required by Article 4, regulations establishing the list of registered agrochemicals required by Article 16 and regulations on agrochemicals' disposal required by Article 17(4).

### *Seed Law and Regulations*

With reference to the Seed Law and its implementing regulations, it was found that, though they contribute to biodiversity conservation, they aim much at productivity; conservation concerns are not clear. It is recommended that this law be revised to include provisions that require consideration of biodiversity and environment conservation before marketing any seeds in Rwanda. Also, establishment of provisions on plant breeders and farmers' rights is recommended. Their contribution to the development of Rwandan seed industry should be legally recognised and valued. The law has therefore to establish the way, breeders and farmers' communities will share the benefits arising from the utilisation of their knowledge or their contribution in seed system development. Additionally, establishment of provisions promoting collaboration between stakeholders involved in informal and formal seed systems is recommended. The interviews revealed that in Rwanda, the use of local seeds is not encouraged while these are recognised to be more diverse than modern seeds. It is recommended that a new provision incentivising the use of local seeds be adopted.

### *Tax Law*

Tax Law revision needs to be made to establish moderate taxes or charges relating to pollution and biodiversity degradation caused by agricultural practices. Taxes and charges on agricultural inputs or outputs that are a potential source of biodiversity degradation are recommended in Rwandan law recalling that, in Rwanda, agricultural inputs are not taxed and are even subsidised under some policies as discussed in chapter two, four and six. It is argued that implementation of taxes and charges on agricultural inputs is not common compared to other sectors because pollution from agriculture is much more dispersed and tends to originate from many different independent farms and in varying intensities.<sup>1133</sup> However, the usefulness of taxes and charges should not be ignored, as pollution or biodiversity degradation should not also be overlooked. In Rwanda, it is still a challenge to determine pollution from agriculture and how it impacts biodiversity. Though water pollution from agrochemicals has been reported, there is still debate between agricultural institutions and environmental conservation institutions whereby the former argue that the use of agrochemicals is still low in Rwanda while the latter argue that their use causes pollution and damage biodiversity. It is recommended that moderate taxes and charges be used to control the use of agricultural inputs and prevent irreversible biodiversity degradation.

### *Economic, Financial and Commercial Laws*

As discussed in chapters six and seven, it was found that Rwandan legislation does not contain effective provisions with regards to promotion of economic and market incentives while they should be fixed to re-align the mismatch between private interests of those involved in farming activities and those of society in general. Proper recognition of biodiversity value and support by economic incentives is therefore recommended. New legal provisions should be enacted to ensure that stakeholders involved in agricultural activities that are biodiversity conservation friendly benefit from easy access to loans. Also clear financial incentives to agricultural conservation activities and legal economic support of investment in sustainable agriculture needs to be established in the law. Adoption of new

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<sup>1133</sup> V Vojtech 'Policy measures addressing agri-environmental issues' (2010) 24 *OECD Food, Agriculture and Fisheries Working Papers* 1 at 30-31.



legal provisions establishing adequate valuation of agricultural products produced in biodiversity friendly ways, those supporting economically the use of more diverse crop and livestock species and provisions that encourage maintenance of rich biological diversity such as, for example, the use of traditional crop and livestock varieties is recommended. Also, new legal provisions are needed with regards to fixation of market prices of agricultural inputs and products such as agrochemicals and seeds taking into account their positive or negative impacts on biodiversity and environment in general. In addition, prices for agricultural products should be legally fixed after consideration of the ways in which they have been produced. New legal provisions must promote products produced in biodiversity friendly ways. It is recommended that revisions incorporate the use of eco-labelling mechanisms to facilitate implementation of market incentives. Besides, the legal provisions on incentives should be supplemented by provisions on subsidization for agricultural development. As discussed in this study, in Rwanda some agricultural policies offer perverse incentive subsidies contributing to biodiversity degradation. It is recommended that the establishment of policy measures on agricultural subsidies be guided by the objective of maintaining high level of biodiversity.

#### *8.3.1.2 Adoption of new specific laws*

Adoption of two new specific laws is recommended.

##### *Soil Conservation Law*

In connection to the use of land, adoption of a new soil conservation law is recommended. Such law should establish the duty of landowners or land users, with particular emphasis on farmers, to take measures of preventing soil loss or degradation. It should also provide for direction to take remedial measures in case soil degradation has occurred. The recommended soil conservation law should provide for the principles of monitoring soil health and condition and protection of cultural aspects of soil. It should additionally provide for the use of soil protection notices, soil conservation agreements and soil ecological standards which are effective tools in soil conservation, as discussed in chapter five. It should further determine institutions responsible for its implementation.

### *Genetic Resources Law*

As, discussed in chapter five, genetic resources are not effectively regulated in Rwanda. However, the interviews reported that genetic resources in Rwanda are negatively impacted by agricultural practices. A specific genetic resources law is therefore recommended. That law should require inventory of crop and livestock genetic resources, regulate determination, characterization, collection and evaluation of plant and animal genetic resources and access to them and how the benefits arising from their utilisation will be shared on an equitable basis. It should aim the maintenance of diversity of on-farm crop and livestock genetic resources. The recommended law should further regulate collection of endangered crop species for *ex-situ* conservation. Also, the recommended law should clearly determine crop and animal breeders' rights and provide for the protection of local farmers' knowledge on the management and use of genetic materials. It should regulate requirements, conditions and procedures of access to local or traditional agricultural knowledge with strong emphasis on prior informed consent of the State and the concerned local communities. Additionally, the new law has to establish an adequate system of equitable sharing of benefits resulting from the utilisation of traditional agricultural and biodiversity conservation related knowledge and ensure effective participation of concerned communities. Further, it should establish institutional arrangements for adequate support and protection of traditional knowledge. This will contribute to the protection of biodiversity through protection of traditional knowledge that has helped to nurture biodiversity in Rwanda, which is currently not legally protected as discussed in chapter seven.

#### *8.3.1.3 Effective implementation of international legal obligations*

Rwanda should effectively implement her international obligations embodied in ratified international conventions discussed in chapter three. It was found that some of them are fully or partly respected and implemented and others are not implemented at all. However, they can assist, to some extent, in conserving and protecting Rwandan biodiversity against negative effects of agricultural development. It is recommended that REMA carries out periodical audits on implementation of international obligations embodied in the discussed conventions. It is recommended that such audits be performed once a year to identify the successes and failures and hence advise on adequate implementation measures to be further undertaken.

### *8.3.1.3 Revision of different biodiversity and agriculture related policies*

Rwanda should revise her policies on development and poverty reduction especially those related to transformation of agriculture from subsistence into market-oriented agriculture. It was found that these policies put much emphasis on boosting agricultural production without giving clear guidance on how to conserve biodiversity against negative effects that may result from different agricultural practices identified as strategic options to increase agricultural production. The latter include the increased use of agricultural inputs such as agrochemicals and improved seeds or breeds. It is recommended that an evaluation of impacts of these policies be made to determine their contributions to both agricultural development and biodiversity conservation. From that evaluation, positive and negative impacts will be identified, and hence new objectives, principles and strategic options will be formulated. The latter should be oriented towards achievement of both the agricultural development and biodiversity conservation in order to achieve sustainable agricultural development.

### **8.3.2 Collaborative and coordinated institutional support**

In Rwanda, different institutions involved in biodiversity conservation and agricultural development work across different and separate fields of intervention as discussed in chapter four. They have different responsibilities and each institution seeks for advancement of its field and fulfillment of its obligations. However, a separate intervention is counterproductive because it sometimes causes duplication of efforts or creates institutional conflicts. To integrate biodiversity conservation and agricultural development in Rwanda, a strongly coordinated institutional support is recommended. Different institutions intervening in the two fields should work together towards a common goal of achieving both biodiversity conservation and agricultural development. This requires coordinated and coherent planning to enable establishment of goals and visions whose achievement fosters successes in the two sectors. Also a clear articulation of respective responsibilities whose fulfillment does not undermine one side or the other is critical. In addition, strong and cooperative communication between concerned institutions is very important. Mutual consultations, open information and experience sharing between institutions intervening in the two competing fields are recommended. All institutions concerned should not work in a competitive way; they should rather work in a cooperative way. It is important that each institution recognizes interests of other institutions and make all concessions they can without compromising their

own needs, rights and principles. This will be possible if the system of cooperative governance proposed above is established. It is recommended that a coordination committee composed of representatives of the Agriculture and Environment Departments, Education and Research Institutions and NGOs intervening in the fields of biodiversity conservation and agricultural development be established. Such committee should -in case it is created- meet twice a year and discuss on how issues pertaining to agriculture advancement and biodiversity protection can be handled in harmony. The proposed coordination committee can work under joint supervision of Ministry of Natural Resources and Ministry of Agriculture.

### **8.3.3 Full involvement of all stakeholders**

In Rwanda, there are different individuals and groups of individuals and institutions that are involved in biodiversity conservation and agricultural development as discussed in chapter four. They include community farmers, public or private institutions involved in agriculture, environment and biodiversity conservation, those involved in investment, in trade or business operations, in standardisation activities and those involved in research and education. They all have different perceptions, interests, priorities and responsibilities and their activities affect whether directly or indirectly biodiversity conservation or agricultural development. However, as discussed in chapter seven, it was found that the participatory approach is not effectively developed in Rwandan legislation and the interviews revealed that public participation is not effectively applied in practice. It was found that participation, especially of farmers, is invoked in the last phase of implementation. It is recommended that public participation be used from the phase of planning to policy and legislation development, decision-making and implementation in both biodiversity conservation and agricultural development sectors. It is recommended that whenever agricultural development programs which are likely to have impacts on biodiversity are being planned, all concerned stakeholders are to be identified at the start, their interests in the programs are identified and their effective representation should be determined and their voices be heard.

In addition, the establishment of an awareness-raising program on the interlinkages between biodiversity conservation and agricultural development is recommended. It is recommended that REMA, MINIRENA and MINAGRI organise regular transmissions on radios and televisions, at least once in three months, and debate on the existing trends

affecting agricultural development and biodiversity conservation. Additionally, agricultural extension officers and environmental officers at district level should meet with farming communities' representatives once in two months and discuss on issues related to biodiversity and agricultural development. Besides, it is recommended that the subject of sustainable agriculture in Rwanda be effectively developed and taught in primary, secondary and higher educational institutions; and related research should be financially supported and encouraged. Moreover, it is recommended that the involvement of all stakeholders be effectively operationalised through the EIA procedure.

#### **8.3.4 Appreciation of local knowledge and sustainable agricultural practices**

The fieldwork data revealed that in Rwanda, there exist some traditional knowledge in relation to soil conservation, fighting against pests and diseases in crops and livestock and in selecting seeds and breeds of good quality. These are important in biodiversity conservation and sustainable use of its components and in agricultural development as discussed in chapter seven. However, it was found that such knowledge is not effectively valued and legally protected. It is recommended that an inventory of sustainable agricultural practices and skills held by local communities be established for effective use and protection. Additionally, the fieldwork data revealed that the use of traditional agricultural knowledge is encouraged in policy but implementation is not effective due to lack of knowledge about it and effective legal support. Furthermore, awareness-raising of the use of traditional knowledge and sustainable agricultural practices in the conservation of biodiversity is recommended.

### **8.4 RESEARCH IMPLICATIONS**

Significantly, reconciling biodiversity conservation and agricultural development, regardless of its ecological and sustainable environmental and economic benefits, has not attracted much academic interest in Rwanda. There is not enough and adequate research-based information available to inform law and policy-makers. This research sought to address this shortcoming. However, it cannot claim to have completely dealt with all questions and issues related to prevention of tensions between biodiversity conservation and agricultural production using legal mechanisms. This is a broad subject, encompassing cross-sectoral issues and themes. Additional and more advanced qualitative and quantitative studies need to be undertaken. Of

great significance, there is more pressing necessity for quantitative and qualitative researches on the:

- factual interrelationships between biodiversity conservation and agricultural production in Rwanda;
- The magnitude of impacts of agricultural development practices on biodiversity ;
- impacts of modernisation of agriculture on healthy nutrition in Rwanda;
- interlinkages between biodiversity loss in agricultural ecosystems and healthy or unhealthy socio-economic living conditions of community farmers;
- relationships between modernisation of agriculture and protection of consumers of agricultural products and its impacts on individual choices for or against biodiversity conservation in Rwanda; and
- interconnections between modernisation of agriculture and increase or decrease of capacity to adapt to climate change in Rwanda.

Different international environmental conventions which contain provisions that can assist Rwanda in the prevention of tensions between biodiversity conservation and agricultural development give to countries the responsibility to adopt legal measures that are suitable to national conditions. Besides, different CBD's COPs held in different periods which dealt with varied issues related to interrelationships between biodiversity conservation and agriculture adopted related non-binding decisions, resolutions and guidelines which can assist Rwanda in reconciling conservation and production. In addition, FAO supports sustainable agricultural programs and projects which balance increased production with environmental, biodiversity and sustainability concerns and provides consequently related recommendations and guidelines which can assist Rwanda in the struggle to achieve both biodiversity conservation and agricultural development. However, although these recommendations, resolutions and guidelines are useful, Rwanda has to invest more in empirical researches which will assist in understanding the actual situations and issues which are possibly specific to Rwanda, and will therefore assist in formulating regulatory and policy frameworks that are relevant to national circumstances.

The above proposed researches are important to inform the law and policy-making processes and the public at large. Currently, different initiatives and programs to develop agriculture, improve the Rwandan population's living conditions and conserve biodiversity

are being developed. Even though these initiatives and programs provide an opportunity to improve gradually the status of biodiversity conservation and agricultural development, they are constrained to failures except if they are informed by empirically established evidence.

### **8.5 FINAL REMARK**

This study has accordingly shown that to reconcile biodiversity conservation and agricultural development Rwanda needs to revisit its agricultural and environmental laws and policies to make them operate in a more cohesive and integrated manner. As a small and poor developing country, whose biodiversity cannot be conserved in protected areas alone and whose economy mainly relies on agriculture, Rwanda needs to be fully aware and acknowledge that development of agriculture needs to be reconciled with biodiversity conservation in order to be sustainable. For that reason, Rwandan agricultural and environmental laws and policies should be concerned with both the increase in agricultural production to eradicate hunger and poverty and the interlinkages between agricultural sustainable development and the level of biodiversity conservation.

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**APPENDICES**

## **Appendix 1**

### **List of International Conventions relevant to agriculture and biodiversity**

The Convention on Biological Diversity (CBD) and its Protocol (Cartagena Protocol on Biosafety).

The International Treaty on Plant Genetic Resources for Food and Agriculture.

The United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD).

The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

The Stockholm Convention on Persistent Organic Pollutants.

The United Nations Framework Convention on Climate Change (UNCCC).

The Convention on Wetlands of International Importance especially as Waterfowl Habitats.

The African Convention on the Conservation of Nature and Natural Resources.



## Appendix 2

### List of Domestic laws and regulations applicable to agriculture and biodiversity

The Constitution of the Republic of Rwanda 2003 *O G* Special n° of 2/12/2003.

Organic Environmental Framework Law n° 08/2005 of 04/05/2005 *O G* n° 9 of 1/05/2005.

Organic law n° 53/2008 of 02/09/2008 establishing the Rwanda Development Board (RDB)  
*O G* n° special 05/09/2008.

Biodiversity Law n° 70 of 02/09/2013 *O G* n°38 of 23/09/2013.

Law n° 63/2013 of 27/08/2013 establishing the Rwandan Environment Management Authority (REMA) *O G* n° 41 of 14/10/2013.

Law n°50/2013 of 28/06/2013 establishing the Rwanda Standards Board *O G* n° 30 of 29/07/2013

Land Law n° 43/2013 of 16/06/2013 *O G* Special n° of 16/06/2013.

Forest Law n° 47 *bis*/2013 of 28/06/2013 *O G* n° 37 of 16/09/2013.

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Agrochemicals Law n° 30/2012 of 1/08/2012 *O G* n° 9 of 04 March 2013.

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Law n°39/2010 of 25/11/2010 establishing national agricultural export development board (NAEB) *O G* n°04 of 24/01/2011.

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Water Law n°62/2008 of 10/09/2008 *O G* n°17 of 27/04/2009.

Law n° 14/2003 of 23/05/2003 regulating production, quality control and commercialization of quality plant seeds *O G* n° Special of 11/07/2003.

Prime Ministerial Order no 26/03 of 23/10/2008 determining the list of chemicals and other prohibited pollutants *O G* n° 21 *bis* of 1/11/ 2008.

Ministerial order n°002/16.01 of 24/05/2013 determining the procedure for declaration, authorisation and concession for the utilisation of water *O G* Special number of 30/05/2013.

Ministerial Order n°003/11.30 of 18/08/2010 setting forth conditions required for marketing quality seeds *O G* n° 40 of 04/10/2010.

Ministerial Order n°005/11.30 of 18/08/2010 setting forth standards for processing quality seeds *O G* no 40 of 04/10/2010.

Ministerial Order n°14/11.30 of 21/12/2010 determining the models of land consolidation and its productivity *O G* no 52 of 27/12/2010.

Ministerial Order n°003/16.01 of 15/07/2010 preventing activities that pollute the atmosphere.

Ministerial Order n° 007/16.01 of 15/07/2010 determining the length of land on shores of lakes and rivers transferred to public property *O G* n° 37 of 13/09/2010.

Ministerial Order n°004/2008 of 15/08/2008 establishing the list of works, activities and projects that have to undergo an environmental impact assessment *O G* n° 22 of 15 /11/ 2008.

Ministerial Order n° 003/2008 of 15/08/2008 relating to the requirements and procedure for environmental impact assessment *O G* no 22 of 15/11/ 2008.

Ministerial Order n° 005/2008 of 15/08/2008 establishing modalities of inspecting companies or activities that pollute the environment *O G* no 22 of 15/11/ 2008.

Ministerial Order n° 006/2008 of 15/08/2008 regulating the importation and exportation of ozone layer depleting substances, products and equipment containing such substances.

Ministerial Order n° 007/2008 of 15/08/2008 establishing the list of protected animal and plant species.

## Appendix 3

### DRAFT SAMPLE SHEET A (ENGLISH VERSION)

#### QUESTIONS FOR PEOPLE INVOLVED IN BIODIVERSITY CONSERVATION AND AGRICULTURE IN RWANDA (RESERVED FOR PARTICIPANTS IN FOCUS GROUPS INTERVIEWS)

#### QUESTIONS

1. List the impacts of agriculture on biodiversity you have experienced in your physical area.
2. Have you changed agricultural practices over the years?
  - a. Probe: Advantages of such changes
  - b. Probe: Their disadvantages
3. Do you still use traditional plant and animal species in your agriculture?
  - a. Probe: Share your experience on disappearance of traditional plant and animal species
  - b. Probe: Enumerate the disappeared species
4. Why have those species disappeared?
  - a. Probe: the role of new animal and plant varieties
  - b. Probe: The role of agrichemicals
  - c. Probe: The impact of changing farming practices
  - d. Probe: Affected by climate change
5. What traditional agricultural practices were used in your physical area which not only increased productivity but also conserved biodiversity?
  - a. Probe: in relation to the protection of the land
  - b. Probe: In the fight against plant and livestock diseases
  - c. Probe: Selection of seeds and livestock to be reared
  - d. Probe: others
  - e. Probe: Government's encouragement for their use
6. Which type of agriculture is promoted in your physical area?
  - a. Probe: Monoculture
  - b. Probe: Multi-culture
7. Have you adopted new plant and animal species?
  - a. Probe: What are they?

- b. Probe: Why?
  - c. Probe: Their advantages and disadvantages
  - d. Probe: Their relationship with biodiversity
8. Have you ever used agrochemicals?
- a. Probe: where do you get them from?
  - b. Probe: Their advantages
  - c. Probe: Their disadvantages
  - d. Probe: Disadvantages on biodiversity
9. Do you take climate change into account before carrying out agricultural activities?
- a. Probe: How?
  - b. Probe: Where do you get information from?
10. Do farmers participate in administrative meetings which discuss agricultural issues?
- a. Probe: Where and how?
  - b. Probe: Encouragement of women
  - c. Probe: Encouragement of the youth
11. What is the contribution of laws and policies in conserving biodiversity in agriculture
- a. Probe: land law and land policy
  - b. Probe: Environmental law and environment policy
  - c. Probe: Agricultural Policy
  - d. Probe: Others
12. What else would you like to say about conservation of biodiversity in agriculture?

**THANK YOU FOR YOUR ANSWERS.**

**Turamwishimiye Marie Rose**

## KINYARWANDA VERSION

### IBIBAZO BIGENEWE ABANTU BAKORA IMIRIMO Y'UBUHINZI N'UBWORONZI N'IYO KUBUNGABUNGA IBIDUKIKIJE (BIGENEWE ABAHINZI BOROZI BAZAGANIRIZWA MU MATSINDA)

#### IBIBAZO

1. Vuga ingaruka ubuhinzi n'ubworozi bigira ku rusobe rw'ibinyabuzima zaba zaragaragaye mu karere kanyu.
2. Waba warahinduye uburyo bwo guhinga no korora uko imyaka yagiye ishira?
  - a. Kunganira: Inyungu z'izo mpinduka
  - b. Kunganira : Ingaruka zazo
3. Muracyakoresha amoko y'ibihingwa n'amatungo bya gakondo?
  - a. Kunganira: Hari ayo wabonye yashizeho atakiboneka
  - b. Kunganira: Ni ayahe?
4. Uko gushiraho kwayo kwatewe n'iki?
  - a. Kunganira: yasimbuwe n'amoko mashya y'ibimera n'amatungo
  - b. Kunganira: Uruhare rw'inyongeramusaruro ziva mu nganda
  - c. Kunganira: Uruhare rwo guhindura uburyo bwo guhinga no korora
  - d. Kunganira: Uruhare rw'ihindagurika ry'ibihe
5. Ni ubuhe buryo bwa gakondo bwo guhinga no korora bwakoreshwaga bugatanga umusaruro kandi ntibubangamire urusobe rw'ibinyabuzima?
  - a. Kunganira: Bwerekanye no gufata neza ubutaka
  - b. Kunganira: Bujyanye no kurwanya indwara z'ibihingwa n'amatungo
  - c. Kunganira: Bwo guhitamo imbuto zo gutera n'amatungo yo korora
  - f. Kunganira: Ibindi
  - g. Kunganira: Uko leta ishyigikira ikoreshwa ry'ubwo buryo
6. Ni ubuhe buryo bw'imihingire n'imyororere muri ubu bubiri bwitaweho cyane mu karere kanyu?
  - a. Kunganira: Guhinga ibihingwa bimwe bitavanze no korora amatungo amwe atavanze
  - b. Kunganira: Kuvanga amoko atandukanye y'ibihingwa no korora amoko y'amatungo atandukanye

7. Waba waratangiye gukoresha amoko mashya y'imbuto ndetse no korora amoko mashya y'amatungo?

- a. Kunganira: Ni ayahe?
- b. Kunganira: Kuki watangiye kuyakoresha?
- c. Kunganira: Inyungu n'ingaruka zayo
- d. Kunganira: Ingaruka zayo ku rusobe rw'ibinyabuzima

8. Ujya ukoresha inyongeramusaruro ziva mu nganda?

- h. Kunganira: Uzikura he?
- i. Kunganira: Zifite izihe nyungu?
- j. Kunganira: Ingaruka zazo ni izihe
- k. Kunganira: Ingaruka zazo ku rusobe rw'ibinyabuzima

9. Mwita ku mihindagurikire y'ibihe mbere yo gukora ibikorwa by'ubuhinzi n'ubworozi?

- a. Kunganira: Gute?
- b. Kunganira: Amakuru ajyanye n'ihindagurika ry'ibihe muyakura he?

10. Abahinzi borozi bahabwa amahirwe yo kujya mu nama z'inzego zifatirwamo ibyemezo byerekeranye n'ubuhinzi-bworozi?

- a. Kunganira: Hehe kandi gute?
- b. Kunganira: Abagore barabikangurirwa?
- c. Probe: Urubyiruko rurabikangurirwa?

11. Uruhare rw'amategeko na politiki za leta mu kubungabunga urusobe rw'ibidukikije mu mirimo y'ubuhinzi n'ubworozi ni uruhe?

- a. Kunganira: Itegeko ry'ubutaka na politiki y'imikoreshereze y'ubutaka
- b. Kunganira: Itegeko ry'ibidukikije na politiki yo kurinda no kubungabunga ibidukikije
- c. Kunganira: Politiki y'ubuhinzi
- d. Kunganira: Ibindi

12. Ni iki kindi wumva wakongeraho kijyanye no kubungabunga urusobe rw'ibinyabuzima mu mirimo y'ubuhinzi n'ubworozi?

## **TUGUSHIMIYE IBISUBIZO UTANZE**

**Turamwishimiye Marie Rose**

## DRAFT SAMPLE SHEET B (ENGLISH VERSION)

### QUESTIONS FOR PEOPLE INVOLVED IN BIODIVERSITY CONSERVATION AND AGRICULTURE IN RWANDA (QUESTIONNAIRE DESIGNED FOR PARTICIPANTS IN FACE-TO-FACE INTERVIEWS)

**Thank you for taking time to answer these questions.**

#### Closed and open-ended questions

1. What impacts of agriculture on biodiversity do you experience in your activities?
2. Did you experience changes of agricultural practices over the years?
3. What have motivated those changes? (choose many possible answers among the ones provided below)
  - a) Poverty and soil degradation.....
  - b) The government's policy.....
  - c) To adapt to climate change.....
  - d) Others (specify).....
4. What are the advantages of such changes?
5. What are their disadvantages?
6. Are traditional plant and animal species still used in agriculture?
7. Have you ever experienced the disappearance of some traditional plant and animal species? Which are they and why have those species disappeared? **(Tick many possible answers)**
  - a) They have been replaced by new varieties.....
  - b) They cannot cope with the use of agrichemicals.....
  - c) They have been affected by the change of farming practices.....
  - d) They cannot adapt themselves to changing conditions.....
8. Tell me the traditional agricultural practices used in Rwanda which not only increased productivity but also conserved biodiversity
  - a. In relation to land conservation
  - b. In fighting against plant and livestock diseases
  - c. In selecting seeds and livestock to be reared
  - d. Others



- e. How does the government encourage their use?
9. Which among the two agriculture types is promoted in Rwanda?
    - a. Monoculture.....□
    - b. Multi-culture.....□
  10. Have there been introduction of new plant and animal species in Rwanda?
    - a. Which are they and what motivates their introduction?
    - b. What are their advantages?
    - d. What are their disadvantages?
    - e. What is their impact on biodiversity?
  11. How is the use of agrochemicals in Rwanda?
    - a. Where do users get them from?
    - b. What are their advantages?
    - c. What are their disadvantages?
    - d. What is their impact on biodiversity?
  12. Is climate change taken into account in agricultural activities?
    - c. When and how?
    - d. Where does the information on climate change come from?
  13. Do farmers participate in administrative meetings which discuss agricultural issues?
    - a. Where and how?
    - b. How are women encouraged?
    - c. How is the youth encouraged?
  14. What is the contribution of laws and policies in conserving biodiversity in agriculture?
    - a. Land law and land policy
    - b. Environmental law and environment policy?
    - c. Agricultural Policy
    - d. Others
  15. How does your institution intervene in the conservation of biodiversity in agricultural activities?
  16. What else would you like to say about conservation of biodiversity in agriculture?

**THANK YOU FOR YOUR ANSWERS.**

**Marie Rose Turamwishimiye**

## KINYARWANDA VERSION

### IBIBAZO BIGENEWE ABAKORA MU NZEGO Z'UBUYOBOZI, IBIGO BIKORA UBUSHAKASHATSI N'IMIRYANGO IDAHARANIRA INYUNGU BYITA KU BUHINZI N'UBWOROZI HAMWE NO KUBUNGABUNGA IBIDUKIKIJE

#### MURAKOZE GUTANGA IGIHE CYANYU NGO TUGANIRE KURI IBI BIBAZO

#### IBIBAZO

1. Ni izihe ngaruka ubuhinzi n'ubworozi bigira ku rusobe rw'ibinyabuzima muhura nazo mu mirimo yanyu?
2. Hari impinduka mwaba mwarabonye zabayeho uko imyaka yagiye ishira zerekeranye n'imirimo y'ubuhinzi n'ubworozi?
3. Ni iki cyateye izo mpinduka? (hitamo ibisubizo byinshi bishoboka muri ibi byatanzwe)
  - a. Ubukene no gusaza kw'ubutaka.....□
  - b. Politiki ya Leta.....□
  - c. Kubera impinduka z'ibihe.....□
  - d. Ibindi (bivuge).....□
4. Ibyiza by'izo mpinduka ni ibihe?
5. Ingaruka mbi zazo ni izihe?
6. Amoko ya gakondo y'imbutu n'amatungo aracyakoreshwa mu buhinzi?
7. Hari ayo mwaba muzi yashize atakiboneka? Ni ayahe? Yashizeho kubera izihe mpamvu?

#### (Hitamo ibisubizo byinshi bishoboka)

- a. Yasimbuwe n'amoko mashya.....□
  - b. Ntabasha guhangana n'inyongeramusaruro ziva mu nganda.....□
  - c. Yabangamiwe n'imihindagurikire y'uburyo bwo guhinga no korora.....□
  - d. Ntiyabashije guhangana n'ihindagurika ry'ibihe.....□
8. Vuga uburyo bwo guhinga no korora bwa gakondo bwakoreshwaga mu Rwanda bugatanga umusaruro mwiza kandi ntibubangamire urusobe rw'ibinyabuzima
- a. Uburyo bujyanye no kubungabunga neza ubutaka
  - b. Bujyanye no kurwanya indwara z'ibihingwa n'amatungo
  - c. Mu guhitamo imbuto zo guhinga n'amatungo yo korora

- d. Ibindi
- e. Guverinoma ishyigikira ubwo buryo bwa gakondo gute?
9. Ni ubuhe buryo bwo guhinga no korora muri ubu bubiri bushyigikiwe mu Rwanda?
- a. Guhinga igihingwa kimwe nta kuvanga cyangwa korora amatungo amwe nta kuyavanga.....□
- b. Guhinga ibihingwa byinshi bivanze cyangwa korora amatungo menshi uyavanze.....□
10. Haba hari amoko mashya y'ibihingwa n'amatungo yazanywe mu Rwanda?
- a. Ni ayahe? Ni iki cyatumye azanwa ngo akoreshwe?
- b. Afite izihe nyungu?
- d. Agira izihe ngaruka zitari nziza?
- e. Agira izihe ngaruka ku rusobe rw'ibinyabuzima?
11. Ikoreshwa ry'inyongeramusaruro ziva mu nganda rihagaze rite mu Rwanda?
- a. Abazikoresha bazikura he?
- b. Zifite izihe nyungu?
- c. Ingaruka zazo ni izihe?
- d. Zigira izihe ngaruka ku rusobe rw'ibinyabuzima?
12. Ihindagurika ry'ibihe ryitabwaho mu mirimo y'ubuhinzi n'ubworozi?
- a. Ryari kandi gute?
- b. Amakuru ajyanye n'ihindagurika ry'ibihe ava he?
13. Abahinzi-borozi bagira uruhare mu ifatwa ry'ibyemezo birebana n'ubuhinzi n'ubworozi?
- a. Ryari kandi gute?
- b. Abagore bakangurirwa kubigiramo uruhare?
- c. Urubyiruko rwo rubikangurirwa rute?
14. Uruhare rw'amategeko na za politiki za Leta mu kubungabunga urusobe rw'ibinyabuzima mu buhinzi n'ubworozi ni uruhe?
- a. Itegeko ry'ubutaka na politiki igenga ikoreshwa ry'ubutaka
- b. Itegeko rirengera ibidukikije na politiki yo kurinda no kubungabunga ibidukikije
- c. Politiki y'ubuhinzi n'ubworozi
- d. Ibindi
15. Ikigo yanyu kigira uruhe uruhare mu kubungabunga urusobe rw'ibinyabuzima mu mirimo y'ubuhinzi n'ubworozi?

16. Ni iki kindi kijyanye no kubungabunga urusobe rw'ibinyabuzima mu mirimo y'ubuhinzi n'ubworozi wumva wakongeraho?

### **TUGUSHIMIYE IBISUBIZO UDUHAYE**

**Turamwishimiye Marie Rose**