RESEARCH REPORT No. 2

THE POTENTIAL IMPACT OF THE EU-ACP ECONOMIC PARTNERSHIP AGREEMENT:

A CASE STUDY OF THE UGANDAN HORTICULTURE SECTOR

RESEARCH REPORT

National Environment Management Authority

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Foreword

Uganda has had formal trade ties with Europe since 1973 when, together with several other commonwealth countries, it signed the Lomé Convention. However, trade relations between Europe and Africa started much earlier, in 1957, at first covering 18 francophone countries and six European countries. The Lomé Conventions granted countries like Uganda non-reciprocal trade preferences with the European Community (EC) and later European Union (EU). From 2000 onwards, major changes occurred in the long-term trade relationship, between the ACP and the EU. First the Cotonou Agreement was signed. This agreement envisaged a removal of non-reciprocal trade preferences between the ACP and the EU to comply with the rules of the World Trade Organization (WTO) on Regional Trade Agreements. The previous agreement was seen as unfair to the other trade partners of the ACP and EU that were excluded. The non-reciprocal trade regime was to be replaced with a much more liberalized trading arrangement referred to as the Economic Partnership Agreements (EPAs). At the same time, Uganda entered into another non-reciprocal trade arrangement, the Everything but Arms agreement, with the EU that was to expire with the coming into force of the EPA, at the end of 2008. In November 2007, an interim EPA was signed between the EAC and the EU and terms were set for agreeing and signing the final EPA by July 2009.

Uganda's current and potential exports to the EU include traditionally sensitive agricultural products such as: maize, sugar, coffee, cotton, bananas, milk and dairy products, animal products, fruit and vegetable products, and oil seed products. The risks from the EPAs can be summarized into three categories. First, that the country will lose its competitive and/or comparative advantages because it cannot match the competitiveness of European producers and/or the EU and national support offered to European producers. Second, compared to many countries in the region, Uganda has already endured many years of political and economic turmoil. The country has had less than two decades of economic stability and may not be ready to be exposed to competition with much more resilient economies. Third, Uganda's economy is natural-resource based. For example, biodiversity services contributed about US$1 billion to the national economy in 1999. Thus, before liberalizing the trade opportunity with the EU there is a need to reflect on the consequences to the country's sustainable development. For this study, the consequences to sustainable development are described in light of the country's commitments to biodiversity conservation as well as the subsequent impacts on livelihoods of the poor who have a high dependence on the country's biodiversity resources.

Uganda expressed the importance of its biodiversity resources by signing, on 12 June 1992, and ratifying, on 8 September 1993, the United Nations Convention on Biological Diversity (CBD) with the aim of conserving and ensuring sustainable use of biodiversity and the fair and equitable sharing of the benefits arising from the utilization of genetic resources. It is hoped that this study will contribute additional insight to Uganda's negotiating position on the EPAs, especially with regard to environment and biodiversity use, conservation, and management.

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Preface

In July 2005, the United Nations Environment Programme launched an initiative to undertake integrated assessments (IA) of trade-related policies and biodiversity in the agricultural sector with the aim to support the implementation of the Convention on Biological Diversity (CBD). The overall objective of the initiative was to build capacity in national institutions and government departments to assess, design and implement policies that maximize development gains from trade-related policies in the agricultural sector while minimizing the impact on agricultural biodiversity. The initiative was in direct response to the CBD Conference of the Parties Decision VI/5, which called for the assessment of the impacts of trade liberalization on agricultural biological diversity. It specifically aimed to identify the potential impacts of the EU-ACP Economic Partnership Agreements (EPA) concluded between the European Union (EU) and Africa, Caribbean and Pacific (ACP) countries. Six ACP countries participated in the initiative by undertaking national-level assessment projects, including Jamaica, Mauritius, Cameroon, Papua New Guinea, Madagascar and Uganda.

Building on its earlier work on integrated assessment, UNEP began this initiative with the development of a *Policy Assessment Manual on Agriculture, Trade and Biodiversity*, putting particular emphasis on biodiversity impacts and opportunities. The Manual, which was prepared to assist a wide range of stakeholders, contains materials that explore the linkages between trade policies, the agricultural sector, ecosystem services and biodiversity, and provides a step-by-step approach to conducting an IA that incorporates biodiversity.

The six country studies applied the manual, and by identifying the impacts of trade-related policies in the agricultural sector on biodiversity in a national context aimed to support the further development of effective methodologies.

Throughout this UNEP initiative, focus has been placed on the impacts of trade-related policies in the agricultural sector, national policy responses, and the impacts of those policies on biological diversity. The specific objectives of the country projects were to:

1. Encourage a better understanding of the linkages between trade, development and biodiversity;
2. Build national, institutional and governmental capacities to conduct IA whereby the environmental, social and economic impact of trade-related policies in the agriculture sector are assessed, with particular attention on the protection of biological diversity;
3. Enhance capacity of government policy-makers, decision-makers in the private sector, and civil society, to develop and implement integrated approaches to national policy, which balance trade, development and biodiversity goals;
4. Develop and refine methodologies for assessing agricultural biodiversity and indicators based on specific circumstances within countries, and assessing the contribution of agricultural biodiversity (and its use) to poverty alleviation;
5. Enable ACP countries to integrate the sustainable management of biodiversity and other natural resources in their negotiation and implementation of the EU-ACP EPAs; and

6. Enhance civil society's engagement in IA and policy-making processes relating to the implementation of both the CBD and the EPAs.

The ACP countries that participated in the initiative received technical and financial support through UNEP to conduct their IAs. Further funding is being provided to assist the countries involved follow up on the results of the studies further develop and implement the policy recommendations that they developed. This step towards implementation provides an opportunity to reinforce the expected outcomes of the IAs, further strengthen capacity, inter-institutional coordination and stakeholder involvement at the national level, to ultimately help ensure that trade liberalization occurs in a way that supports sustainability and strengthens the implementation of the CBD.

Financial support to the initiative was provided by the European Commission and the Swedish International Development Cooperation Agency.

The United Nations Environment Programme

The United Nations Environment Programme (UNEP) is the overall coordinating environmental organization of the United Nations system. Its mission is to provide leadership and encourage partnerships in caring for the environment by inspiring, informing and enabling nations and people to improve their quality of life without compromising that of future generations.

In accordance with its mandate, UNEP works to observe, monitor and assess the state of the global environment, improve the scientific understanding of how environmental change occurs, and in turn, how such change can be managed by action-oriented national policies and international agreements. UNEP's capacity-building work thus centers on helping countries strengthen environmental management in diverse areas that include freshwater and land resource management, the conservation and sustainable use of biodiversity, marine and coastal ecosystem management, and cleaner industrial production and eco-efficiency, among many others.

UNEP, which is headquartered in Nairobi, Kenya, marked its first 35 years of service in 2007. During this time, in partnership with a global array of collaborating organizations, UNEP has achieved major advances in the development of international environmental policy and law, environmental monitoring and assessment, and the understanding of the science of global change. This work also supports the successful development and implementation of the world's major environmental conventions.

In parallel, UNEP administers several multilateral environmental agreements (MEAs) including the Vienna Convention's Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (SBC), the Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention, PIC) and the Cartagena Protocol on Bio-safety to the Convention on Biological Diversity as well as the Stockholm Convention on Persistent Organic Pollutants (POPs).

Division of Technology, Industry and Economics

The mission of the Division of Technology, Industry and Economics (DTIE) is to encourage decision-makers in government, local authorities and industry to develop and adopt policies, strategies and practices that are cleaner and safer, make efficient use of natural resources, ensure environmentally sound management of chemicals, and reduce pollution and risks for humans and the environment. In addition, it seeks to enable implementation of conventions and international agreements and encourage the internalization of environmental costs.

UNEP DTIE's strategy in carrying out these objectives is to influence decision making through partnerships with other international organizations, governmental authorities, business and industry, and non-governmental organizations; facilitate knowledge management through networks; support implementation of conventions; and work closely with UNEP regional offices. The Division, with its Director and Division Office in Paris, consists of one centre and five branches located in Paris, Geneva and Osaka.

Economics and Trade Branch

The Economics and Trade Branch (ETB) is one of the five branches of DTIE. ETB seeks to support a transition to a green economy by enhancing the capacity of governments, businesses and civil society to integrate environmental considerations in economic, trade, and financial policies and practices. In so doing, ETB focuses its activities on:

1. Stimulating investment in green economic sectors;
2. Promoting integrated policy assessment and design;
3. Strengthening environmental management through subsidy reform;
4. Promoting mutually supportive trade and environment policies; and
5. Enhancing the role of the financial sector in sustainable development.

Over the last decade, ETB has been a leader in the area of economic and trade policy assessment through its projects and activities focused on building national capacities to undertake integrated assessments – a process for analysing the economic, environmental and social effects of current and future policies, examining the linkages between these effects, and formulating policy response packages and measures aimed at promoting sustainable development.

This work has provided countries with the necessary information and analysis to limit and mitigate negative consequences from economic and trade policies and to enhance positive effects. The assessment techniques and tools developed over the years are now being applied to assist countries in transitioning towards a green economy.

For more information on the general programme of the Economics and Trade Branch, please contact:

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Acronyms and abbreviations

ABS	Access to genetic resources and benefit sharing
ACP	Africa, Caribbean, and Pacific countries
CBD	United Nations Convention on Biological Diversity
COMESA	Common Market for East and Southern Africa
DRC	Democratic Republic of Congo
EAC	East African Community
EDF	European Development Fund
EIA	Environmental impact assessment
EPA	Economic Partnership Agreement
EPRC	Economic Policy Research Centre
ETB	Economics and Trade Branch
EU	European Union
FFV	Fresh fruit and vegetables
GAP	Good Agricultural Practice
GDP	Gross domestic product
GMO	Genetically modified organism
HORTEXA	Horticultural Exporters Association
HPOU	Horticulture Promotion Organization of Uganda
IA	Integrated assessment
ISO	International Standards Organization
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MFPED	Ministry of Finance Planning and Economic Development
MoGLSD	Ministry of Gender, Labour and Social Development
MTTI	Ministry of Trade, Tourism and Industry
MPS	Milieu Programma Sierteelt
MUIENR	Makerere University Institute of Environment and Natural Resources
MSY	Maximum sustainable yield
NARO	National Agricultural Research Organization
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environment Management Authority
NGO	Non-governmental organization
NTB	Non-tariff barriers
OCT	Overseas Countries and Territories
PEAP	Poverty Eradication Action Plan
PGRFA	Plant Genetic Resources for Food and Agriculture
PMA	Plan for Modernization of Agriculture
PSC	Project Steering Committee
RCA	Root-cause analysis
SPS	Sanitary and phytosanitary
SWOT	Strengths, weaknesses, opportunities and threats
TBT	Technical Barriers to Trade
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
UEPB	Uganda Export Promotion Board
UFEA	Uganda Flower Exporters Association
UNEP	United Nations Environment Programme
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Executive Summary

The United Nations Environment Programme (UNEP), in collaboration with the United Nations Convention on Biological Diversity (CBD), launched a five-year initiative in 2005 to support the implementation of country studies in six Africa, Caribbean and Pacific (ACP) countries, including Uganda. The studies aim to build national capacities to understand, examine and assess the environmental, social and economic impact of trade-related policies in the agriculture sector and emphasize the protection of biological diversity and the promotion of sustainable development. They are intended to increase the understanding of factors that lead to biodiversity loss, and to support the implementation of the CBD.

Uganda signed an interim Economic Partnership Agreement (EPA) with the European Union (EU) in November 2007, which established the new trading arrangement between Uganda (and the East African Community (EAC)), pursuant to the Cotonou Agreement. Until recently, the EU was Uganda's most important export market. At present, it accounts for 24.3 per cent of Uganda's export market, second only to the countries of the Common Market for East and Southern Africa (COMESA), which account for 37 per cent of Uganda's exports. Over the past eight years, stakeholders in the EU and in the ACP countries have been discussing the terms of the EPA. One of the points of debate was the potential impact of the EPAs on the environment and natural resources, including biodiversity resources. UNEP commissioned this integrated assessment (IA) study to provide additional insight into the potential impacts of an EPA on Uganda's biological diversity, specifically with respect to the horticulture sector.

In Uganda, the need to conserve biodiversity has been articulated in the Constitution of the Republic of Uganda, the National Environment Act Cap 153, the National Environment Management Policy, sectoral laws and policies, and the National Biodiversity Strategy and Action Plan (NBSAP). The NBSAP provides a framework for implementing Uganda's obligations under the CBD, including the achievement of the CBD 2010 biodiversity targets and biodiversity conservation in general.

Considerable focus has been placed in Uganda on protecting biodiversity in protected areas (such as national parks, wildlife reserves, forest reserves and wetlands), but little attention has been paid to the influence of trade on biodiversity in general and on agro-biodiversity in particular. Increasing trade in agricultural products is likely to have an impact on biodiversity outside protected areas, particularly in agro-ecosystems. Uganda's horticultural exports contributed about US$35million per year to the country's total exports. The subsector has direct links to the country's biodiversity resources through the volume of commodity exports, and indirect links through changes in land use, water and energy use, and the use of agrochemicals.

The methodology employed in this IA included a literature review, and an assessment of relevant criteria and indicators. Baseline conditions were identified and policy options were developed based on the following three scenarios:

- *Business as usual:* maintaining the current terms of trade with the EU.

- *Leading edge:* expanding the contribution of trade to Uganda's economy to equal the leading countries in the region (such as Kenya and Ethiopia).
- *Matching the best*: matching the country's most recent best export performance to the EU.

These policy scenarios were developed to respond to Uganda's Ministry of Trade, Tourism and Industry (MTTI) export policy and the country's development goals (the Poverty Eradication Action Plan (PEAP) 2004/05-2007/08). Data were collected through discussions and interviews with stakeholders. Analysis was carried out using a simplified regression model, and a root-cause approach.

The IA showed that the *leading edge* and *matching the best* scenarios offered a realistic opportunity for expansion in the horticulture sub-sector. For the flower industry, growth in the *matching the best* scenario can only be achieved if the price of flowers continues to increase over the 17-year period employed in the model, and this is unlikely. On the other hand, the *leading edge* scenario provided growth projections based on growth in volume achieved through intensification and/or extensification of flower production. The *leading edge* scenario is plausible if the EPA enables Uganda to become at least as competitive as its major trade competitors in the region—Kenya and Ethiopia. At present, Uganda's horticultural sector is less competitive because the country has high marketing and transportation costs (as a result of air freight). Uganda is a long distance from the EU market, and volumes are still relatively low. However, exports of organic agriculture have grown in value from US$7.7 in 2005 to US$22.5 million in 2008, despite the costs of air freight. This is because of the premiums offered in the market and the relatively high volumes that Uganda is able to produce. Growth in horticulture (consistent with the *matching the best* and *leading edge* scenarios) is likely to come from organic agricultural exports.

In the flower sub-sector, the *matching the best* scenario offers the least distortion in terms of additional investment, increased land area, and resources compared to export earnings. However, that scenario also projects a continuous rise in prices, which means that Uganda would have to enter the higher value large-head-size flower market, and gradually increase its volume of sales for those products, in order for that scenario to be plausible. The *leading edge* scenario appears to be more readily achievable in terms of investment for fresh fruits and vegetables. It offers an opportunity to increase the economic performance of a large number of actors in the sector, and is consistent with national policy on trade development. Also, the investment in both the flower industry and with respect to fresh fruits and vegetables would benefit from a greater focus on a higher value market. The fruits and vegetables industry is limited by low levels of productivity. The two growth paths are plausible but the *matching the best* scenario, driven by higher prices and increased productivity, would lead to a more sustainable environment and improved biodiversity resources compared to the *leading edge* scenario, which is based on increased productivity.

The optimal path for future trade policy in the sector would be to adopt a cautious approach in the floriculture industry and to pursue growth consistent with previous best performance for fresh fruit and vegetables. Aggressive growth in the flower industry would require high levels of external inputs, which are expensive and are likely to damage the environment, particularly biodiversity. These environmental concerns are compounded by the fact that

there are very few less-polluting inputs available to substitute for those that are already in use in the flower industry, and therefore the potential for mitigation is low.

For fresh fruits and vegetables, the focus should be on aggressive growth in the sector, given that Uganda is already among the leading producers of fresh fruits and vegetables in the world with a competitive edge in organic agricultural production. Productivity should be enhanced through the adoption of improved technologies (such as such drip irrigation and improved seeds) and a comprehensive organic agriculture policy should be developed and supported by a legislative and administrative structure at the sectoral level.

Several institutional concerns limit opportunities for growth in horticultural exports. These include: costly certifications, limited market access, lack of exporter and producer associations, supply side constraints, lack of a well-developed local market, and information gaps. Many fruit and vegetable exporters are not certified to EU market standards because they cannot afford the certification fees. Developing a domestic certification equivalent to the EU standard could help address this challenge.

There are additional challenges facing exporters of fruits and vegetables to the EU. Several traders operate without formal contracts with buyers. Exporters of fruits and vegetables tend to produce on a small scale and have difficulties increasing volume to meet the demands of the market. The domestic market for fruit, vegetables and flowers is generally poorly developed and offers a limited fallback position for exporters. Therefore, when producers and exporters invest in produce handling systems (such as cold chain storage) they have to ensure that their operating costs can be covered by the prices offered for exports.

The findings of the IA can help Uganda plan a future strategy in the context of the EPA, which avoids potential biodiversity losses while exploiting opportunities for higher incomes offered by adopting more sustainable production techniques. The greatest opportunity offered by pursuing sustainable production is the lasting economic, environmental and social benefits for developing countries, such as Uganda. The policy recommendations developed from the IA have been proposed to address some of the challenges facing the horticulture sector, to encourage the development of sustainable production practices, to safeguard sustainability and, to enhance the conservation and sustainable use of biodiversity in the horticultural sector.

Recommendations for the Government of Uganda

- Under the EPA, pursue an aggressive trade expansion policy with the EU, as the current state of trade favours the EU.
- Address issues of low productivity to achieve higher levels of growth, through an emphasis on research, innovation, technological development, technology transfer, and access to capital.
- Integrate a synthesis of the linkages between biodiversity and trade into the operations of government in areas such as agriculture, energy, lands, environment and natural resources, and other relevant sectors.

- Undertake capacity building on the valuation and monitoring of impacts arising from trade-related development on the economy, the environment, ecosystem services, and social welfare.
- Conduct research to quantify the costs and benefits of certification, effects of pollution on ecosystems services, and components of biodiversity (mainly species and habitats).

Recommendations for private sector

- Encourage all producers (smallholders and large-scale) to engage in the export of horticultural goods to the EU market, through, for example, training, institutionalization (forming cooperatives or companies), improving access to inputs, capital and information, and offering trade concessions.
- Companies exporting horticultural goods should engage in corporate social responsibility in the communities where they operate and should invest in the restoration and maintenance of the ecosystems that sustain their operations.
- The horticulture industry should use technologies that will ensure efficiency in the use of resources (for example water, energy, fertilizer and land) and environmental conservation, particularly given the threat of climate change.

Recommendations for the EU

- Undertake capacity building for monitoring the impacts of climate change on biodiversity and implement activities to mitigate any adverse impacts, including through technical and financial assistance. This is crucial because other factors, including climate change, are likely to exacerbate the loss of biodiversity, increase the risk of floods and droughts, reduce the reliability of hydropower and biomass production, and affect agricultural productivity and land use.
- The EU and other trade partners (including under the umbrella of the WTO) should recognize and support efforts by farmers and other actors in Uganda to conserve the integrity of its biodiversity and to maintain ownership over the rights of the country's biodiversity. This will involve support for current efforts to complete policy and legislation on biodiversity conservation and intellectual property rights.
- Support the Government of Uganda to develop and improve its share of trade with the EU through investment (infrastructure, research, and building human and technological capacity) in sectors that contribute to the trade balance, such as energy, water, and agriculture, with the aim of increasing agricultural productivity.
- Undertake a valuation of Uganda's ecosystems and biodiversity resources to inform future policy and investment decisions. The most recent valuation of Uganda's biodiversity was conducted 10 years ago and was based on less precise methodologies and information than currently exist.

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1 Introduction

This integrated assessment (IA) examines the potential impacts on the horticulture sector of Uganda's Economic Partnership Agreement (EPA) with the European Union (EU). Horticulture was selected as the focus of the IA because it contributes significantly to Uganda's total exports and is at the centre of the EPA negotiations. Under the EPA, increased trade with the EU in horticulture could have an impact on biodiversity in several ways, including as a result of the conversion of natural ecosystems to croplands and the increased use of agrochemicals. This IA aims to contribute to the understanding of the critical interdependencies among economic growth, social development, and the environment and biodiversity. It proposes policies to encourage the integration of concerns related to biodiversity in future trade agreements.

This IA describes the potential economic, social, and environmental impacts of further liberalization under the EPA, and consequences for Uganda's biodiversity. It also explores the impacts of alternate export strategies for Uganda as its trade regime with the EU moves from the Cotonou Agreement and the *Everything but Arms* initiative to the EPA. The IA aims to ensure that the EPA fully takes into account economic, social, and environmental concerns, in particular with respect to the sustainable use of biodiversity in the horticulture and floriculture sectors and that the national response and national action plan are fully integrated and respond to the recommendations in this IA.

The specific objectives of this study were to:

1. Strengthen the analytical and technical capacity of Uganda's negotiators, which include the Ministry of Trade, Tourism and Industry (MTTI), the Inter-Institutional Trade Committee, and the Ugandan Parliament, to enable them to integrate sustainable management of biodiversity and other natural resources into the negotiation and implementation of the EPA;
2. Enhance stakeholder engagement in IA and policy-making processes relating to both the EPA and the implementation of the United Nations Convention on Biological Diversity (CBD);
3. Enhance the capacity of government policy-makers, private sector decision makers, and civil society to develop and implement integrated national responses to the findings of the IA, to enhance positive effects and mitigate any negative effects of trade liberalization; and
4. Support the implementation of the CBD and the National Biodiversity Strategy and Action Plan (NBSAP) through an improved understanding of the factors related to trade policy that lead to biodiversity loss.

At the time that the IA was conducted, Uganda had already signed an interim EPA (along with the other East African countries of Kenya, the Republic of Tanzania, Rwanda, and Burundi) but had not fully negotiated the final EPA. This presented a window of opportunity to contribute to Uganda's negotiating position in a way that could have a positive influence on issues related to biodiversity conservation and environmental management. The IA can contribute to the implementation of Uganda's obligations under the CBD through the further refinement and development of methodologies to assess agricultural biodiversity,

proposing measures to strengthen capacity for coordination of biodiversity, trade, and development objectives, and implementing policies that enhance positive effects and mitigate negative effects on biodiversity of trade-related and other policies that have an impact on agriculture and the wider economy.

Chapter 2 of this IA presents background issues that will be important for the IA. These include Uganda's geographical location, the rich diversity of Uganda's biodiversity, as well as threats to biodiversity from increasing populations, which put pressure on the country's natural resources. It also introduces the linkages between biodiversity and trade and the importance of healthy ecosystems for human wellbeing.

Chapter 3 discusses Uganda's important trading relationships, in particular with the EU. As a member of the Africa, Caribbean and Pacific (ACP) countries, Uganda has enjoyed the benefits of non-reciprocal trade preferences with the EU under successive Lomé Conventions. However, under the new EPA, this will change, as the agreement is negotiated to ensure reciprocity. This will open Uganda up to competition from other ACP countries but also from non-ACP countries, although there are opportunities for development cooperation under the EPA. Uganda is also involved in liberalization efforts in the region.

In Chapter 4 the horticulture and cut-flower industries are presented, both with respect to their production and their importance to trade. The EU is the most important destination for cut flowers; for horticulture the regional market is also important. The small but growing organic production of fruits and vegetables is considered vital for Uganda's future growth in this industry.

Chapter 5 describes the methodological approach employed for the assessment. This includes the development of a conceptual framework that illustrates the linkages between trade, the horticulture sector, and biodiversity. It also outlines the major steps taken in conducting an IA, including developing indicators and analytical tools. This IA relied for its approach, on a combination of scenario analysis, regression analysis, and root-cause analysis.

The findings of the IA are discussed in Chapter 6. During the analysis projections were carried out for each of the three scenarios (including a baseline scenario) in terms of the impacts of the EPA on trade in cut flowers and fresh fruit and vegetables, between 2009 and 2025. With respect to the flower industry, with the exception of the business-as-usual scenario, trade in both the value and volume of flower exports was projected to rise sharply. Similarly, with respect to fresh fruits and vegetables (FFV), strong growth was projected in the scenario analysis, indicating the potential for high levels of growth in the industry. It is expected that this growth would be accompanied by a sharp expansion in land under cultivation and more intensive agricultural techniques. This would also be expected to lead also to concomitant increases in inputs such as water, energy and agrochemicals. Several institutional challenges are also identified in this section.

Chapter 7 presents conclusions derived from the findings of the IA. It notes that increased stress on the environment and on biodiversity are likely to result from increases in the scale of, and levels of intensification in, the FFV and flower industries. In particular, water and

energy use are expected to rise. Negative impacts can be mitigated, however, through employing more efficient production technology and water treatment processes, or, for example, by using bio-fuels as an alternative energy source to replace fossil fuels. The conclusions also make note that one of the most promising areas for expansion is in the organic sector for fruits and vegetables. The study cautions against aggressive growth in the cut-flower industry, which would require additional inputs, such as agrochemicals, that could threaten biodiversity and ecosystems, in particular, wetlands. However, it notes that in the FFV industry, low levels of productivity should be addressed and attention should be placed on developing organic products, which could offer benefits for biodiversity.

Chapter 8 presents several policy recommendations. These are directed at the major stakeholders and actors including the Government of Uganda, the private sector, and the EU.

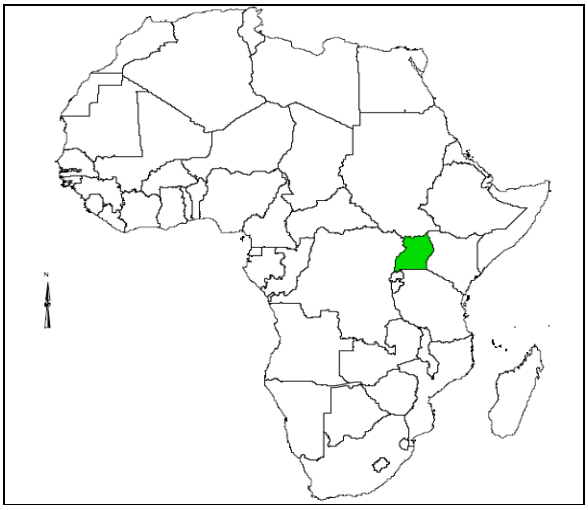
Finally, the technical report included in Annex 3 provides details related to the individuals and organizations that made up the project team and the project steering committee that guided the work. It also presents a summary of the stakeholders involved and the meetings that were held over the course of the project. Further, it provides additional details related to the methodology, including the major challenges that faced the project team, along with specific achievements.

2 Background

2.1 Uganda's geography

Uganda is a landlocked country located in the Eastern region of Africa (see Figure 1). The country is bordered to the east by Kenya, the Republic of Tanzania and Rwanda in the south, Democratic Republic of Congo (DRC) in the west, and Sudan in the north. Uganda lies astride the equator between latitude 4^{o} North and 1^{o} South and stretches from longitudes 29.5^{o} to 35^{o}, covering a total area of 236 000 km^2. Of the country's total area, 194 000 km^2 is dry land, and 33 926 km^2 and 7 674 km^2 are open water and permanent wetlands, respectively.

Figure 1: Location of Uganda in Africa



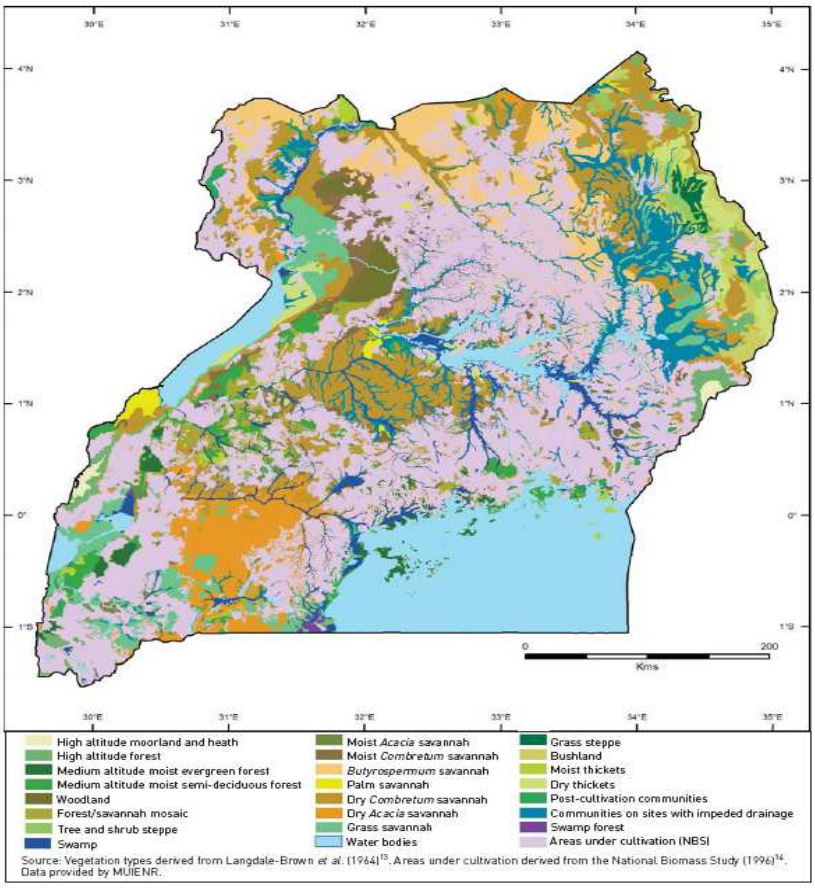
Source: NEMA (2002).

2.2 Biodiversity in Uganda

2.2.1 General description of biodiversity in Uganda

Uganda has exceptional levels of diversity because of its location in the zone where the East African savannah and the West African rain forests overlap. The country is well endowed with rich biodiversity and natural resources including water bodies, terrestrial biomes, equatorial climate and mineral wealth (see Figure 2). Uganda is home to seven of 18 *phytochoria* in Africa and is one of the countries with the highest levels of biological diversity on the continent (Davenport and Matthews 1995). Over half of all African bird species live in Uganda, and the country is the second richest in mammal species in Africa. Despite its small size, Uganda is the ninth richest country in the world in terms of mammal species. Conservation of biological diversity has largely been undertaken *in situ* and has focused on species and ecosystems, often in protected areas.

Figure 2: Vegetation types and areas under cultivation in Uganda



Source: Cottray *et al.* (2006).

The major natural ecosystems in Uganda are: forests, woodlands, grasslands, wetlands, and open water. Protected areas include national parks, wildlife reserves, wildlife sanctuaries, community wildlife areas, central forest reserves, and local forest reserves. Both Lake

George and Lake Nabugabo have been gazetted as Ramsar sites. Other ecologically important sites include Bwindi Impenetrable National Park, Mount Rwenzori National Park, and Queen Elizabeth National Park. A total of 18 783 biotic species have been recorded in Uganda and some locations have been identified as biodiversity hotspots (see Table 1).

Table 1: Key biodiversity hot spots in Uganda

Location	Purpose
Mgahinga Gorilla National Park	Mountain Gorilla (*Gorilla berengei*) and other regionally and globally important species
Bwindi Impenetrable National Park	Mountain Gorilla (*Gorilla berengei*) and other regionally and globally important species
Rwenzori Mountain National Park	Bay duiker (*Ceplahaphus leucogaster*)
Sango Bay wetland and forest ecosystem	Biodiversity of global importance
Kibaale National Park	Regional and globally endemic species
Dry mountains of Karamoja-Napak, Kadam, Timu, Morungole, Moroto	Regional and globally endemic species
Lake Victoria	Cichlid and Nile perch species (alien species invasion)
Papyrus swamps L. Edward, George and Bunyonyi	Endemic papyrus (*Chloropeta gracilirostis*)
Mount Elgon National Park	Regional and globally endemic species

Source: NEMA (2007).

2.2.2 Biodiversity at the ecosystem level

The major natural biodiversity ecosystems are represented by forest, grassland woodlands and wetland ecosystems, both above and below ground. Natural forests and woodlands together cover approximately 36 270 km^2 (FAO 2005) of which a quarter is protected as forest reserves with the remainder contained in wildlife protected areas or on private property.[1] Wetland ecosystems include wetlands associated with lakes, rivers and flood plains, and a system of small unconnected units that depend on water from surrounding uplands. Wetland ecosystem coverage is estimated at approximately 12.5 per cent of the country's total land surface area, with 30 000 km^2 of Uganda under seasonal or permanent wetlands (NEMA 2002). Open water resources cover up to 17 per cent of the country's surface area comprising five major lakes (Victoria, Albert, Kyoga, Edward and George) about 160 minor lakes, an extensive river system, groundwater, and rain harvest in dams and ponds.

Relatively little information exists on soil and underground biodiversity although several studies have focused on the importance of soil biodiversity for agricultural productivity. Understanding the complex interactions between the biotic and abiotic components of soil could provide an incentive to pursue the conservation of soil biodiversity beyond simply as a resource for agriculture.

[1] The major types of forests are: high altitude moorland and heath, high altitude forests, medium altitude forests and wooded savannah. There are two types of savannah woodlands: the *Combretaceious* and the *Butyrospermum* (Langdale-Brown *et al*. 1964).

2.2.3 Agro-biodiversity

Agro-biodiversity encompasses many types of biological resources including crop varieties, livestock and fish species, soil organisms in cultivated areas and biological control agents for pests. Cultural practices and indigenous knowledge of biodiversity play a vital role in the conservation of agro-biodiversity. Efforts to conserve agro-biodiversity began in the 1960s. Makerere University's Faculty of Agriculture and the Agricultural Research Institutes at Namulonge and Serere have collected forage germplasm for conservation. A National Gene Bank for Agro-biodiversity has been established by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). Exotic species of grasses and legumes have also been collected as a way to increase the base of genetic resources.

Loss of agro-biodiversity presents risks to food production in three critical ways. First, it reduces future options through the loss of genetic information and genetic material that could be introduced, through breeding, into domesticated crops and stock. Second, it creates an increased susceptibility to disease and pests because fewer varieties and species are grown over large areas. And third, it destabilizes ecosystem processes, for example, by disrupting soil formation and predator-prey cycles.

2.2.4 Biodiversity at the genetic level

The genetic characterization of populations of both wild and domestic species is in its early stages. Various breeding experiments have been conducted in several agricultural research institutes, including Namulonge (cotton, potato and cassava), Kawanda (horticultural crops and banana) and Serere (cereal crops and livestock). A microgenetic laboratory was established at Makerere University's Institute of Environment and Natural Resources (MUIENR) with a view to training local researchers in genetic characterization, including facilitating genetic studies on wildlife, crops, and domestic animals. It is evident that even before the capacity for high-level genetic studies has been acquired, the large-scale introduction of improved varieties of both plants and animals will adversely affect indigenous varieties. Thus, it is important that the genetic attributes of the indigenous breeds and varieties are preserved before they are completely lost through hybridization and other forms of genetic manipulation.

2.2.5 *In situ* conservation

Uganda's biodiversity conservation efforts within protected areas are governed by the Wildlife Act Cap 200 and the National Forestry and Tree Planting Act 2003. These two legislative frameworks aim to achieve the CBD objectives related to conservation and sustainable use of biological diversity and contain provisions for guiding access to biological resources and their sustainable use. There are other legislative instruments relating to Access to Genetic Resources and Benefit Sharing (ABS), which are highlighted in section 2.5 of this report. Regulations concerning *in situ* biodiversity conservation date back to the 1920s. The initial target was to protect forests, which was followed by legislation for game preservation in the 1930s, and for national parks in the 1950s. Six forest reserves (Semliki, Rwenzori Mountains, Kibale, Mgahinga Gorilla, Bwindi Impenetrable and Mount Elgon) were upgraded to national parks in 1990 in order to strengthen biodiversity conservation. Over

the past 30 years, many of Uganda's wildlife protected areas have been severely encroached upon, and their wildlife populations have been drastically reduced as a result of illegal hunting and habitat destruction. This has led to the extinction, in the area, of several large mammal species (such as the rhino, Derby's eland, and bongo) and has left other species threatened (such as the Roan gazelle). In an attempt to ensure the protection of all representative ecosystems, assessment programs for protected areas have been undertaken since 1997, which has led to changes in legislation.

2.2.6 Conservation outside protected areas

The existing legal framework for biodiversity conservation provides for conservation both inside and outside protected areas. The NBSAP has been developed and is awaiting government approval. The development of the plan was coordinated by the National Environment Management Authority (NEMA) under the Ministry of Water, Lands and Environment. The NBSAP targets several issues that promote conservation of biological diversity inside and outside protected areas, including wetlands conservation and management, and environmental impact assessment (EIA) for projects and programmes likely to have adverse impacts on biodiversity. There have also been several attempts to promote sustainable development in "buffer zones" adjacent to protected areas, with the goal of ensuring the conservation of critical ecosystems that exist outside those areas that are formally protected. These efforts are undertaken through education and awareness-raising efforts and through the identification of the benefits that can be derived from conservation. In addition, regulations have been instituted (under the umbrella legislation relating to environment, wildlife, and forestry) for wildlife use rights and to manage degraded fragile ecosystems, such as riverbanks, lakeshores and hilly and mountainous areas. Access to the genetic resources outside protected areas is governed by Uganda's ABS regulations.

2.2.7 *Ex situ* biodiversity conservation

The National Environment Act requires that measures be taken to ensure *ex situ* conservation of biological diversity through *inter alia*, the development of guidelines for establishing and operating germplasm banks, botanical gardens, zoos, and animal orphanages. *Ex situ* conservation is also encouraged on private land, such as through the conservation of domesticated and wild relatives of beneficial crops and medicinal plants.

Although Uganda has centres for *ex situ* biodiversity conservation, it does not yet have an inventory of existing institutions, including their *ex situ* collections. The focal points for the collection of microbial genetic resources are the National Agricultural Research Organization (NARO), the MAAIF and the MUIENR. For plant genetic resources, the focal point is the NARO. The NARO runs the botanical gardens in Entebbe and the seed bank at Kawanda Agricultural Research Institute. Makerere University has a herbarium and a botanical garden. The herbarium holds plant collections that date from 1946 and serves as the National Herbarium.

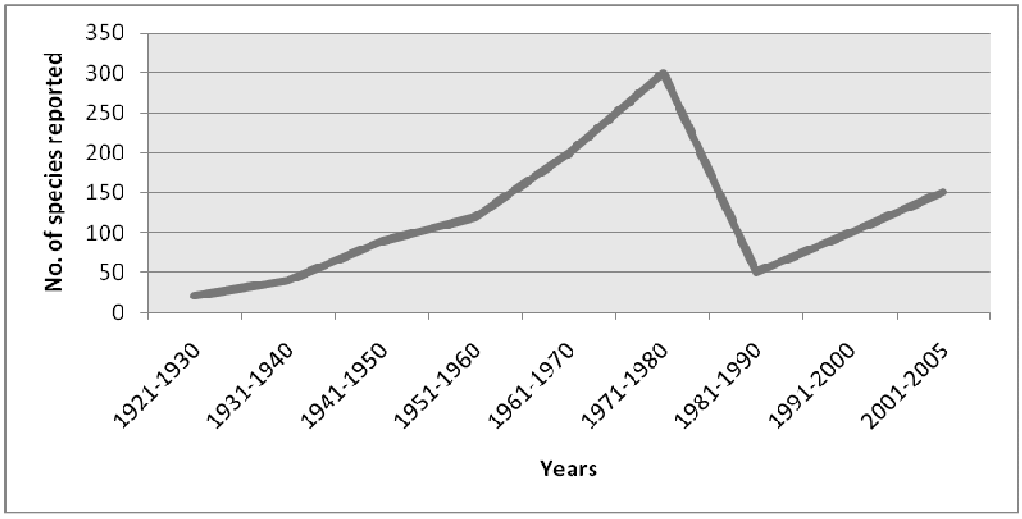
The focal point for animal genetic resources is the MAAIF. Other institutions with collections are the NARO, the Uganda Wildlife Education Centre, the Makerere Museum, the Ziwa

Ranch for rhinos, and Ngamba Island for chimpanzees. There are other depositories of genetic materials scattered in some higher institutions of learning and research facilities although no specific database exists with respect to the status of the information available.

2.2.8 Aquatic biodiversity

Uganda is extremely rich in aquatic resources. Ugandan territory includes 43 per cent of Lake Victoria, along with Lakes Kyoga, George, Edward and Albert, and a system of rivers and wetlands. The fauna associated with the Great Lakes of East Africa are dominated and shaped by members of the *Cichlidae* family, which are endemic to Uganda (MUIENR 2006). Fish biodiversity is the major indicator used for assessing the state of biodiversity in Uganda's aquatic systems. Over 50 per cent of the native fish in Lake Victoria disappeared between 1981 and 1990 and about two-thirds of the haplochromine cichlids are presumed to be extinct (see Figure 3). The rapid decline in the diversity of fish species during that period has been attributed to the introduction of exotic species (such as the Nile perch), habitat degradation (for example, through siltation and pollution), species invasion (such as water hyacinths), and over harvesting.

Figure 3: Status of recorded fish biodiversity up to July 2005



Source: LVEMP (2005).

The continued survival of biodiversity in Uganda's freshwater systems and habitats is being threatened by anthropogenic activities such as drainage of swamps, deforestation, poor fishing techniques and dumping of industrial and agricultural waste (LVEMP 2005). In view of predator-prey population dynamics and the apparent recovery of many native species of fish in Lake Victoria (particularly the haplochromines), it is important that monitoring of both the recovery and suitability of critical habitats be undertaken. It is also essential to continue identifying those haplochromines that have not been assigned scientific names. The long-term fluctuation in fish stock densities requires monitoring of breeding habits and breeding intensity in relation to seasonal and other environmental changes (LVEMP 2005).

2.3 Threats to biodiversity conservation in Uganda

In recent years, Uganda has lost natural resources at an alarming rate. In 1890, forests and woodlands covered approximately 45 per cent of the total land area. That coverage is now around 18 per cent. Over 90 per cent of the population depends directly on the exploitation of natural resources for their livelihoods. Uganda's population was estimated at 28 million 2008, and its growth rate of 3.3 per cent per year is among the highest in the world. As the population increases, demand for resources increases and fragile ecosystems including forests, wetlands, and mountainous areas are being increasingly encroached upon. Degradation of these important ecosystems affects the productivity of natural resources and trade (USAID 2006). In 2006, it was estimated that the country lost 72 000 hectares of forest (6 000 hectares per month) (NEMA 2007). Between 2005 and 2006, encroachments on forest reserves increased by about 22 per cent. With the high rate of exploitation it has been predicted that forests resources will be exhausted within 50 years.

It has been forecast that over the next 40 years the pressure on natural resources will increase five-fold. This is due to the rapidly expanding population, which is projected to reach roughly 130 million during that time. High population densities are a catalyst for poverty and environmental degradation. The pressure on resources may lead to a loss of forest cover and biodiversity, destruction of water, soil erosion, landslides, siltation of water bodies, reduced agricultural potential, loss of other ecosystem services, as well as reduced government revenue. With low electricity connectivity (estimated at 8 per cent) a large proportion of the population depends on fuel wood and charcoal for domestic energy requirements (NEMA 2007). It is estimated that 16 million tonnes of firewood and four million tonnes of charcoal are consumed for domestic energy per year (NEMA 2007). The high demand for these products has led to increased deforestation and land degradation. It has been estimated that around 30 per cent of the Tropical High Forest, which provide high-value forest products, environmental services and biodiversity, will be lost. The communities living adjacent to forest reserves (estimated at 15 per cent of the total number of parishes) rely heavily on biodiversity for their livelihoods. Loss of biodiversity makes ecosystems vulnerable to shocks and disturbances, less resilient and less supportive for humans. Forest resources also absorb carbon dioxide, reducing the accumulation of greenhouse gases that lead to global warming. One hectare of forest is estimated to absorb about 550 tonnes of carbon dioxide (NEMA 2009).

The cost to the economy of encroachment into wetlands has been estimated at US$1.2 million per year. The loss of wetlands leads to the loss of traditional grazing land, loss of water storage capacity (groundwater), the loss of biodiversity, and pollution of water bodies (Moyini *et al.* 2004). Fish is Uganda's leading non-traditional export and contributes three per cent of the gross domestic product (GDP). The resource richness of the fishery is declining due to unsustainable fishing methods. Current levels of fishing exceeded the maximum sustainable yield (MSY) of 330 000 tonnes per year. Although the MSY has been adjusted to 460 000 tonnes per year, there remain doubts about the sustainability of the fishery resources (NEMA 2006).

2.4 Linkages between biodiversity and trade in Uganda

There are several ways that biodiversity is linked to trade, and in particular to trade in horticulture. These include potential negative impacts as a result of land clearance or conversion, changes in technology and the use of intensive production techniques, loss of habitat, destruction of nesting grounds, soil degradation, loss of wetlands, loss of genetic diversity, and changes in the patterns of use of agrochemicals. A full array of the potential linkages between increased trade in horticulture and biodiversity ecosystems is attached as Annex 1.

In Uganda, these linkages are critical as over 80 per cent of the population depends directly on the natural resources for their livelihoods and most of the industries are based on agriculture or natural resources. The services and products provided by biodiversity in the form of ecosystems, species, and genetic resources, contribute billions of shillings per year to Uganda's economy. For example, the bulk of GDP (54 per cent) is generated from the use of natural resources, with agricultural, forestry and fisheries contributing the largest share. The forestry sector contributed six per cent to GDP in 1999 while its current annual turnover is about US$356 million (UBOS 2000). Biodiversity contributes about US$1 billion per year in monetary and non-monetary values (Emerton and Muramira 1999). The productivity potential for wetlands is estimated at between US$300 and US$600 per hectare per year while purification and carbon sequestration is valued at around US$10 000 per hectare. The annual gross economic output attributed to biological resources in the fisheries, forestry, tourism, agriculture, and energy sectors has been estimated at US$546 million.

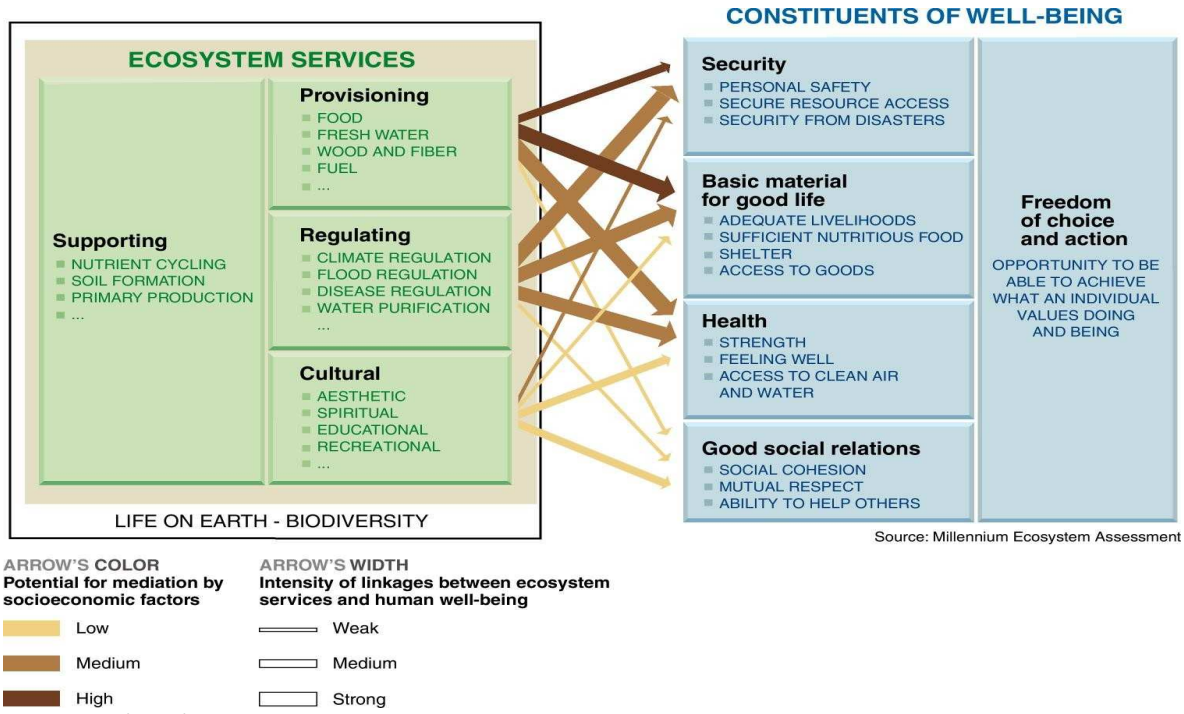
Biodiversity also supports economic output indirectly since it provides secondary inputs, ecosystem services, and other functions that maintain human production and consumption. These indirect benefits have been valued at over US$200 million per year (UBOS 2007). For example, the Nakivubo wetland in Kampala contributes about US$1.7 million annually to the economy through tertiary wastewater treatment (Emerton and Muramira 1999). Ecosystems are therefore both ecologically and economically important.

Trade relies on ecosystems and the services that they provide. As trade increases, the demand for these services also increases, which affects the resilience of ecosystems. The ability of ecosystems to deliver services depends on complex biological, chemical and physical interactions, which are affected by human and trade-related activities. Exploitation of the ecosystems for trade in terms of food, water, timber, fibre, and medicines, disrupt other services such as regulation of climate and flood protection. Changes in ecosystems will affect human wellbeing, which needs to be considered by policy makers, development planners, and natural resource managers. Figure 4 shows the interaction and interdependency between humans and ecosystems that should be considered in any development plan. Agricultural trade will be impacted by ecosystem degradation due to effects resulting from disruptions in ecosystem services (such as changes in microclimates, loss of pollinators and important crop traits). It is therefore important to ensure environmental conservation while pursuing trade opportunities.

Organizations and individuals involved in trade have to take sustainable development into account in their planning processes. Trade may lead to the increased availability of

technologies for protecting the environment (such as the use of hydroponic systems that recycle wastewater in crop production). Trade may also help disseminate goods or technologies that have lower environmental impacts than the technologies they replace, such as solar power technology. Trade may also lead to the degradation of the environment and the production of waste, which could compromise the operation of ecosystems.

Figure 4: The impacts of ecosystem change on human well-being



Source: UN (2005).

2.5 Policy and legal framework for biodiversity conservation in Uganda

The high value placed on biodiversity by Uganda is evident by virtue of the fact that it has been entrenched in the Constitution of the Republic of Uganda, and given the many laws and policies directed to biodiversity conservation, agriculture and the environment (see Table 2).

Table 2: Uganda's policies and legislative framework

Policy	Legislation
The National Environment Management Policy (1994) provides a framework for biodiversity conservation in Uganda.	The Constitution of the Republic of Uganda
The National Policy for the Conservation and Management of Wetland Resources (1995).	National Environment Act Cap 153
The Uganda Wildlife Policy (1995).	The Uganda Wildlife Act Cap 200
The Decentralization Policy (1997) devolves natural resource management to local governments.	The National Forestry and Tree Planting Act 2003
The National Water Policy (1999) provides for the development and management of Uganda's water resources.	The Land Act (1998)
The National Science and Technology Policy (2001) provides for the	The Local Government Act 1997

prudent use of science and technology for sustainable development.	
The National Forestry Policy (2001) provides for the conservation and management of forest resources and biodiversity.	The Fisheries Act (1964)
The National Fisheries Policy (2003).	The EIA Regulations (1998)
The National Agriculture Policy (2003).	Regulations on Access to Genetic Resources and Benefit Sharing
The National Tourism Policy (2003) provides a mechanism for sustainable use of biodiversity and cultural resources for economic development.	Regulations on Wetlands, Riverbanks and Lakeshores (2000)

Uganda has also ratified several multilateral environmental agreements on biodiversity conservation, which are listed in Annex 2.

3 Trading arrangements and the EPAs

Uganda is already a member of several trading arrangements, both at the regional level and at the international level. At the regional level, Uganda is a founding member of the East African Community (EAC), the regional intergovernmental organization that includes Kenya, Uganda Tanzania, Rwanda, and Burundi. Its aim is to widen and deepen cooperation among the countries in the political, economic, and social fields for their mutual benefit. The EAC has developed an environment protocol and EIA guidelines to guide the countries in their environmental management. These are instruments that will guide ABS across the region. Uganda is also a member of the Common Market for East and Southern Africa (COMESA). COMESA was established to contribute to the economic integration of Africa. It encourages cross-border activities including trade throughout Eastern and Southern Africa.

At the multilateral level, Uganda is a member of the World Trade Organization (WTO), which provides a multilateral forum for encouraging trade liberalization among its member states. There are provisions in the WTO's Agreement on Technical Barriers to Trade (TBT) and its Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) that are relevant for biodiversity.[2] Uganda is also a member of the World Intellectual Property Organization (WIPO). WIPO's committees on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore and the Standing Committee on the Law of Patents as well as its Working Group on the Reform of the Patent Cooperation Treaty regulate the patenting of genetic resources.[3]

3.1 Trading arrangements with the EU

[2] The Agreement on TBT recognises the right of countries to adopt such measures for the protection of human, animal or plant life or health, and the protection of the environment as being legitimate objectives for countries to pursue. The Sanitary and Phytosanitary Standards (SPS) Agreement is similar to the TBT but covers a narrower range of measures that are taken by countries to ensure among other things protection from the spread of pests or diseases on plants. This is based on a risk assessment, which should be applied only to the extent necessary to protect human, animal or plant life or health, and should not arbitrarily or unjustifiably discriminate between countries where similar conditions prevail. The Agreement on TRIPS provides an international framework for the protection of plants, animals and micro organisms including the *sui generis* options of plant variety protection. Uganda signed the Agreement on TRIPS in January 1995. TRIPS cover all seven of the main areas of intellectual property: copyright, trademarks, geographical indications, industrial designs, patents, layout designs of integrated circuits; and undisclosed information, including trade secrets.

[3] Uganda acceded to the WIPO Convention in October 1973 and to the Patent Cooperation Treaty in February 1995.

As a member of the ACP, Uganda's trading relationships with the EU have been governed, historically, by successive Lomé Conventions, which granted ACP countries non-reciprocal trade preferences to the European market.[4] Transition to the EPAs began on 13 June 2000 when the Cotonou Agreement was signed by 77 ACP countries and the EU. The Cotonou Agreement set the stage for the removal, after a specified transition period, of the non-reciprocal trade preferences that had been granted to ACP countries. The EPAs were negotiated between the EU and various configurations of ACP countries. The ACP-EU EPAs aim to ensure the development of ACP countries and their gradual integration into the global economy, however, they must be compatible with the rules of the WTO. In addition to the gradual nature of any trade liberalization among ACP countries, the EPAs must be asymmetrical and take into account the different levels of social and economic development between the EU and ACP countries. The EU will assist ACP countries and businesses to implement the necessary structural and macroeconomic reforms, by building their capacities to enable them to cope effectively with the challenges of competition and globalization.

This transitional phase of ACP-EU trade cooperation, between 2000 and 2007, required that a waiver be granted by the WTO. In November 2001, during the Fourth WTO Ministerial Conference, a waiver was secured for the Cotonou Agreement. The Cotonou Agreement set out an ambitious agenda for negotiating the EPAs, to ensure that the trade relations between the EU and the ACP would be consistent with the principle of reciprocity, would be compatible with the WTO rules on Regional Trade Agreements, and would not require a waiver in the future. The overall objectives of economic and trade cooperation under the Cotonou Agreement included: fostering the smooth and gradual integration of the ACP countries into the world economy, eradicating poverty, and promoting sustainable development. The EPAs were identified as a route towards achieving these objectives.

A process of substantive negotiations was agreed upon by the ACP and the EU, which unfolded in the following four phases: (i) establishing priorities of the EPA negotiations for each ACP configuration and the EU; (ii) achieving convergence on strategic approaches to ACP regional integration, the objective of which was to establish a common understanding on the priorities for supporting regional integration and targets to be attained by January 2008 and beyond; (iii) consolidating discussions and points of common understanding into

[4] The origin of trade cooperation between the EU and Africa, as part of the ACP, was the Treaty of Rome, which created an avenue for cooperation with the Overseas Countries and Territories (OCTs) of the six signatory countries: Germany, Belgium, France, Italy, Luxembourg and the Netherlands. The OCTs were initially countries in West and Central Africa with ties to France. A regime of alliance was devised in 1957 and endowed with resources from the first Economic Development Fund (EDF). In 1963 and 1969, 18 African countries and their six European counterparts signed the first and second Yaoundé Conventions, supported by resources from the 2nd EDF and 3rd EDF, respectively. In 1973, the Lomé Convention replaced the Yaoundé Convention to accommodate the preferences of the British ex-colonies. With the signature of the first Lomé Convention in 1975, the number of signatory countries rose to 46 from the ACP and nine from Europe. Lomé II was signed by 58 ACP countries in 1980 and Lomé III by 65 ACP countries and 10 European countries in 1985. These three Conventions, each spanning a five-year period, were accompanied by the 4th, 5th and 6th EDFs, respectively. Lomé IV was signed in 1990 (www.acp-eu-trade.org).

elements of a draft EPA; and, (iv) finalizing negotiations and completing the EPA by the end of 2007.

3.2 Economic and development cooperation

An interim EPA – the EAC-EC Framework EPA – was signed in November 2007 between the EAC and the EU and established a framework for completing the EPA. At that time, several issues remained to be discussed (EAC 2008). There are 14 broad areas of the economic and development cooperation under the EPA. They address supply side constraints; policy and regulatory reforms; agriculture; private sector development; EPA adjustment costs; sanitary and phytosanitary (SPS) measures, non-tariff barriers (NTB) and TBT; private sector development; trade in services; trade facilitation; trade development; capacity building; financial instruments; other trade-related issues; fisheries; and natural resources and the environment (see Table 3).

Table 3: Broad areas of economic and development cooperation between the EAC and the EU

Broad area	Specific area under focus
Address supply side constraints	Infrastructure support (roads, railways, ports, air, water transport, energy and information and communications technology).
Policy and regulatory reforms	Development of policies and regulations; review of policies and regulations; harmonization of policies, regulations, and laws.
Agriculture	Research and development; access to finance; agricultural support infrastructure; production, marketing, distribution and transportation; gender mainstreaming and access to production factors; empowering local communities; technology transfer; and diversification.
Private sector development	Access to credit; business environment; technology transfer, research and development.
EPA adjustment costs	Compensation for employment, revenue losses (social safety net and budgetary issues), support to industry to cope with the effects of EPA implementation.
SPS, NTB, TBT	Cooperation in areas arising from SPS, NTB and TBT.
Trade in services	Cooperation in areas arising from trade in services.
Trade facilitation	Cooperation in areas arising from customs and trade facilitation.
Trade development	Cooperation in areas arising from the Food and Environment Protection Act, 1985 (FEPA) and the trade in goods chapter.
Capacity building	A cross-cutting issue.
Financial instruments	Economic Development Fund financial envelope-contribution agreement for EAC, National Implementation Plan; EC own resources; Member States contributions; aid for Trade; and other development partners.
Trade-related issues	Cooperation areas arising from trade-related chapters, including TRIPS.
Natural resources and environment	Water resource management; trade and environment and the sustainable use of natural resources; sustainable utilization of shared resources; and implementation of international agreements, conventions and treaties.
Fisheries	Fisheries management and conservation; vessel management; post-harvest management; access to credit and marketing capacity building and export market development; development and improvement of infrastructure; technological promotion and transfer; legal and regulatory reforms; promotion of investment and finance; environment and conservation of stocks; socio-economic and poverty alleviation measures; and testing and

	certification.

Source: EAC (2008).

3.3 Uganda's negotiating priorities

Since deciding to take part in the EPA negotiations, Uganda set its targets on exploring the full range of economic opportunities that could be achieved through the agreement. These opportunities range from increased agricultural production and value added, to increasing imports and exports of goods. The following priorities emerged with respect to Uganda's negotiating position for the EPA:

- to secure EU commitments to assist Uganda address supply side capacity constraints through, for example, infrastructure development;
- to ensure that the EPA does not impact negatively on Uganda's development efforts (particularly with respect to infant industries and sensitive product, which include maize, sugar, coffee, cotton, bananas, milk and dairy products, animal products, fruit and vegetables, and oil seed products);
- to secure improved and effective market access for Ugandan exports to the EU (duty free and quota free, with simple rules of origin);
- to ensure that the EPA process does not undermine the regional integration agenda (for example, with respect to the consolidation of an EAC customs union); and
- to secure assistance from the EU to build capacity within Ugandan institutions with respect to trade-related issues such as competition policy, investment, trade facilitation, intellectual property rights, government procurement, and the environment;

The EPA negotiations were launched in Brussels on 27 September 2002 and were scheduled to end by 31 December 2007 with the signing of an EPA that would be effective on 1 January 2008. However, due to delays, by November 2007 the EAC had only signed an Interim EPA with the EU. Negotiations continued with a deadline of July 2009 for the comprehensive EPA.

4 Horticulture and cut flower production, trade, and links to biodiversity

Uganda's real growth in its total trade of goods and services increased from 5.1 per cent in 2000-2004 to 10.8 per cent in 2005-2006. The increase was the 48th highest among the 152 ACP countries during the same period. The share of Uganda's service industry in overall exports grew from an average of 22.1 per cent in 1995-99 to 36.8 per cent in 2005-2006 (World Bank 2007). The growth was due mainly to growth in the tourism sector and an emerging information and communications technology sector. While the country's exports grew at a low rate of 4.5 per cent, imports grew by 14.3 per cent, a rate roughly 50 per cent above the average for low-income countries (World Bank 2007). Uganda's major traditional exports were coffee, tea, tobacco, and cotton. In 2007, the value of exports of coffee grew by 19.9 per cent and tobacco grew by five percent. On the other hand, exports of cotton declined to 1.5 percent in 2007 from 2.1 percent in 2006 and tea declined to 3.6 percent in 2007 from 5.3 percent in 2006 (see Table 4). The value of non-traditional exports (including

fish and fish products, FFV, and cut flowers) increased in value between 2003 and 2007 (see Table 4).

Table 4: Uganda's exports of major agricultural products, 2003-2007 (US$'000)

	20033	2004	2005	2006	2007
Total traditional exports	**199 344**	**244 955**	**267 522**	**288 141**	**399 354**
Coffee	100 233	124 237	172 942	189 830	265 853
Tea	38 314	37 258	34 274	50 873	47 629
Cotton	17 755	42 758	28 821	20 474	19 571
Tobacco	43 042	40 702	31 485	26 964	66 301
Total non-traditional exports	**334 762**	**420 134**	**545 335**	**674 051**	**937 314**
Overall trade balance	**-841**	**-1 061**	**-1 241**	**-1 595**	**-2158.70**

Source: UBOS (2008).

4.1 Fresh fruit and vegetables

Prior to the second half of the 1980s, horticultural production – mainly vegetables, fruits and flowers – was undertaken using non-intensive production systems with limited commercial orientation. Since then, horticultural production has become more intensive, with farmers targeting both the local and export markets (Muwanga 2008). The volume of horticultural produce consumed locally is unrecorded. Nevertheless, exports of FFV and cut flowers to the EU increased significantly in volume between 2000 and 2006.

Production: Uganda produces 11.1 million tonnes of fresh fruits and vegetables, and is the second largest producer in Sub-Saharan Africa after Nigeria (FAO 2008; FAO 2007; Muwanga, 2008). Table 5 presents the share of global production for African countries and indicates that in 2004 the top six producers in Africa were Nigeria, Uganda, South Africa, Kenya, Cameroon and Ghana. By 2004, Uganda's fruit and vegetable production was equivalent to about one per cent of the world's total production.

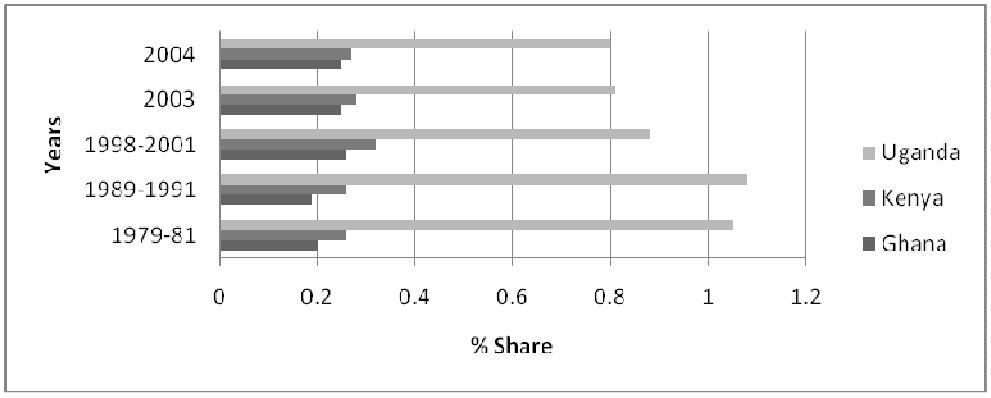
Table 5: Production of fruits and vegetables, 1979-2004

No.	Countries	Production (thousand tonnes)				
		1979-81	1989-1991	1998-2001	2003	2004
1.	Nigeria	8 287	11 416	16 817	17 412	17 397
2.	Uganda	6 589	8 805	10 571	10 829	11 124
3.	South Africa	4 662	5 801	7 141	7 897	7 769
4.	Kenya	1 614	2 137	3 848	3 827	3 789
5.	Cameroon	2 088	2 399	3 259	3 530	3 671
6.	Ghana	1 271	1 562	3 113	3 424	3 476
7.	Sudan	1 543	1 939	2 957	3 028	3 028
8.	DRC	3 094	3 833	2 867	2 962	2 893
9.	Rwanda	2 331	3 152	2 594	2 751	2 813
10.	Tanzania	2 227	2 505	2 482	2 522	2 528
11.	Cote d' Ivoire	1 866	2 062	2 611	2 547	2 516
12.	Other SSA countries	8 442	10 732	13 563	14 583	14 716
13.	Total SSA	44 015	56 344	71 817	75 312	75 720
14.	World	629 744	812 733	1 207 588	1 345 056	1 383 649

Source: FAO (2007).

The industry is largely comprised of smallholders. Only three companies export over 40 per cent of their production. Overall, the small size of production and its subsistence nature suggests that a more commercially oriented farming system would lead to large increases in the levels of production of fresh fruits and vegetables in Uganda.

Figure 5: Percentage share in world production of fruits and vegetables



Source: FAO (2007).

Trade: The value of FFV exports from Uganda was about US$11 million between 2004 and 2006 (COMTRADE 2007). The principle vegetable exports were beans, green chillies (cayenne), hot pepper (scotch bonnet) and other vegetables (including okra). The main fruit exports were bananas, passion fruit and pineapples (see Table 6). Although most FFVs were exported to the EU, exports of dried beans, the single largest FFV export, were destined for neighbouring country markets in DRC, Burundi, Rwanda and Kenya. The share of Uganda's FFV exports going to the EU is small compared to the share of exports to neighbouring countries.

Table 6: Uganda's exports of FFV, 2004-2006

Value (US$'000)					**Exports to the EU-27**	
	2004	**2005**	**2006**	**Average 2004-2006**	**Average annual exports 2004-2006 (US$'000)**	**Share of EU-27 in Uganda's total FFV exports to world (%)**
FFV	11 733	8 885	12 810	11 143	3 067	27.5
Vegetables	10 157	6 921	11 477	9 518	2 055	21.6
Beans	4 582	5 462	7 804	5 949	25	0.4
Mixed vegetables	1 315	642	3 035	1 664	1 596	95.9
Peas	3 238	6	298	1 181	9	0.1
Other vegetables	397	468	209	358	350	97.9
Other	625	343	131	366	82	22.5
Fruit	1 576	1 965	6 333	1 625	1 012	62.3
Banana	850	806	127	594	345	58.0
Other fruit	348	405	609	454	370	81.6
Pineapples	119	171	69	120	35	29.4

Other	259	583	528	457	261	57.2

Source: COMTRADE (2007).

Small volumes of starchy staples, such as sweet potato, cassava, and yam are also exported to niche consumers in Europe. However, these starchy staples cannot compete with cheaper products transported by sea from Costa Rica, South Africa, and other countries (Sonko *et al.* 2004).

Export of organic products. In Uganda, organic exports were valued at US$6.2 million in 2004-2005 (free on board); having risen from US$3.7 million in 2003-2004 (Gibbon 2006). Table 7 indicates that at present, Uganda's organic exports include fresh vegetables, tropical fruits (avocadoes, mangoes, pineapples, and papaya), dried fruits, coffee, tea, cotton, sesame, spices and forest products (Gibbon 2006).

Table 7: Export volumes for Uganda in 2004

Product	Export volume (tonnes)
Fruits	855
Cotton	3 875
Sesame	1 124
Coffee	1 705
Shea	1
Vanilla	15
Cocoa	280
Bark cloth	1
Fish	3
Hibiscus	15
Chilli pepper	5
Total	7 877

Source: Willer *et al.* (2008).

The organic sector holds out the best prospects for high levels of growth in Ugandan agriculture. This is evident in the rapid increase in production of organic agricultural goods in recent years. Between 2004 and 2007, the average annual rate of growth of organic exports was 67 per cent. Between 2004-2005 and 2007, the number of organic farmers in Uganda rose from 45 000 to 60 000. During that same period, the area of land under certified organic agricultural production rose from 180 000 hectares to 250 000 hectares (Gibbon 2006). The number of farmers certified and linked to export markets increased from 28 000 in 2002 to over 200 000 in 2008, of which 90 per cent were smallholders, producing on fewer than three hectares (Tumushabe *et al.* 2008).

4.2 Cut flowers

Production: Several suitable varieties of roses and other cut flowers have been introduced into Uganda for cultivation, with the support of the US Agency for International Development (USAID) and programmes developed by the Government of Uganda. Seventy per cent of the flowers grown in Uganda are roses. Of the remaining production, 25 per cent are chrysanthemums (cut flowers) and five per cent are potted plants. Roses introduced include large-headed rose varieties (such as the tea hybrid) and small-headed varieties (the

'sweetheart'). Most of the roses cultivated are high-yielding, small-headed 'sweetheart' varieties (UEPB 2006). The average cost of production is US$0.04 per rose stem. The operating margin for a rose flower farm is about US$122 500 per hectare (UEPB 2006).

Exports of cut flowers: Roughly 95 per cent of the total volume of flowers produced in Uganda is exported. Uganda is one of a select few developing countries to successfully export cut flowers and foliage to the EU (mainly the Netherlands). The other countries include Kenya, Zimbabwe, Ecuador, Zambia and Colombia (see Table 8). All of these countries export roses, although there are typically two different varieties produced for export. Uganda, Zambia and Zimbabwe specialize in the small-headed varieties ('sweethearts'). Kenya grows a mix of small- and medium-headed varieties and Ecuador specializes in the large-headed varieties. The large-headed varieties tend to command a higher price than the small ones (see Table 8). Uganda does not have suitable conditions to produce the large-headed varieties and so can only enter the market at the lower end (CBI 2006).

Table 8: EU imports and leading suppliers of cut flowers and foliage to the EU, 2001-2005

	Value (US$ million)		Category of trade	Leading supplier (2005)	Share in exports (%)
	2001	2005			
Roses	811	919	Intra EU	Netherlands (61%)	64%
			Extra EU excluding developing countries	Others	1%
			Exporters to the EU	Kenya (20%)	
				Ecuador (6%)	
				Uganda (2%)	36%
				Zimbabwe (2%)	
				Zambia (1%)	
				Colombia (1%)	

Source: CBI (2006).

Table 9: Average annual prices of selected rose varieties at the Dutch auction, 2001-2005

Main products		2001	2003	2005
	Type	Flower price (€ per stem)		
Rosa	**Large budded**	**.28**	**.27**	**.26**
	Akito	.26	.21	.19
	First red	.28	.28	.23
	Grand prix	.43	.45	.46
	Passion	.36	.35	.33
	Red Berlin	.33	.30	.28
	Sphinx	.27	.21	.20
	Small budded	**.13**	**.11**	**.11**
	Black bluntly	.14	.10	.10
	Escuro	.11	.10	.10
	Frisco	.12	.10	.10
	Golden gate	.15	.13	.12
	Lambada	.10	.09	.08
	Sacha	.14	.13	.13

Source: CBI (2006).

The results of a strengths, weaknesses, opportunities and threats (SWOT) analysis of the horticulture sector in Uganda are summarized in Table 9. Uganda's weaknesses include the long distance to the market, poor infrastructure and low levels of access to financing. Its strengths include low labour costs, low import costs and favourable climatic conditions. The major opportunity presented is the stability expected in the market. The threats include lack of state-of-the-art equipment for handling produce to meet the increasing quality demands in the market (CBI 2006).

Table 10: SWOT analysis for exporters of cut flowers adapted for Uganda

Strengths	**Weaknesses**
• Low labour costs • Low or zero import duty in target country • Low land costs • Favourable climate	• Distance to market (transportation costs) • Negotiation skills • Language and communication • Lack of market knowledge, information regulation • Low level of organization in the sector • Lack of access to finance and poor banking system
Opportunities	**Threats**
• Growing demand for horticulture bought over the internet • Consumer concern for environment • Speciality novelty production for niche markets • Decreasing number of competing producers • High demand for low priced products • Shift of adding value from the wholesaler towards the farmers in developing countries • Off season supplies • Certified products quality management systems • Increasing shortage and costs of land in main European production areas	• Changing flower colour needs in the market • Shift from flowers to other gift items • High technical production method and increasing production scale • High level of European research on production techniques • A threat of overproduction and downward price pressure particularly in the case of roses • Logistical problems and lack of professionalism and inexperience • Increasing air freight rates • Retail chain required suppliers and production to be certified • Political instability in some developing countries • Increasing quality requirements • SPS requirements • Breeder regulations • Customers demand increasingly short-term (immediate) deliveries

Source: CBI (2006).

In Uganda, the horticulture sector and the production of cut flowers are dynamic industries with the potential for high levels of growth. They can contribute to economic growth, provided the necessary investments are made to upgrade infrastructure and production systems. This will also create employment as demand in the EU market increases.

5 The integrated assessment: conceptual framework and methodology

This section discusses the methodology employed to assess the potential economic, social and environmental impacts of increased trade on the horticulture sector, with a focus on

biodiversity. The linkages between agriculture and biodiversity are complex and diverse. Biodiversity is an input to agricultural production, and damage to biodiversity can have important implications for agriculture itself. Increasing agricultural production affects biodiversity directly as it requires either expanding the land area under agricultural production, or intensifying production on existing areas (Pagiola and Kellenberg 1997). Moreover, agricultural activities depend on several ecosystem services. In Uganda, like in many other developing countries, patterns of agricultural development and biodiversity loss have been heavily influenced by government policies, including those specifically aimed at the sector, along with broader government policies, such as trade policies.

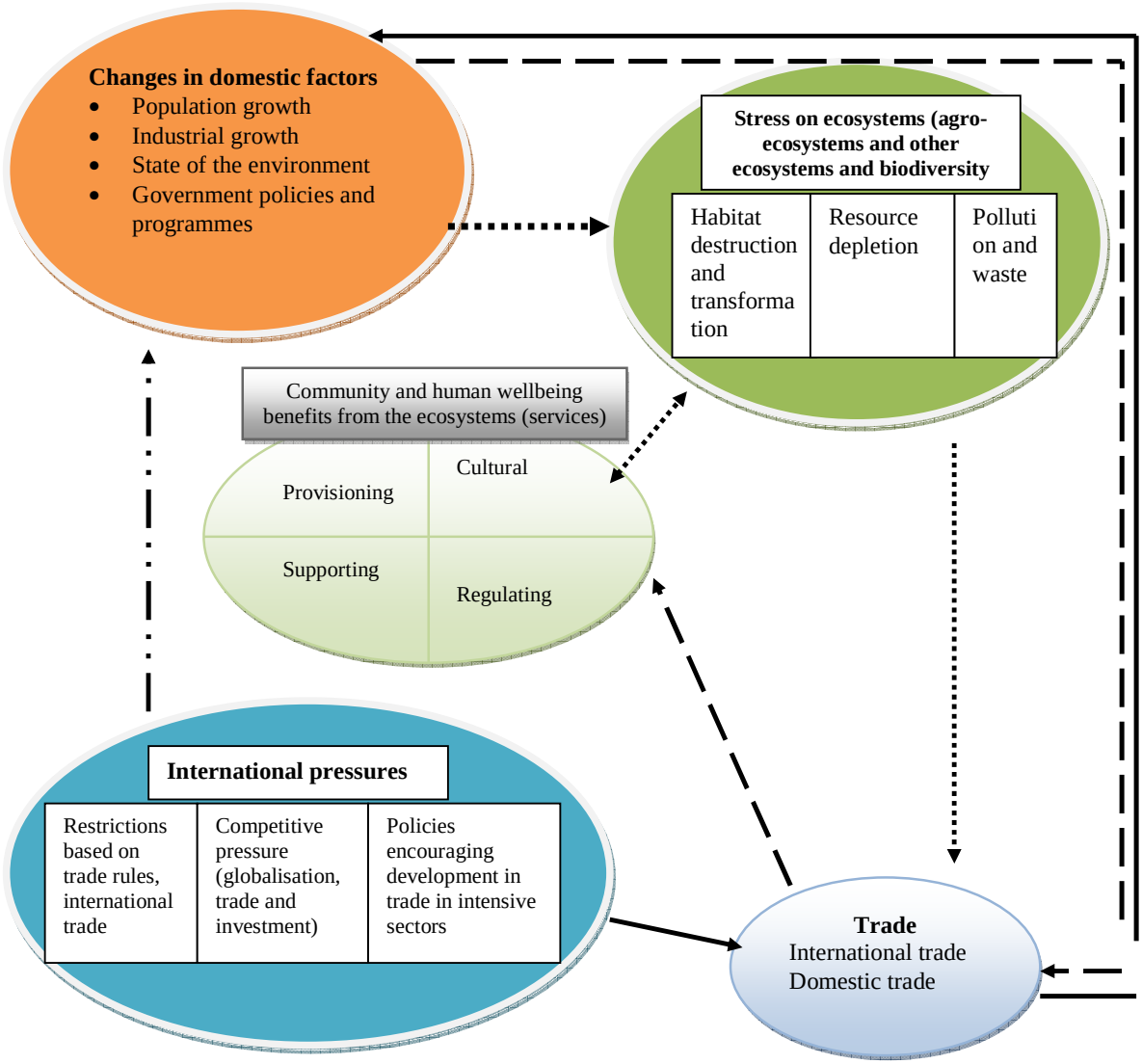
There are several ways that the EPA could have a direct impact on biodiversity. These include encouraging intensive and extensive production to meet excessively large quotas or volumes required for trade, and liberalizing imports that could encourage the introduction of invasive alien species or higher levels of agrochemical use. These types of developments could threaten biodiversity through habitat destruction, pollution and increased commercialization of genetic resources, increasing monoculture, increased physical development of land, and requirements for more resources, such as water and energy (Conway 1998). Increasing trade can also have indirect effects on biodiversity. These include product effects (resulting from changes in levels and methods of production of an agricultural product), scale effects (resulting from increases or decreases in overall levels of economic activity) and structural effects (including changes in patterns of trade-related activity). Actual impacts on biodiversity should be examined in terms of changes in lifecycle from export-related production.

An overall framework for Uganda's agricultural sector has been established in the country's Plan for Modernization of Agriculture (PMA). The PMA is guided by the national development framework including the Poverty Eradication Action Plan (PEAP) and now the draft National Development Plan. Under the PMA the Government has developed several specific policies, which include the National Agricultural Research Policy of 2003 (which defined the breadth of agricultural research and decentralized agricultural research and services), the National Agricultural Advisory Services (which provides agricultural extension services), and the Farm Power and Agricultural Mechanization policy (which promotes the adoption and use of intermediate technology based on the needs of individual farmers). Policies for the dairy, beef, and fisheries industries have also been developed (MAAIF 2008).

5.1 The conceptual framework

As part of this exercise, a conceptual framework was developed to illustrate the linkages between trade, the horticulture sector, and biodiversity (see Figure 6). The major driver for export-oriented FFV and flower production in Uganda is the trade regime with the EU and government policies at the national level that support the horticultural sector. Government policies and price indicators from the EU also affect production. High prices will encourage increased production, leading to intensification of production of increased land areas under cultivation. If the market indications are poor and no supportive government policy exists, production will remain low, largely at the subsistence level.

Figure 6: Conceptual framework proposed for linking trade and biodiversity in Uganda



Source: adapted from Pagiola and Kellenberg (1997); Conway (1998); MAAIF (2008); Tushabe *et al.* (2001).

Land-use practices in agro-ecosystems and other onsite and offsite systems (such as habitat change, resource depletion and pollution) will lead to a loss of biodiversity and a loss of ecosystem services that are supported by biodiversity. At the end of the cycle, communities use the revenue generated from agricultural activities to improve their livelihoods. Under ideal circumstances, the net gains in revenue and livelihoods should outweigh the net losses to biodiversity services, or should prevent biodiversity loss. Often, however, the value of the biodiversity loss in agro-ecosystems is much higher than the gains achieved (Tushabe *et al.* 2001). It is therefore important to identify the losses in biodiversity and devise mechanisms to prevent or counteract them.

5.2 Key stages in the IA

IAs involve an interdisciplinary process that combines the collection, interpretation and communication of knowledge from various disciplines in such a way that the economic, social and environmental impacts associated with a policy can be evaluated for the benefit of decision making or planning[5] (UNEP 2007). Data for this IA were collected through stakeholder consultations, interviews and literature reviews.[6] The key issues to be addressed were identified during a capacity building workshop, which involved work in two groups based on the conceptual framework. The main issues identified by the two groups were: land requirements for the fresh fruits and vegetables and flower sub-sectors, pollution and loss of ecosystem services, market access, use of chemicals, the health and well-being of workers, stakeholder assessment, livelihoods issues, and food security. A summary of the structure of the IA and the consultations and issues raised, is contained in Annex 3.

Along with the data collection, this IA employed a four-stage process that included the following steps: (i) identifying the criteria relevant to the main issues of concern for developing economic, social and environmental indicators; (ii) determining the baseline for the IA; (iii) identifying the most likely scenarios and policy options to be reviewed; and (iv) conducting the analysis.

5.3 Criteria and indicators for the IA

The model used for developing the criteria and indicators of trade impacts on agro-biodiversity, is shown in the matrix in Table 11. It consists of the following four components: cultivated systems; components of cultivated systems; possible impacts of trade liberalization; and possible indicators (Lehmann 2005). Each component is divided into the following sub-components: production, sources of production, biodiversity providing ecosystem services to agricultural production, and other biodiversity. From this matrix, the following potential indicators were identified: genetic diversity; biodiversity used in food; sustainably managed areas and products from these areas; trends in species abundance; connectivity fragmentation; water quality; trends in habitats; and nitrogen deposition (Lehmann 2005).

Using this approach, the most relevant indicators were selected. They are presented in Table 12 and have been divided into economic, social, environmental, and biodiversity indicators. The economic indicators include trade values for flowers and fruits and vegetables for conventional and organic production. Environmental indicators include land area, and water, energy and chemical use. Biodiversity indicators include the rate of biodiversity loss, the number of varieties of flowers and FFV, land use and agrochemical use. Social indicators include: employment, occupational health, and wages.

[5] This IA is the fourth in a series of integrated assessments that have been conducted in Uganda since 2003. The others focused on the National Trade and Fisheries Policy, the Organic Agriculture sub-sector and the Integrated Ecosystem Assessment for the Lake Kyoga Catchment in Uganda.

[6] The literature review covered a number of sources ranging from UNCTAD, EC Trade Desk, UBOS, MFPED, UNEP, Economic Policy Research Centre (EPRC) and NEMA. The Project Steering Committee (PSC) provided additional technical information and guidance during the preparation of the integrated assessment report.

Table 11: Indicators for impacts of trade on agricultural biodiversity

Components	Cultivated systems	Components of cultivated systems	Possible impacts of trade liberalization	Possible indicators
Production	Inside cultivated systems	Crops, livestock, aquaculture fish	Modernization and harmonization – loss of genetic diversity on farm	Genetic diversity
	Outside cultivated systems	Wild food sources	Land conversion: loss of weeds and wild food sources	Biodiversity used in food
Sources of production	Inside cultivated systems	Crops and wild relatives	Modernize, harmonize loss of genetic diversity on farm	Genetic diversity
Biodiversity providing ecosystem services to agricultural production	Inside cultivated systems	Associated biodiversity (such as soil biota), natural enemies of pests and pollinators, alternate forage plants for pollinators; alternative prey for natural enemies Biodiversity that protects water supplies and prevents soil erosion	Changing farm practices – knowledge of intensive integrated pest management versus the use of pesticides; impacts of land conversion and pesticide use off farm Land conversion – changing farm practice	Area and/or products from sustainable management areas; Trends in species abundance; Connectivity; Fragmentation; Water quality
Other biodiversity	Inside cultivated systems	Other biodiversity including species of conservation and/or aesthetic interest such as farm birds	Changing farm practice	Trends in species abundance
	Outside cultivated systems	Other wild biodiversity	Off-farm impacts of pesticides	Trends in habitats Trends in species abundance Nitrogen deposition

Source: Lehmann (2005).

Table 12: Indicators and framework for the IA

Economic indicators	Environmental indicators	Biodiversity indicators	Social indicators
Imports from the EU (US$)	Area under flowers (ha)	Rates of biodiversity loss (per cent)	Number of women employed
Exports to the EU (US$)	Area under vegetables (ha)	Number of indigenous crops traded	Number of people employed
Trade balance with EU (US$)	Water litres/tonne of flowers exported (million cubic-metres)	Amount of land used (ha)	Occupation health
Flowers exports (US$)	Amount of energy used (Megawatts)	Fertilizer usage (tonnes)	Average wages per year US$
Fruits and vegetables exports (US$)	Agrochemicals (tonnes/year)		
Value of conventional and organic fruits and vegetables exports (US$)			

5.4 Analytical approach

In the past, IA studies in Uganda have employed scenario-building approaches (UNEP/NEMA 2006; Tumushabe *et al.* 2007; UNEP/NEMA 2008). Experience has shown that root-cause analysis (RCA), simple regression analysis, and cost-benefit analysis area also well suited to Uganda. Data limitations, however, prevented a robust cost-benefit analysis, and so this IA used a combination of a scenario approach, a simple regression and a RCA to conduct the analysis of the impact of trade liberalization under the EPA on biodiversity.

The scenarios that were developed were based on Uganda's external and internal trade policies (MTTI 2008). With respect to external trade, Uganda's policies seek to achieve the following:

- use international trade to stimulate and complement the domestic trade and production sectors;
- promote international competitiveness of Uganda's exports;
- improve market access for Ugandan products and services through trade negotiations;
- strengthen the institutional capacity of the trade department and the Uganda Export Promotion Board (UEPB) to promote exports;
- establish and sustain markets for Uganda's exports with an emphasis on non-traditional exports;
- develop products with a focus on adding value to exports;
- equip farmers and exporters with export skills and build national capacity by training trainers of exporters and consultants; and
- equip farmers and exporters with adequate market information.

With respect to internal trade policies, the Government aims to strengthen the domestic trade regulatory framework; enhance private sector competitiveness; and, enable and support productive sectors in the economy to engage in trade.

5.4.1 Scenario analysis

The following three scenarios represent plausible future paths for Uganda's trade with the EU under the EPA: *business as usual*, *leading edge,* and *matching the best*. For each scenario, the annual rate of change in the value and volume of exports in flowers and fresh fruits and vegetables were determined and then used to make projections of the total value and volume of exports up to 2025.

- The *business as usual* scenario (status quo) assumes that even if the Government of Uganda signs the EPA, the rate of growth in the horticulture sector will not change and the future will involve a continuation of current levels of growth in exports. This means that the value of flower exports would rise at a rate of 1.6 per cent per year while the volume of exports would decline by one per cent (UBOS 2007). The value of FFV exports would decline at a rate of 1.2 per cent, while the volume of exports would rise at a rate of 7.3 per cent per year. If the EPA is signed, and neither domestic policies nor the EU's relationship with Uganda change, then the *business as usual* scenario is the most likely outcome.

- The second scenario is the *leading edge* scenario. It assumes that Uganda will have opportunities under the EPA to increase its trade with the EU by becoming at least as competitive as other countries in the COMESA region (such as Kenya and Ethiopia). The growth path projected suggests that the share of trade in GDP would grow from 39 per cent to 80 per cent without slowing current rates of economic growth. To reach 80 per cent, all trade sectors, including horticulture, would have to grow by 20.6 per cent per year between 2009 and 2025. Therefore, the assumption underlying this scenario is that the value and volume of both flower and fresh fruit and vegetable exports will grow at an annual rate of 20.6 per cent.

- The third scenario is the *matching the best* scenario. Under this scenario, the trade policy for the horticulture sector is set in such a way that the best export performance achieved in the last five years can be replicated (in terms of rates of growth). For instance, between 2006 and 2007, Uganda's exports of FFV to the EU grew at a rate of 28.3 per cent in value and 43 per cent in volume. Between 2003 and 2004, Uganda's flower exports to the EU grew at a rate of 19.7 per cent in value and 8 per cent in volume (UBOS 2006). The growth experienced for both FFV and flowers was the result of market conditions and supply responses from producers. As a regional comparison, countries such as Ethiopia have been able to achieve a growth rate in flower exports of over 20 per cent over five years. This scenario assumes that it is possible to replicate the policies, incentives, market conditions and competitiveness that led to those high export results consistently for the next 17 years.

5.4.2 Regression analysis

The scenarios for export growth in the horticulture sector for the next 17 years were developed using a regression analysis. A simple quadratic equation was employed to explain the relationship between the values of the economic, social and environmental indicators at the baseline and for the period of the projection.[7]

5.4.3 Root cause analysis

The RCA approach developed by UNEP provided a systematic framework for undertaking the integrated analysis of the economic, social, environmental and institutional impacts (UNEP/NEMA 2006). The RCA employed a simple framework that identified the root causes of economic, environmental, social and institutional problems, along with associated actors and opportunities. The RCA provides a platform for synthesizing problems that occur at the

[7] The equation relationship states that at rate of growth per year (r), the indicator will grow from a baseline value of A to B_t over the time periods (t).

$B_t = A + B_o(1+r)^t$ Where: B_t = is the future value of the economic, social or environmental indicator t time periods from the baseline 2008; A = is the intercept the starting point for the economic, social or environmental indicator for simplicity it was assumed to be zero. In theory this value is usually greater than zero; B_o = this is the baseline value of the economic, social or environmental indicator; r = this is the rate of growth, per year, of the economic, social or environmental indicator time periods (t) from the baseline 2008; t = number of time periods under prediction (from 2008 to 2025—17).

economic, environmental, social, and institutional levels and helps determine how they interrelate. As such it is a useful tool for undertaking an IA of trade policies (UNEP/NEMA 2006).

5.5 Assumptions

The IA was undertaken taking into account the following assumptions:

- The rate of growth of exports projected in each scenario represents the average rate of export growth over the projection period of 2008 to 2025 (at -1.0 per cent, 20.6 per cent, and 8.0 per cent for flowers, and 7.3 per cent, 20.6 per cent and 43 per cent for fruits and vegetables for the *business as usual*, *leading edge* and *matching the best* scenarios, respectively);
- The real value of all horticultural products is constant throughout the projection period (the real values of the prices remain unchanged despite monetary changes envisaged);
- The annual rate of change for land area, water, and electricity used, equals the annual rate of change in export volumes;
- The rate of biodiversity loss is directly proportional to the rate of change in land use from the original stable ecosystems, including conversions to commercial farms;
- Flower firms generally use a lot of fertilizers, herbicides and pesticides and the rate of use is likely to increase at the same rate as changes in land use;
- Investment in each sub-sector was calculated as directly proportional to the trade expansion envisaged in each scenario; and
- From the outset of the scenarios, before additional permutations were made, similar input levels were assumed (for example, for water and energy) per unit of output.

6 Findings of the integrated assessment

6.1 Economic and trade issues

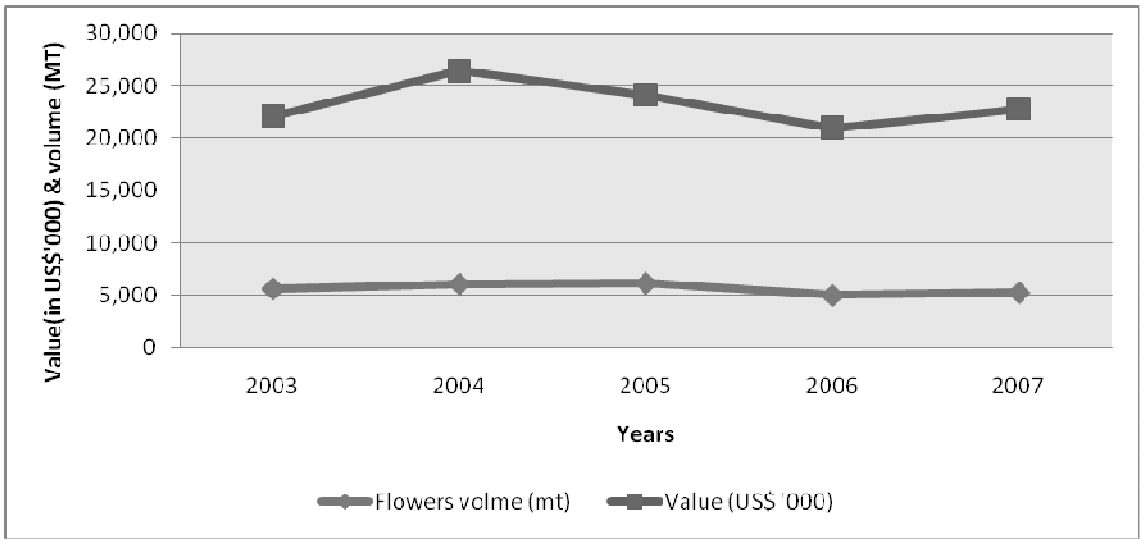
Projections were undertaken to assess the impacts of each of the three scenarios on exports of flowers and FFV to the EU. The results are presented in this section.

6.1.1 Flower exports

Between 2003 and 2007, Uganda's flower exports to the EU declined slightly both by volume and value (see Figure 7). By value, of total exports to the EU, flower exports declined from 4.1 per cent in 2003 to 1.7 per cent in 2007. The decline was attributed to the high costs of doing business and the subsequent closure of some farms.

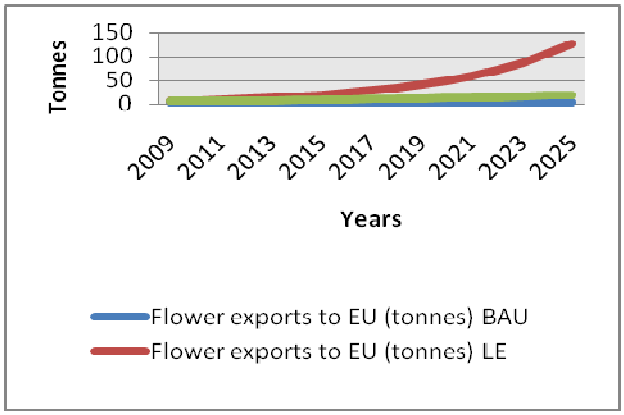
Figures 8 and 9 illustrate the trade and economic projections for the flower sub-sector under the three different scenarios, for the period 2009 to 2025 with respect to volume of exports and value of exports. Figure 10 illustrates projections for land use under flower cultivation for the period 2009 to 2025.

Figure 7: Volume and value of flower exports from Uganda to the EU, 2003-2007



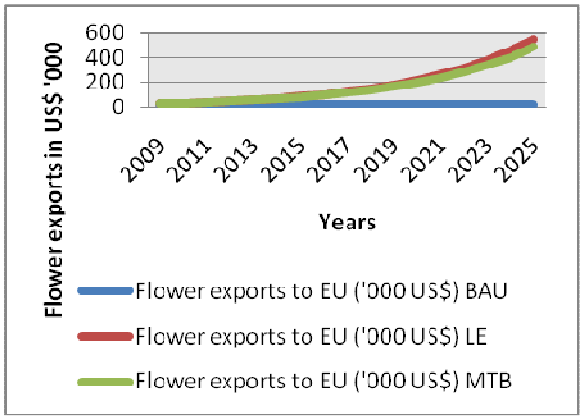
Source: adapted from UBOS (2008).

Figure 8: Projections of flower exports to the EU by volume, 2009-2025



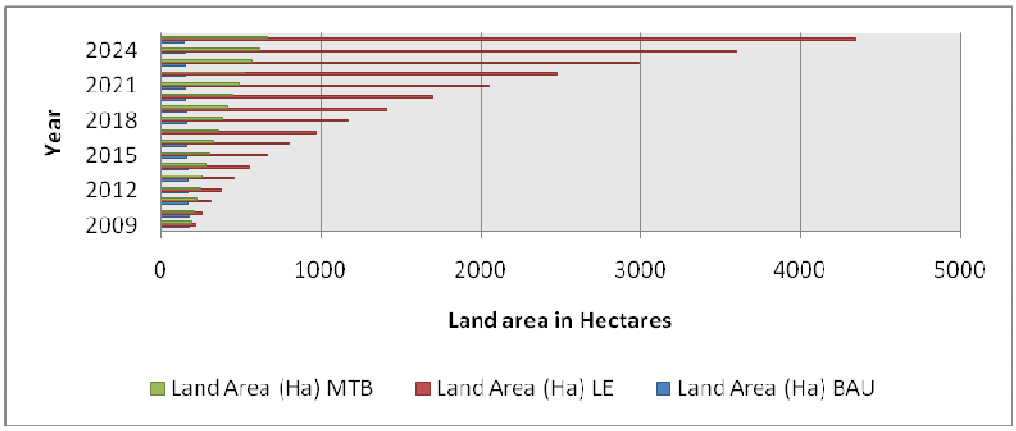
Source: adapted from UBOS (2008).

Figure 9: Projections of flower exports to the EU by value, 2009-2025



Source: adapted from UBOS (2008).

Figure 10: Land use projections for flowers, 2009-2025



Source: adapted from UBOS (2008); UEPB (2007); and Ssonko *et al.* (2004).

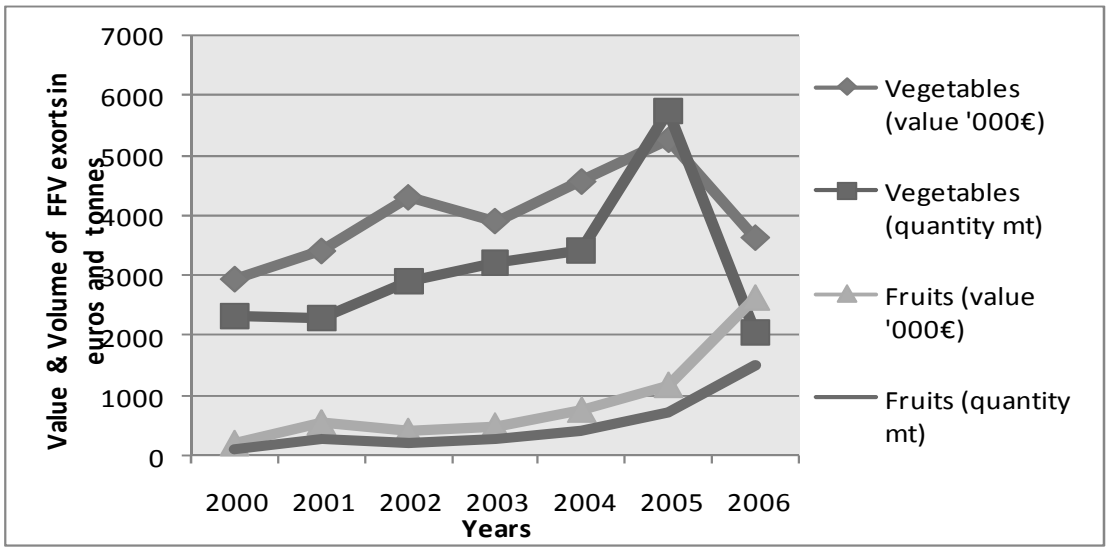
When assessed in the context of the three scenarios the economic and trade cycle for Uganda's flower sector showed a considerable rise in the volume and value of flower exports for the *leading edge* and *matching the best* scenarios, and continued to decline in the *business as usual* scenario. The *leading edge* and *matching the best* scenarios projected a considerable increase in the value of flower exports both in value and volume of exports. Based on the current rate of growth of exports in the flower industry, the value and volume of flower exports are likely to stay at the same level for all the years of the projection period under the *business as usual* scenario.

The prospects in the flower industry under *leading edge* scenario showed a higher value of exports, followed closely by the *matching the best* scenario. This is because while the value of exports grew at a rate of 19.7 percent per year in the *matching the best* scenario, the volume increased by 8 per cent per year. On the other hand, both the volume and value of flower exports grew at a rate of 20.6 per cent in the *leading edge* scenario. Therefore, the *matching the best* scenario, premised on sustained increased prices, is likely to offer the best prospects. Historically, however, the price of flower exports has not sustained 10 years of continued growth (UEPB 2006). An average price that is proposed in the *leading edge* scenario is more likely to occur instead. As such, while the *matching the best* scenario is the most attractive scenario, a *leading edge* scenario is more likely.

6.1.2 FFV exports

Generally, exports of FFVs to the EU have been increasing both in volume and value since 2000 (see Figure 9). Even though there was a decline between 2005 and 2006, that decline was associated with the collapse in the value of vanilla in the domestic market, which also became a disincentive for producers who reacted by reducing volumes of exports (MFPED 2008, 2005, and 2006). However, the nature of FFV production in Uganda shows that a fast recovery can be achieved and that the increasing trend can be maintained.

Figure 11: Volume and value of FFV exports from Uganda to the EU, 2000-2006



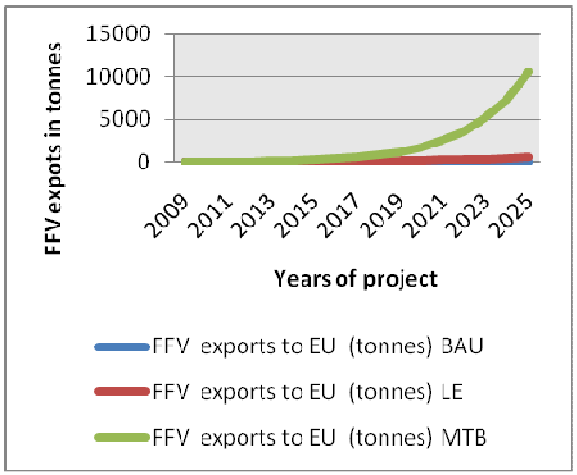
Source: CBI (2008).

Figures 12 and 13 show changes to Uganda's exports to the EU in both volume and value terms under the three different scenarios, between 2009 and 2025.

In Figure 12, the *matching the best* scenario projects high levels of growth in the volume of exports. On the other hand, the growth in the *leading edge* scenario is relatively low. The *business as usual* scenario projects roughly the same volume of FFV exports in the years from 2009 to 2025. Because Uganda already has a large base production of FFVs it is possible that a *matching the best* scenario could be attained with a reasonable injection of additional inputs.

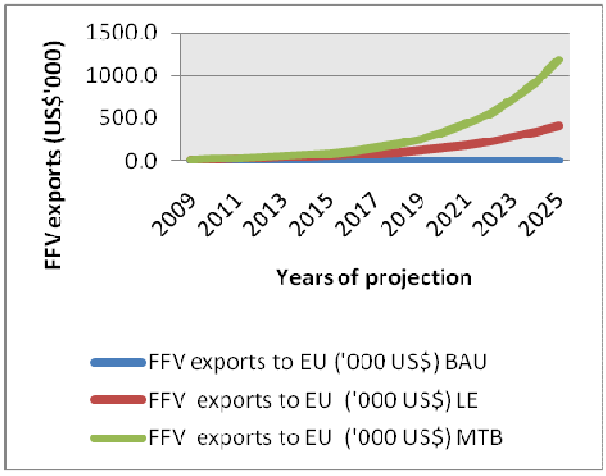
Under the *matching the best* scenario, Uganda would experience annual growth in the export of FFV to the EU of 43 per cent. If Uganda sustained a 20.6 per cent growth rate as in the *leading edge* scenario, the value of exports to the EU by 2025 would be just over one-third of the levels under the *matching the best* scenario (see Figure 13). The large difference between these two scenarios is an indication of the high growth potential in the FFV industry. Given that much of Uganda's FFV production is for the domestic and regional markets where quality standards are lower, it appears that the gains in the *matching the best* scenario could be achieved by raising quality standards.

Figure 12: FFV exports to the EU by volume, 2009-2025



Source: adapted from UBOS (2008) and UEPB (2006).

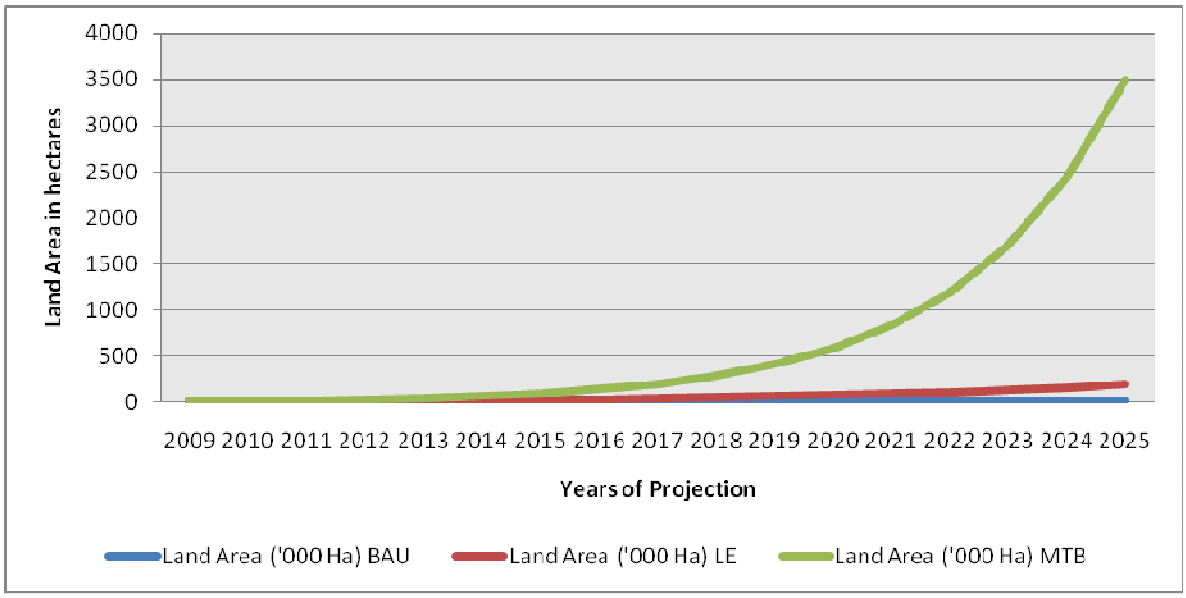
Figure 13: FFV exports to the EU by value, 2009-2025



Source: adapted from UBOS (2008) and UEPB (2006).

The projected growth in volume and value of FFV is likely to come with a large expansion in land area under production. It is projected that by 2025 at least 4 million hectares would be under cultivation of FFV. Of this, around 40 per cent would be from non-commercial cultivated systems and a six-fold increase in current the area of commercial farms in the country. This level of expansion of farm land is plausible and indeed it could be envisaged that increases in productivity of FFV production on non-commercial farms could also ensure that less land, than the area projected above, might actually be used.

Figure 14: FFV scenario projections for land area under production, 2009-2025



Source: adapted from UBOS (2008).

6.2 The environment and biodiversity

In Uganda, loss of biodiversity is often associated with changes in land use. It has been estimated that biodiversity loss in Uganda generally occurs at a rate of around 10 per cent per decade (Arinatwe *et al.* 2000; Pomeroy and Mwima 2002). The rate of loss is particularly high in savannah areas, reaching over 20 per cent per decade. Moreover, limited assessments of agro-ecosystems suggest that biodiversity is being lost at a rate as high as 50 per cent per decade (Pomeroy and Mwima 2002).

Much of the commercial horticulture production in Uganda occurs in the central region of the country (UEPB 2006). However, the small, older horticulture production occurs in Central, Western and Eastern Uganda (Tushabe *et al.* 2001). An assessment of biodiversity on commercial estates and small-scale farms demonstrated a declining state of biodiversity on farms. The number of indigenous plant species was lowest on the commercial horticultural estates in Central Uganda and highest on the high-cultivate intensity farms in Eastern and Western Uganda as well as on the low cultivation farms in Western Uganda (see Table 13). This is because the Western and Eastern highland areas of Uganda are perhaps the most biodiversity rich areas in the country. In addition, the more remote the location of production the less likely that heavy agrochemicals are used as the local microclimate already implies low pest populations and relatively high levels of soil fertility.

Table 13: Number of stems, tree species and percentage of canopy cover in Uganda

Scale of farming	Land-use category	Study site	Number of plant species		Total number of stems	Canopy cover (%)
			Exotic	Indigenous		
Large scale	Commercial plantation	Central Uganda Horticulture Estate	10	11	67	0.29
Small scale (smallholder farms)	High cultivation intensity	Eastern Uganda	21	22	126	2.10
		Western Uganda	29	42	185	2.26
	Medium cultivation intensity	Central Uganda	18	30	117	3.90
		Western Uganda	13	21	93	0.89
	Low cultivation intensity	Western Uganda	25	39	175	1.00

Source: Tushabe *et al.* (2001).

The trade in FFV with the EU targets specific vegetables. Those that are commercially viable are beans, peas, onions, okra, cabbage, carrots and tomatoes. Fruits of significant export importance include pineapple, passion fruit, apple, banana, *gros michel*, avocado, citrus, mango, paw paw and jack fruit, along with others specified in Annex 4 (Sonko *et al.* 2004).

However, specialization in a specific group of FFV will not only lead to a loss in crop biodiversity but will distort stable faming systems. In many farming systems in Uganda, a different set of fruits and vegetables are grown. For instance, a survey conducted at three sites in Masindi, Hoima and Kibaale districts showed that the vegetables grown in order of importance were obugoora, tomatoes, dodo (*Amaranthus sp.*), eggplant and cabbage. Onions, African eggplant (enjagi), green pepper*, Sukuma wiiki*, *eyobyo* (spider weed–*Gynandropsis gynandra*), *eteke,* and pumpkins were also grown. These vegetables are grown for both cash and food. The vegetables were all local varieties except for the tomatoes and cabbage. The main fruits grown are guavas, oranges and tangerines. Jack fruit, pawpaw and mangoes were mainly grown for domestic consumption while passion fruit, pineapple and avocados were grown for sale (Akullo *et al.* 2007).

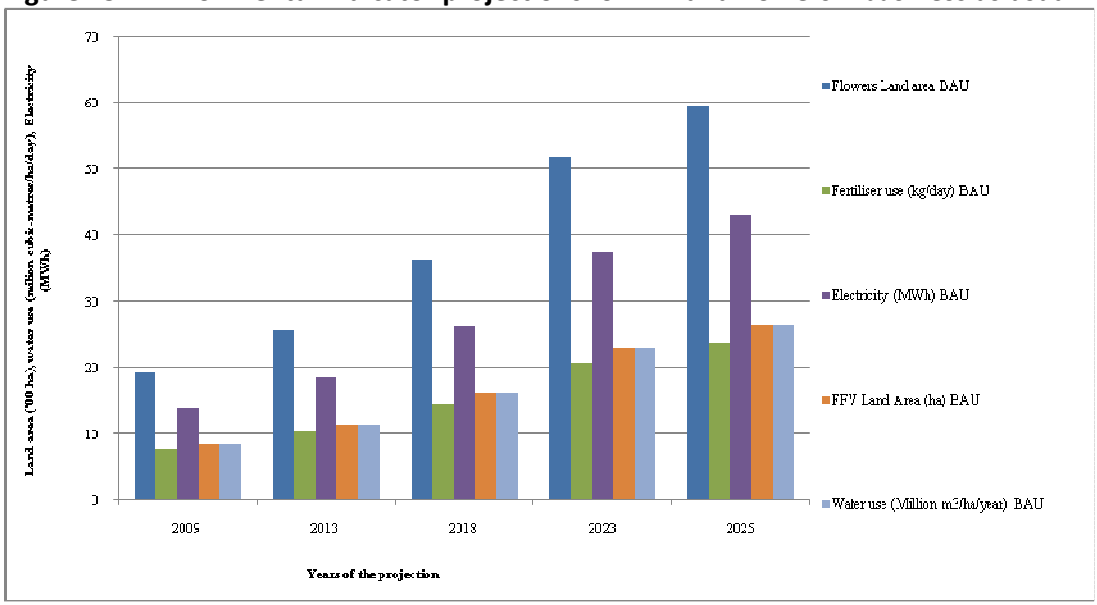
The larger the area of land converted to commercial agriculture, as proposed in the *matching the best* scenario, the higher the likelihood that these communities will abandon current production patterns (that consist of crop rotation cycles) for approaches that are better suited to the market. Crop rotation cycles encourage recycling of soil nutrients between fibrous and tap-rooted crop systems and nitrogen fixing crops. Crop rotation cycles also break pest cycles in traditional farming systems (Masiga and Ruhweza 2007).

The starting point for considering specific environmental and biodiversity impacts is the projected changes in each scenario in terms of land use, which leads to subsequent impacts on other environmental resources, particularly biodiversity. Figures 15, 16 and 17 show that at present, the flower industry is relatively resource intensive. Rose farms consume up to 50

000 litres of water per hectare per day (50 m^3) (UEPB 2006). In Uganda, a 180 hectare flower farm uses about 9 million m^3/ha/day of water.

Figure 15 shows that in the *business as usual* scenario, the land area under cultivation, fertilizer use, and electricity use in the flower industry are projected to grow by three-fold between 2009 and 2025. The land area under intensive flower production is projected to increase from 180 hectares to around 600 hectares and fertilizer, water, and electricity use would increase in similar proportions.

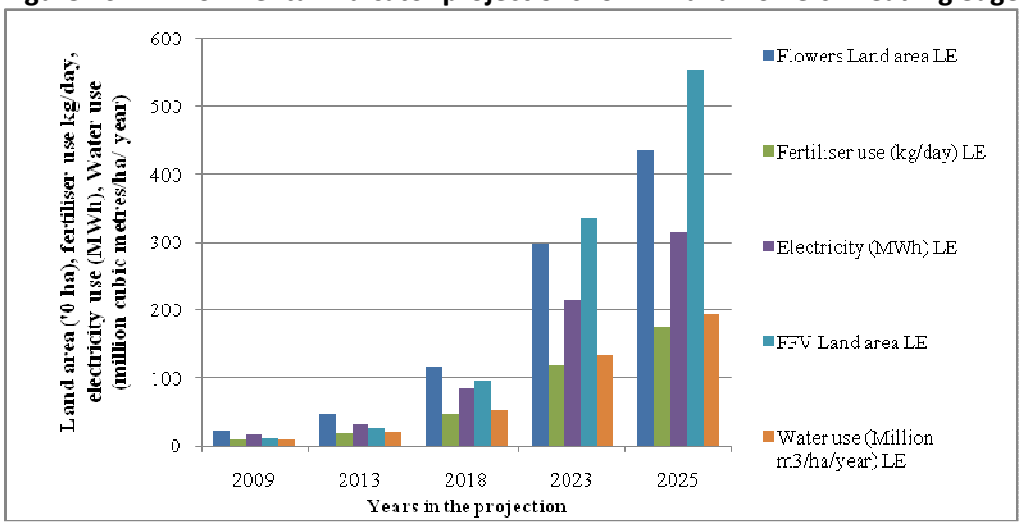
Figure 15: Environmental indicator projections for FFV and flowers – business as usual



Source: adapted from UEPB (2006) and Muwanga (2008).

In the *leading edge* scenario, the land area under intensive flower production would increase from 180 hectares to just under 4 500 hectares—a 25-fold increase in area under production. This would result in an increase in fertilizer use from less than one tonne per day to nearly 20 tonnes per day, and electricity use would increase from about 17 MWH to over 300 MWH in the flower industry alone (see Figure 16). For FFV, the *leading edge* scenario projected a 50-fold increase in land area under commercial production—from 8 000 hectares to over 550 000 hectares. Because the area under fruits and vegetables was estimated at 93 000 hectares at the outset, this simulation projects a five-fold increase in conversion to commercial land. Water use increases in proportion to the land area under the commercial FFV production and so a 20-fold increase in water consumption would be expected.

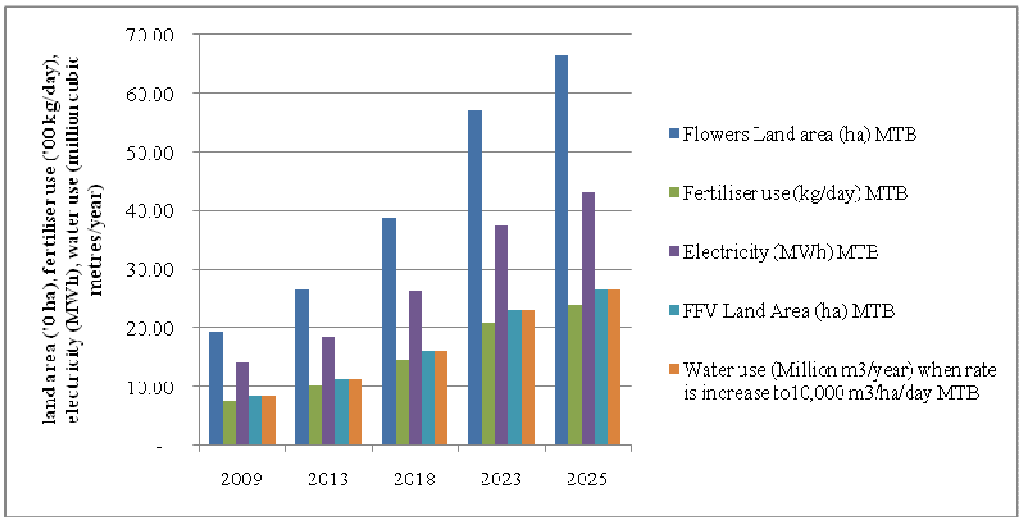
Figure 16: Environmental indicator projections for FFV and flowers – leading edge



Source: adapted from UEPB (2006) and Muwanga (2008).

In the *matching the best,* scenario the land area under production for cut flowers was projected to expand by four-fold, from 180 hectares to 666 hectares (see Figure 17). Subsequently, fertilizer and electricity use would both also be expected to increase by over three-fold from baseline levels to 30 tonnes of fertilizer and 24 MWH of electricity. For FFVs, it was projected that the land area under commercial production would increase to 553 000 hectares in 2025, up from 93 000 hectares in 2008. Levels of water use would be expected to increase by 10 000 m^3/ha.

Figure 17: Environmental indicator projections for FFV and flowers – matching the best



Source: adapted from UEPB (2006) and Muwanga (2008).

Of the three scenarios examined, it appears that the *matching the best* scenario, which includes a 28.3 per cent growth rate in both the value and volume of exports, provides the most appropriate balance of inputs for the FFV exports, although it places an enormous strain on land and water resources and would result in the excessive use of fertilizers in the flower industry (see Figure 17). On the other hand, as indicated in Figure 16, the *leading*

edge scenario offers an opportunity for reasonably high increases in export values from flower exports and fairly low values for FFVs. The *leading edge* scenario presents a positive path for growth in the flower industry, where the increased value of exports seems to outweigh costs associated with the increased use of inputs. Under the *business as usual* scenario, it appears that the export position for both FFVs and flowers would decline. It would seem therefore that the *leading edge* scenario, although itself taking up considerable resources, would be a better choice than the *matching the best* scenario, which puts the highest strain on resources. For instance, in severe cases, excessive use of fertilizers and pesticides have caused pollution, eutrophication and fertilization of benthic organisms have been reported. This in turn impacts fisheries and the quality water for production and domestic use (UNEP/NEMA 2006).

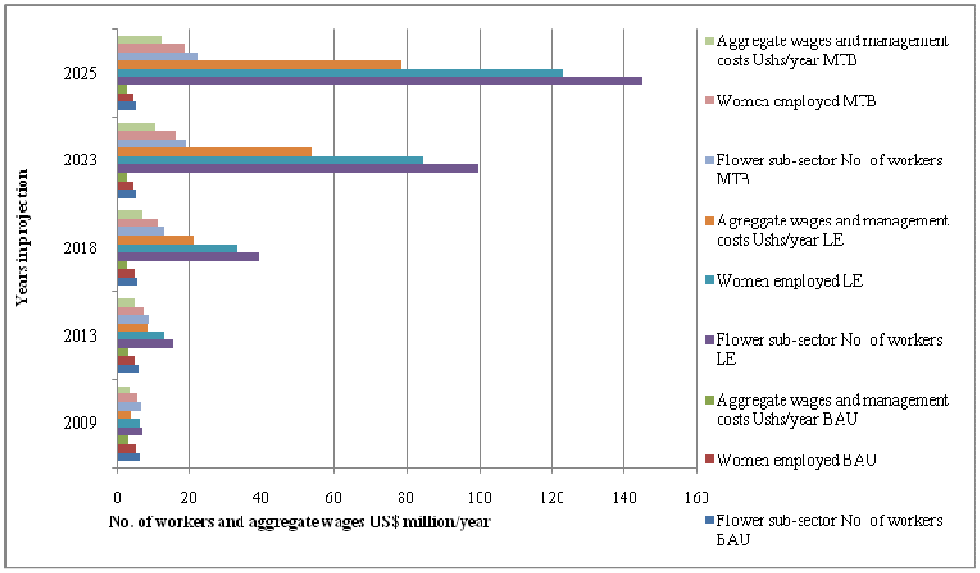
6.3 Social impacts

The social impacts of the different scenarios in the horticulture sector flow from their economic and environmental impacts. In the flower industry, where the employment and wage figures were calculated, Figure 18 shows that the *leading edge* scenario included a 20-fold increase in both employment and aggregate wages. The *matching the best* scenario projected a three-fold increase in employment and aggregate wages, while the *business as usual* scenario projected a 15-fold decline. These results point to the need for an exponential growth strategy if social benefits are to be maximized. Maintaining the status quo in the flower industry is likely to lead to a reduction in the performance on social indicators. The advantage gained from growth within the sector is the increased benefits of expansion of the corporate flower industry, which would enable flower entrepreneurs to invest more in their human resources.

Similar data do not exist for the FFV industry, so it is assumed that the impacts of the projections in the three scenarios are likely to be similar. The resource poor and rural population in Uganda often find it difficult to purchase exotic vegetables from local markets because of their high price. As a result, they depend on traditional vegetables to accompany the staple foods such as maize, cassava, sweet potatoes, bananas, millet, sorghum and yams (Rubaihayo 1994). The staple foods provide calories while the traditional vegetables are very nutritious.[8] Most FFVs grown in Uganda are either indigenous or have been successfully integrated into the farming systems. One study on local sourcing for FFVs in Uganda concluded that middle-income consumers find it difficult to afford sufficient amounts of FFV and the market is poorly developed to allow investment in quality improvement (Bear and Goldman 2005).

[8]They contain vitamins A, B and C, protein, and minerals such as iron, calcium, phosphorous, iodine and fluorine in varying amounts.

Figure 18: Social projections under the three scenarios for the flower industry



Source: adapted from UEPB (2006).

There are also concerns about impacts of trade liberalization on occupational health and safety issues, employment, and income. The flower industry currently employs over 6 000 people. A majority of the employees (85 per cent) are women, mainly at the unskilled and clerical levels. Around 90 per cent of the employees live entirely from their jobs working on rose farms, with no supplementary income (Djikstra 2001; Kaija 1999). The manual porters earn US$2 per day (US$528 per year based on 264 days). Spending is directed mostly towards housing, food and education. Low-level supervisors earn around US$1 000 per year. Women earn the bulk of the wage bill in the rose industry, but are paid less than men because their work is confined to unskilled tasks. This means that some of the resources gained from the wage bill could be earmarked to increase the pay of the workers in the sector and provide resources for safety equipment rather than to hire more workers and pay them poorly.

With regard to occupational health and safety, several flower companies visited showed a high level of concern for the health and safety of their workers, particularly with respect to the use of chemicals and pesticides. Most chemicals used on the farms are hazardous and several measures are typically in place to avoid accidents.[9] However, performance assessments undertaken by the Ministry of Labour Gender and Social Development indicated that while many flower producers have codes of practice it is often a challenge to implement these codes (NEMA 2008).

[9] These include: (i) proper protective clothing when handling chemicals (overcoats, gloves, masks, boots, overalls, goggles); (ii) instructions on the proper use of equipment; (iii) storage safety–(chemicals stored separately from other products); (iv) shower room facility to wash off chemicals, drinking water, and pit latrines; (v) first-aid kits for emergencies; periodic medical check-ups; and (vi) worker insurance policies.

6.4 Institutional challenges

Within government institutions responsible for overseeing horticultural production and trade, and among private sector and civil society organizations, several institutional issues emerged, which constrain the growth of the country's horticulture industry. These issues, which include certification, market access, industry associations for producers and exporters, supply-side constraints, a lack of well-developed local markets, and information gaps are outlined below.

Certification: During the consultations, flower companies discussed certification through Milieu Programma Sierteelt (MPS) guidelines, a private protocol (originally developed in the Netherlands) geared toward environmental conservation and risk mitigation.[10] The MPS is one of the flower-related protocols that have been benchmarked to the Euro-Retailer Produce Working Group for Good Agricultural Practices (GAPs). The flower companies noted that with the opening up of the markets, flower farms have to obtain MPS-GAP certification in order to compete. The costs of obtaining such certification were estimated to be around €8 000 and most flower farmers said they would not be able to afford to obtain the certification. It was noted that while farmers have hitherto been able to access markets in Europe without this certification, there is no guarantee that this would continue. When asked whether certification could be undertaken locally, the companies said that there is no mutual recognition and equivalence. However, the companies were unable to quantify how much they were losing without the certification and sought assistance with research in this area. In addition to MPS-GAP, it was noted that companies are required to be International Standards Organization (ISO) 180001 compliant and need to implement the new ISO 26000 standard, which went into effect as of October 2008. Stakeholders recommended developing a Uganda GAP with EU equivalency to address the requirement for multiple certifications.

Market access: Export markets for horticulture are largely controlled by multinational companies that have placed stringent conditions on the supply of seeds, amount produced, amount exported and price. These requirements have frustrated local farmers unable to compete in such a restricted market. Although an opportunity to access the market through an auction exists for local exporters, a quality test must be passed. The few successful flower exporting companies already have partners abroad. The Uganda Flower Exporters Association (UFEA) should help companies to access markets. At present, the Uganda Export Promotion Board (UEPB) provides information to farmers with respect to market opportunities.

The FFV exporters experience additional challenges in accessing markets. Many sellers who access markets over the internet have been victims of fraud. Some traders have been deceived, after one or two sales, into sending large volumes of exports to buyers who subsequently default on payment. This was most common among new entrants in the market and traders who operate independently. Stakeholders felt that they lacked collective bargaining power and recommended the establishment of an organization that would help

[10] MPS themes relate to fertilizer, crop protection, energy, water, and waste management.

sellers negotiate better terms. The existing Horticultural Exporters Association (HORTEXA) is weak in market access negotiations.

Industry associations: A new umbrella organization – the Horticulture Promotion Organization of Uganda (HPOU) – has been formed to coordinate the activities of all stakeholders in the horticulture sector. Among its activities, is the development of a GAP for Uganda.

Supply-side constraints: Farmers cited constraints regarding producing sufficient quantities to meet the demand in the international market. For example, Nile Botanical Resources, a producer and exporter of products made from natural ingredients (such as moringa oil), said they had found a market for spices and essential oils in Canada and Australia, and for nilotica shea butter in the United Kingdom. However, at present they do not have sufficient land area to produce adequate quantities of these products. Most of the land available is in northern Uganda, an area that has been ravaged by war since 1986. However, the region is now more peaceful, which should allow for the introduction of various economic activities. The flower farmers cited freight costs as a continuing challenge–in particular with the rising price of oil. Exporters of FFVs said most of them are smallholders and they struggle to produce the quantities required by the EU market. Most of the farmers cannot afford to add value through processing in order to compete in the international market for value-added products.

Lack of a well-developed local market: In the flower and FFV industries, most firms produce solely for the foreign market. The local market for flowers is very small and the FFVs that are consumed in the local market are of a poor quality. Despite this, there seems to be little domestic demand to improve the quality of the products. This means that in order to export FFVs, the farmers have to put in new and expensive systems (such as cold storage and other SPS measures) to cater to the foreign market. Some companies would prefer to work towards developing local markets for products to ensure sustainability before building the international market. In particular, they recommended raising domestic standards and testing products before putting them on the international market

Information gaps: Despite institutions such as the Private Sector Foundation Unit several producers and exporters have difficulty accessing information on export markets and the production and export requirements in those markets. There is a concern that the existing institutions have been unable to reach many producers and exporters.

6.5 Root causes of challenges, and opportunities presented by the EPA for biodiversity

The increased production envisaged as a response to the EPA will take place in the context of several economic, social, environmental and biodiversity challenges that already exist. The RCA approach synthesizes the problems by exploring their root causes, and examines opportunities, together with stakeholders. The IA identified several economic, environmental and biodiversity, social and institutional challenges related to the horticulture sector. The root causes, actors and opportunities associated with the problems

were explored through the RCA that is summarized in Table 14. Horizontal linkages between the economic, environmental/biodiversity, social and institutional factors were explored.

At the economic level, incomes earned by smallholder farmers who produce fruits and vegetables are quite low (Sonko *et al.* 2004). This is because of the small size of the farms and the internalization of marketing costs by traders, which further lowers the price earned. For many exporters, the costs of trading are quite high, given air freight costs, and costs of inputs such as electricity and water. In many cases, the power supply is inadequate or supply is not available in most production areas. Even if the government was interested in investing in the horticulture sector, these resources would have to be shared with many other sub-sectors. Even then, the export revenue from the horticulture sector is dependent on the price in the EU, which may not always be stable (Gibbon 2006). Some market analysts have downgraded the prospects for Uganda's organic FFV exports becoming mainstream products that can compete with conventionally produced FFV.

It has been suggested that the only area where small producers with high transaction costs have an advantage in Uganda is in the premium market for organic agriculture (Baffes 2006; MTTI 2006). In Africa, Uganda has the highest number of smallholder farmers engaged in organic agriculture (206 803) and 0.71 per cent of the farm land is under organic production. This is the second highest land area in Africa. At present in Uganda 88 439 hectares is under organic agriculture, which is more than in the country's competitors in the region, such as in Kenya (3 307 hectares), Ethiopia (2 601 hectares), and Tanzania (23 732 hectares). Therefore, Uganda is in a strong position to exploit emerging opportunities in the market for organic agriculture.

The impacts of the projections related to economic growth and trade will have an impact on the environment and biodiversity in the horticulture sub-sector. For example, increased trade horticulture is likely to lead to the increased use of agrochemicals, and increase in the number of small subsistence farm plots that convert to commercial horticulture production units, and the introduction of alien species and genetically modified organisms (GMOs). The result of these developments include: i) a likely increase in pollution of water systems and health concerns among farm workers, ii) the risk of food insecurity if farmers stop growing staple food crops, iii) the likely encroachment of agricultural land into protected areas, and iv) contamination and loss of local genetic diversity. Large-scale conversion of land and loss of biomass will also lead to increased greenhouse gas emissions.

From a social perspective, concerns include occupational health of workers, equitability of wages, potential loss of rights to land and gender implications from the potential new and growing economy. An equitable social strategy for the future of the horticulture sector should increase the opportunity for education among farmers, increase employment (especially for women), ensure that incomes in the horticulture sector are more equitable, rationalize rural-urban migration and promote sustainable production and the equitable integration of different social groups.

Smallholder farmers engaged in sustainable production (especially organic agricultural production) have received little government support, and land ownership is characterized by weak property rights. Biodiversity has not been adequately integrated into planning at

the local and national levels and this is likely to make future action inadequate. The institutional concerns at the international level consist of the enormous influence of the Euro-Retailer Groups and the influence of the behaviour of exporters and producers in developing countries like Uganda. While there is a strong push for higher quality standards, there has not been sufficient effort among all actors to ensure that all participants (including smallholder farmers) are not worse off because of the continually changing standards. One of the major fears among Ugandan producers is that increased liberalization will actually benefit the EU more because of the unequal trading relationship largely based on the more stringent regulations placed on goods sold in the EU market (MTTI 2006). From this, however, there is an opportunity for increasing interaction among producers, exporters in Uganda and the traders in the EU.

Table 14: Matrix used for RCA of the EPA on Uganda's biodiversity

Matrix analysis of root causes, actors and opportunities related to a impacts of increased trade in horticultural products from Uganda on biodiversity				
Levels	***Economic***	***Environmental and biodiversity***	***Social***	***Institutional and/or political***
Problems:	• Low prices of fruits and vegetables fruits received by farmers. • Loss of some sources of livelihood such as food and medicine. • High production and marketing costs (transportation and freight costs, certification costs). • Low aggregate production of fruits and vegetables. • Transfer of resources from other sectors to support the horticulture sub-sector. • High quality produce is not adequately rewarded with better prices in the domestic market. • A high concentration in the conventional market where Uganda is not as effective as its competitors. • Transport routes are long and road and sea transport to destinations often take longer than the shelf-life of the goods, so that the freight will decay before reaching markets in Europe or Asia. • Consequently, the only exports of conventionally grown bananas from East Africa to Europe go by airfreight, often with higher value products.	• Loss of ecosystem services such as filtration loss, direct values like food, loss of pollinators. • Pollution of rivers and lakes with effluents from flower farms and potential threat from commercial fruit and vegetables farms. • High water use rates in the horticulture sector, which are also shared with communities. • Encroachment on protected areas. • Introduction of alien species. • Deforestation as more land is acquired for production. • Changes in microclimate could lead to increased pests and diseases. • Agrochemicals may lead to extinction of important microorganisms. • Changes in below ground diversity. • Potential high rate of conversion of smallholder subsistence farms and other lands for commercial horticulture. • Conversion of other land uses to commercial horticulture production. • Encroachment on marginal land. • Release of greenhouse gases from changes in land use of land.	• Poor health due to chemicals. • Displacement of people. • Threat to food security. • Loss of family productive labour to commercial horticulture production. • Poor wages in the flower industry, especially for women. • Poor working conditions in some flower farms and high risk for work-related diseases. • Economic empowerment of women.	• Weak property rights for poor land users. • Absence of government policy on organic agriculture. • Limited support from government extension agencies. • Biodiversity concerns have not been adequately integrated into the planning especially at the local government and national levels. • Limited information on biodiversity to use for planning purposes.
Local and national levels				
Root causes:	• Smallholder farms are between 0.5 hectares and 2 hectares and farmers are sensitive to low prices. • Conversion of farmlands to commercial lands deprives farmers of land for other crops and could endanger their livelihoods.	• Use of agrochemicals in areas adjacent to smallholder farms has been reported to reduce the population of pollinators in the central region of Uganda (Mpigi, Wakiso Districts). • Effluent from flower farms is one of the causes of point source pollution on Lake	• Intensification in the horticulture sector will increase use of agrochemicals which could increase health problems for exposed persons. • Expansions of farmlands will lead to the displacement of people,	• There have been delays in reforms of the Land Act (1998) • The Domestic Relations Bill has not been passed to provide strength to women as they seek domestic rights. • Organic agriculture was a very small sub-sector that was ignored for years

	• Export oriented production on a small scale also involves many chores that reduce profitability for the farmers. • Many farmers are engaged in subsistence production already and much of the produce is consumed at home, sold on farm or at the road side. • While local production may be high; very little of the fruits and vegetables have a quality viable for the export market. As such aggregate effective supply is low. • Quality standards are poorly developed or regulated.	Victoria (Odada *et al.* 2004). • Some flower farms share water sources with communities and both groups are uncertain of the sustainability of the water resources. • The land tenure systems in central Uganda empower landlords (*Mailo*) over smallholder land occupants. This insecurity of tenure limits the number of investments farmers can make. • In the high density population areas neighbouring National Parks and Central Forest Reserves of the western and eastern highlands of Uganda extensification of production might lead to encroachment on protected areas. • Commercial horticulture in Uganda is always associated with the introduction of exotic species. This is because many of the local varieties may not be commercially viable in mainstream EU markets.	especially the poor and landless. • Land use conversion from food to crop land for commercial production. • The flower industry still pays low wages. This is because Uganda is still looked at as a low wage country. The trade unions are poor or non-existent. • Over two-thirds of the people employed in the flower industry are women. This helps improve employment for women.	There have been no separate government efforts to include biodiversity concerns into national and sub-national policy • There is an absence of comprehensive baseline or quantitative data.

Matrix analysis of root causes, actors and opportunities related to a impacts of increased trade of horticultural products from Uganda on biodiversity				
Levels	***Economic***	***Environmental and biodiversity***	***Social***	***Institutional and/or political***
Associated actors:	UFEA, HORTEXA, UEPB, and HPOU.	MUIENR, UFEA, HORTEXA, HPOU, District Local Governments – Production Departments, and MAAIF.	Ministry of Gender, Labour and Social Development (MoGLSD), UFEA, HORTEXA, HPOU, and National Organization of Trades Unions.	District Local Governments – Production Departments, MAAIF, Ministry of Tourism Trade and Industry (MTTI).
Opportunities:	• Investment in expansion of organic agriculture. • Increase household income. • Increase economic diversification. • Increase capacity building in the flower sector. • Promote horticulture for export. • Promote horticulture for the domestic market. • Uganda earned over US$22 million	• Enhance food security with maintenance of crop cycles and rotation of crops. • Using sustainable practices to forestall crop diseases and pests. • Growth of organic fertilizer and biological controls and biocides industry. • Exploiting all the sustainability benefits and incomes from organic agricultural production including income from Reduced Emissions from Deforestation and Forest Degradation.	• Increased opportunities for education. • Increased opportunities for employment, especially for women. • Possibility for making incomes within the horticulture sector more equitable. • Rationalized rural-urban	• Opportunity to develop a National Organic Agriculture Policy. • Opportunity to include biodiversity in local government and national development programmes. • Enhance the productive responsibility and rights of women.

	in 2008. The country has over 206 803 organic farmers with 38 exporters (NOGAMU 2009).		migration that minimizes mass movement and labour transfer. • Sustainable production also means equitable integration of different social groups.	
International level				
Root causes:	• Exposure to international price volatility. • The large size of conventional horticulture products compared to sustainable horticulture products. • Uganda is a land locked country, far from the EU market and a lot of Uganda's horticulture exports are air freighted. • The EU market requires large volumes of very high quality product. But Uganda does not have large volumes of high quality produce. • In Europe Ugandan producers supply only specialty markets, such as cooking bananas or plantain for African expatriates, who do not make up a significant market share. • The specialty (market for sustainable produce) market is still less than 10 per cent of the market in Europe.	• Pressures from multinationals and foreign governments to use GMOs. • Pollution of water systems like Lake Victoria by factories or producers based in neighbouring countries like Kenya and Tanzania. • Pressure from European market to have clean and healthy looking fruit, which leads to large scale use of chemicals in the domestic market.	• Nearly all chemicals used in Uganda are imported. • The standards set by the EU market means that farmers have to protect the plants with agrochemicals.	• EURO retailer groups control the major export outlets (supermarkets). • The smaller outlets such as those in the United Kingdom are slowly becoming mainstream leading to a reduction in product differentiation.
Associated actors:	EURO Retailer Group, joint ventures (flower and fruits and vegetable export companies), UFEA, HORTEXA and HPOU.	EU, Uganda Bureau of Statistics, Netherlands Flower Auction (Market), MAAIF, MTTI.	EU, MoGLSD, MAAIF, MTTI), UFEA, HORTEXA and HPOU.	EU, MoGLSD, MAAIF, and MTTI.
Opportunities:	• Organic agriculture markets are growing at between 5 per cent and 20 per cent in different countries of the EU.	• Sustainable production systems that conserve biodiversity.		

7 Conclusions

The economic analysis under the IA indicates that even from its most recent economic or trade performance, as under the *matching the best* scenario, Uganda has been competitive enough to make substantial gains in terms of trade with the EU. The *leading edge* scenario, on the other hand, would put Uganda in a strongly competitive position as it begins to compete for the EU market with other EAC, COMESA and ACP countries. From a social perspective the *leading edge* scenario would lead to a faster increase in employment opportunities and wages. However, in terms of poverty reduction and expansion of Uganda's export revenues over the long term, and taking into account economic, trade, and environmental factors raised in the scenarios, the country would maximize gains if the *matching the best* scenario were to be adopted.

Stress on the environment and biodiversity are likely to come about as a result of increased intensification in the FFV and flower industries. While volumes in the flower sector are limited by the size of the market, there is a considerable opportunity to expand in the FFV industry. The *matching the best* scenario would result in a four-fold increase in land area under FFV production. With regard to the EU market, the greatest expansion observed for FFV was achieved by moving to more sustainable organic production. Organic production was projected to rise by 5 per cent, 10 per cent, and 20 per cent under the *business as usual*, *leading edge*, and *matching the best* scenarios, respectively (Tumushabe *et al.* 2008). These levels are much closer to the growth projected under the *leading edge* scenario. Therefore, while the *matching the best* scenario represents an optimistic set of objectives, the *leading edge* scenario might be more readily achievable, and deliver comparable benefits.

With respect to the environment, under all the scenarios Uganda will have to take into account the fact that additional inputs (such as water, energy, fertilizer and land) will be required for both FFV and flowers. For water use, the analysis suggests that increased productivity will be achieved under the *leading edge* or *matching the best* scenarios. For the commercial estates, the concerns are associated with the sustainability of volumes of abstraction, which also has a social element in that it affects the water quantity or quality available for local communities. There will be a need to establish whether an ecosystem service is being protected by one group or another and whether the group should be compensated. There is also a need to ensure that the ecosystem service can continue to be provided sustainably, and if not whether there are alternatives. One of the alternatives is considering the efficiency of the production technology. Perhaps, along with the increased water use, technologies that encourage the efficient use of water (such as treatment, recycling or re-use) could also be introduced.

Electricity use is likely to expand under all of the scenarios. The direct proportionality of production and electricity use can be countered with more efficient technology. The more intensive systems, such as those proposed in the *leading edge* or *matching the best* scenarios could use bio-fuels as an alternative fuel source. However, bio-fuel use, as well as the increased use of heavy fuel generators for electricity, will also pose significant concerns for environment. The bio-fuels would compete for land area with food crops as well as the horticultural export crops. On the other hand, it is unclear how much FFVs contribute to carbon sequestration. The post-EPA trade policy will have to take a position on whether or not to promote bio-fuel technology. Moreover, bio-fuels themselves may

become an exportable product (even from a horticultural crop point of view, such as from Jatropha).

The concerns over land use encompass all the other environmental threats. Yet, there are specific land-use concerns raised in the *matching the best* scenario, such as transformation of other ecosystems. For sustainability to be realized the preferred scenario should not lead to conversion of other ecosystem into horticulture farmland. On the other hand, where opportunities exists to restore degraded fields, perhaps the *matching the best* scenario would provide a good opportunity for enhancing degraded arable lands, especially in the drier Cattle Corridor areas of the country. However, alternatives would have to be identified where expansion threatens forest, wetland, and grassland ecosystems.

A direct consequence of increased commercialization of FFV in the country will be the orientation of farmers towards commercially viable fruits and vegetables and the neglect of those which are not commercially viable (Akullo *et al.* 2007). If this happens it will distort stable livelihoods that survive through subsistence production and sale. Many farming systems in the country also have distinct crop rotation systems that ensure that the fertility which is lost during one season is recovered in the next, that pest and disease cycles are broken, and that food security is maintained (Masiga and Ruhweza 2007). The commercialization of small farms risks tampering with these cycles, which means that beyond the loss of biodiversity, soil nutrient cycles, and ultimately food security, would be threatened.

The best scenario appears to be the *leading edge* scenario since it proposes a realistic growth path where rates of growth can consistently be achieved. In addition, sustainable markets (especially organic horticulture for FFV) seem to offer the best opportunity for accessing the EU market. From a social perspective, the smallholder FFV production systems may lead to wider welfare effects. However, the IA also points out several requirements for institutional changes, particularly administrative changes to the National Trade Policy in the post-EPA period.

From the three scenarios discussed, it appears that expansion under the *leading edge* and the *matching the best* scenarios will only be possible if opportunities presented by organic agriculture are explored. For the flower industry, the *matching the best* scenario offers the least distortion in terms of additional investment, increased land area, and increased use of resources, relative to export earnings.

With regard to FFV, the *leading edge* scenario appears to be the most realistic in terms of investment. It also presents opportunities for increased economic performance consistent with national policy on trade development, in an industry with a large number of participants. Investment directed toward the flower industry, as well as FFV, would benefit from a greater focus on higher value products. In the FFV industry the most limiting factor is the low level of productivity.

This study shows that the preferred path for future trade policy is to take a cautious approach to floriculture, and a more aggressive approach involving pursuing growth consistent with previous best performance in the FFV industry. Aggressive growth in the cut-flower industry requires additional inputs, which are expensive, but are also likely to threaten the environment, especially biodiversity. Such growth would lead to excessive water abstraction, and competition for wetlands as both a source of water and as a natural means of treating effluents. This behaviour would lead to

heavy losses of biodiversity in wetlands. Many communities near flower farms are also engaged in agriculture and the potential loss of pollinators is significant. There are concerns over pollution of fresh water systems. Moreover, a cautious approach is necessary given that there are very few more sustainable inputs to substitute for those already in use in the flower industry and the potential market is restricted.

For the FFV industry, the focus in the EPA discussions and post-EPA policies should encourage aggressive. Given that Uganda is already among the leading producers of FFV in the world it has a natural advantage. However, current low levels of productivity should be improved through irrigation and other technologies and inputs. In addition, there should be a greater focus on organic agriculture since it is a growing area for Uganda and offers substantial market premiums. Since Uganda has the largest number of smallholder farmers engaged in organic agriculture and the second largest area of estate land under organic agriculture it is in a relatively competitive position. Increasing levels of organic agriculture is likely to enhance biodiversity benefits. There may also be an opportunity to establish a system of payments for ecosystem services (especially for watersheds) where the rights of resource users can be determined.

8 Policy recommendations

The following policy recommendations have been developed in response to the findings of the IA. They cover several issues related to sustainability, the environment and in particular, biodiversity. They also require action from a range of stakeholders and actors associated with the horticulture sector at the national level and with respect to international trade, including its major trading partner, the EU.

8.1 Government of Uganda

1. Although the EPA provides a good opportunity for Uganda to increase its international trade position, the country should continue to pursue an aggressive trade expansion policy *vis à vis* the EU as the current state of trade is heavily tilted in favour of the EU.

2. In order for Uganda to realize a high growth rate in its trade, it will need to address the issue of low productivity. Research, innovation, technology dissemination, and access to capital should be emphasized to enhance productivity.

3. The links between biodiversity and trade should be integrated into government departments such as agriculture, energy, lands, environment and natural resources and other relevant sectors.

4. Capacity building on valuation and monitoring of impacts arising from trade-related development on the environment, the economy, and social welfare should be pursued.

5. Research should be directed towards quantifying the costs and benefits of different forms of certification required by Ugandan exporters, to inform the national standardization bodies and processes and to allow for the choice of economically viable and sustainable (including biodiversity conservation) options.

6. Enforcement of environmental laws should be strengthened at the national, district and local levels to ensure compliance with legal requirements and standards.

8.2 Private sector/business communities

1. Smallholders and large scale producers should be empowered to engage in horticultural production for export to the EU market through, *inter alia*, training, institutionalization (such as forming cooperatives or companies), access to inputs, capital and information, and trade concessions.

2. Companies exporting horticultural products should engage in corporate social responsibility with respect to the communities where they operate. They should also be encouraged to invest in the restoration and maintenance of the ecosystems which sustain their industry.

3. The horticulture industry should use technologies that will ensure efficiency in the use of resources (such as water, energy, fertilizer, and land) and environmental conservation, particularly given the threat of climate change.

8.3 The EU

1. Other factors, including climate change, are likely to exacerbate the loss of biodiversity, increase the risk of floods and droughts, and reduce the reliability of hydropower and biomass production. These changes will affect agricultural productivity and land use. Capacity building is required to monitor the impacts of climate change on biodiversity and implement activities to mitigate any adverse impacts. The EU and other development partners could provide financial and technical assistance.

2. The EU and other trade partners (also under the umbrella of the WTO) should recognize and support efforts by farmers and other actors in Uganda to conserve the integrity of its biodiversity and to maintain ownership over the rights to the country's biodiversity. This will involve support for current efforts to complete policy and legislation on biodiversity conservation and intellectual property rights.

3. Uganda lags behind the EU in terms of its trade balance and the country will require development support to improve its share of trade. This support should come about through investment that supports trade in energy, water and agriculture (and agricultural productivity). Investments could be directed towards infrastructure, research, capital, technology and human capacity building.

4. Valuation of biodiversity and ecosystem services is very important and Uganda lacks capacity in this field. The EU and other development partners should contribute to training and capacity building in this area.

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Annex 1: Potential impacts of increased trade in horticulture on biodiversity and ecosystems

Activity /driving force	Potential negative biodiversity impacts	Potential negative impacts on ecosystem services	Results and/or trade-offs
Direct (directly attributable to agriculture)			
Increased market access	Increased land conversion (forest clearance, cultivation of grassland). Loss of important habitat and associated species.	Loss of products provided by habitat, such as timber and non-timber forest products; forest loss reduces water storage and flood attenuation capacity, soil erosion in grasslands.	Increased area of land for cultivation. Rural landless poor migrate to marginal areas and poverty pressures alter the environment. Loss of ecotourism potential.
Cultivation and mechanical farming operations in grasslands and wetlands	Destruction of ground nesting birds.	Soil erosion, CO_2 emissions from oxidized carbon in soil organic matter.	Short-term gain in increased agricultural production yields leading to increase food security and improved human health.
Drainage of wetlands	Loss of wetland species.	Loss of non-crop species of food, medicinal or other value. CO_2 emissions from oxidized carbon.	Increased area of fertile land for cultivation. Rural landless poor migrate to marginal areas and poverty pressures alter the environment. Loss of ecotourism potential.
Increased use of artificial fertilizers and agrochemicals	Decline in plant diversity and dominance of species favoured by high nutrients. Declines in directly impacted species and food chain supplies.	Loss of non-crop species of food, medicinal or other value. Contamination of non-crop foods; loss of population in natural predators. Loss of natural pest management systems.	Increased agricultural production yields, but continual use of fertilizers required to maintain crop yields. Increased food security and human health due to reduced risk of crop failure.
Use of modern commercial crop varieties, imported seeds, seeds bred outside the country	Fast growing dense crops out-compete native species.	Loss of genetic diversity and potential future crop varieties.	Reduced use of fertilizers, pesticides and insecticides, increased nutritional value of crops. Increased food security and human health due to reduced risk of crop failure.
Indirect (indirectly attributable to agriculture)			
Eutrophication of water bodies (from nutrient rich runoff and soil erosion)	Degradation of wetland habitats, river systems and marine and coastal areas.	Reduced drinkable water supplies and fish stocks.	Increased malnutrition and incidents of disease in poor communities. Other communities benefit from increased agricultural production brought about by use of nitrogen.
Secondary impacts (resulting from actions that are not an intrinsic part of the agriculture)			
Increased road and infrastructure development to supply agricultural areas	Further habitat loss from footprint and sourcing of building materials, disturbance, habitat fragmentation.	Hydrological disruption and pollution of water bodies, loss of arable land.	Increased human well-being in some communities. Income increases and costs are reduced due to easier transportation of commodities and access to of infrastructure.
Migration and displacement of	Loss or declines in wild food species (such as	Loss in food resources if accessed unsustainably.	Rural landless migrate to marginal areas and pressures alter

Activity /driving force	Potential negative biodiversity impacts	Potential negative impacts on ecosystem services	Results and/or trade-offs
people	bush meat) in marginal areas.	Pressures on urban environments due to migration.	environment. Potential work force migrates to urban centres searching for work.
Increased incomes from farming	Loss of biodiversity and degradation of habitat.	Hydrological disruption and pollution of water bodies, loss of arable land, loss of food species and drinkable water.	Reduction of poverty in some communities and capital input available to contribute to increased production.

Source: adapted from UNEP (2007) (working document).

Annex 2: Multilateral environmental agreements

- ***Convention on Wetlands of International importance especially as Waterfowl Habitat (1971):*** The aim of the Convention is to halt the global loss of wetlands and to conserve those that remain through wise use and management. Uganda signed the Convention on 4 March 1988 and ratified it on 4 July 1988.

- ***Convention Concerning the Protection of the World Cultural and Natural Heritage (1972):*** This Convention was the first global instrument to address the conservation of particular habitats. It focuses on the natural heritage that provides the habitat for biological diversity. It also deals with the cultural setting that embodies crucial knowledge and experience founded upon the natural heritage. Uganda ratified the Convention on 20 November 1987.

- ***Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973):*** This Convention brings together biodiversity conservation and wildlife trade. It recognizes the need to regulate access to wildlife resources that is aimed at economic benefit through trade, the ever increasing value of wild fauna and flora, and highlights the need to protect them and it recognizes the importance of international cooperation to support this. Uganda ratified the Convention on 18 July 1991 and acceded to it on 16 October 1991.

- ***United Nations Convention on Biological Diversity (1992)****:* The Convention seeks to conserve biological diversity, to promote the sustainable use of its components, and to encourage equitable sharing of the benefits arising from the utilization of genetic resources. Article 15 reaffirms the principle of national sovereignty over natural resources. Uganda signed the Convention on 12 June 1992 and ratified it on 8 September 1993.

- ***The United Nations Framework Convention on Climate Change (1992):*** This Framework Convention aims to reduce emissions of greenhouse gases. Uganda signed it in June 1994 and ratified it in September 1997.

- ***Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora (1994):*** This Agreement focuses on the conservation of wild species. It also has provisions relating to effective application of preventive laws. Its objective is to reduce and eventually eliminate illegal access to trade in wild fauna and flora. Uganda signed the Agreement on 8 September 1994 and deposited the instrument for ratification on 12 April 1996.

- ***United Nations Convention to Combat Desertification (1994):*** This Convention seeks to achieve sustainable development through better land and water resources management. It is primarily concerned with management of ecosystems and habitats. The Convention establishes synergies among related conventions (such as the CBD and the UN Framework Convention on Climate Change). Uganda signed the Convention on 21 November 1994 and deposited the instrument for ratification on 25 June 1997.

- ***The Cartagena Protocol on Biosafety (2000):*** A Protocol of the CBD, this instrument contributes to ensuring adequate protection in transfer, handling and use of living modified organisms from modern biotechnology likely to have adverse effects on conservation and sustainable use of biodiversity. Uganda signed the Protocol on 24 May 2000 and ratified it on 30 November 2001.

- ***The International Treaty on Plant Genetic Resources for Food and Agriculture (2001):*** The Treaty was adopted by consensus on 3 November 2001 at the 31st Session of the Conference of the UN Food and Agriculture Organization. Following the CBD principles, it establishes principles for facilitating access to plant genetic resources and mechanisms for fair and equitable sharing of benefits. The Treaty's main provisions promote the conservation of Plant Genetic Resources for Food and Agriculture (PGRFA); their sustainable use; facilitated access to PGRFA for research, breeding and education; benefit-sharing arrangements; a funding strategy; and agreement on terms of access to important collections managed by international agricultural research centres. It establishes a multilateral system of access and benefit-sharing, which applies to an initial list of 64 food crops from 35 genera and 29 forges. Uganda ratified the treaty in March 2003.

Annex 3: Technical report of the integrated assessment study for Uganda

I. Summary of project implementation process

Identification of lead Government agency

The government agency responsible for coordination and supervision of this project was the National Environment Management Authority (NEMA) established by an Act of Parliament through the National Environment Act Cap 153 of 1995. NEMA is the principal government agency for the management of the environment and is mandated to coordinate, supervise and monitor all activities in the field of environment. NEMA is also the National Focal Point for the CBD. NEMA coordinated and supervised the implementation of the project on behalf of Government of Uganda.

Identification of relevant Government agencies and stakeholder groups

Implementation of the project began in May 2007. Although key stakeholders were identified during the development of the project proposal, it was during the capacity building workshop in May 2007 that most of the stakeholders were identified. A summary of the stakeholders and their roles in the project is provided below.

Government ministries and departments – policy issues
Ministry of Water and Environment, Ministry of Trade, Tourism and Industry (MTTI), Ministry of Finance Planning and Economic Development (MFPED) , Ministry of Local Government, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Ministry of Gender Labour and Social Development (MoGLSD), Ministry of Lands Housing and Urban Development and Ministry of Justice and Constitutional Affairs.

Government departments - implementers as well as initiators of policy review
NEMA, Uganda Wildlife Authority, National Forestry Authority, Wetlands Inspections Division, Forestry Inspection Division, Uganda National Council for Science and Technology, Uganda Wildlife Education Centre, National Biotrade Programme/UEPB, Uganda Bureau of Statistics, Uganda Investment Authority, National Planning Authority, Presidential Initiative on Research and New Innovations, Directorate of Water Development, Parliamentary Committee on Natural Resources, Government Analytical Laboratory and Government Chemist, Occupational Safety and Health Department, and Uganda Cleaner Production Centre.

Research institutions
National Agricultural Research Organization (NARO), Natural Chemotherapeutic Research Laboratory, academic institutions (such as universities) and Industrial Research Institutes.

Non-governmental organizations (NGOs) and civil society – policy advocates
Advocates Coalition for Development and Environment, CARE Uganda, International Union for Conservation of Nature, Green Watch, Environmental Alert, Nature Uganda and Abantu for Development Association.

The private sector – the business community

The PSF, Uganda National Farmers Association, Uganda Chamber of Commerce, Uganda Electricity Distribution Company Limited, Uganda Manufacturer's Association, Uganda Small-Scale Industries Association, Uganda Agric Input Dealers Association, Uganda Fisheries Exporters Association and Uganda Horticulture Exporters Association.

Stakeholders likely to be affected
Local communities and local governments, the private sector, herbalists, flower farmers, land owners, employees in the horticultural sector and the Uganda Natural Ingredients and Products Association.

Establishing Project Steering Committee

The Project Steering Committee (PSC) was established in April 2007 to oversee and guide the implementation of the project. The PSC is composed of 15 representatives from MFPED; MAAIF; Ministry of Water and the Environment; the Forestry Sector Support Department (formerly Forestry Inspection Division); MoGLSD; NEMA; the Subcommittee on Economic Partnership Agreements (EPAs) or the EPA negotiating team-MTTI; the Technical Committee on Biodiversity Conservation; National Biotrade Programme-MTTI; Makerere University Institute of Environment and Natural Resources; Nature Uganda (local NGO); Uganda Cleaner Production Centre; Economic Policy Research Centre (EPRC); UNDP; and HORTEXA (the private sector representative).

Members of the PSC

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Main issues to be addressed by the project

The main issues were identified during the capacity building workshop in conjunction with group work on the conceptual framework. The main issues identified were land for the horticulture and flower sectors, pollution and loss of ecosystem services, market access, use of chemicals, health and well-being of workers, stakeholders likely to negative impacted by the horticulture and floriculture sectors, livelihood improvement, and food security.

Establishing the country project team (core team)
The country project team included the individuals listed in the table below.

Name	Institution	Function	Professional background
Mr. Francis Ogwal	National Environment Management Authority	Resource person Biodiversity and CBD related issues Project supervision and coordination	MSc (Environment and Natural Resources – Biological option
Ms Alice Ruhweza	Private consultant	Resource person on trade and environment issues	MSc Applied Economics
Mr. Agaba Raymond	Ministry of Tourism, Trade and Industry	Resource person on EU-ACP-EPAs	
Dr. Nichodemus Rudaheranwa	EPRC	Senior Research Fellow	PhD Economics

II. Main achievements

Launching the project

The project was launched on 29 May 2007 by the Permanent Secretary, Ministry of Water and Environment, as the first step in the project implementation. The stakeholders involved in the launch of the project were the PSC Members, government representatives, members from the research institutions, NGOs, the Technical Committee on Biodiversity, Development Partners, representatives of the private sector and representatives from the media. The attendance was very good. The following key issues were identified for follow up:

It was emphasized that the issue of capacity building needed to be handled as a matter of priority so that the stakeholders could properly understand the linkages between trade-related policies and the environment. Capacity building for stakeholders was conducted.

Participants noted that the PSC should involve more stakeholders namely including: UNDP, HORTEXA, the Forestry Support Services Department, Nature Uganda and the Uganda Cleaner Production Centre. NEMA issued invitations to these institutions to nominate qualified representatives to the PSC and responses were received.

Capacity Building Workshop

The Capacity Building Workshop was held on 30-31 May 2007. The main objective was to create an understanding about the project among the key stakeholders that would be consulted during the national review workshops. The workshop covered various aspects of the IA, including the inter-linkages between trade, agriculture and biodiversity, the different stages of the process, techniques and tools used to assess trade-related impacts, and stakeholder analysis and participation.

The participants raised several economic, environmental and social issues. They noted that unstable markets, certification, and exporting unprocessed products had an economic impact on the sector. Most of the horticulture farms are not certified and those that are certified do not produce to standards for the EU market. Production of unprocessed products was noted as a hindrance to expansion in the sector. Environmental issues raised included land conversion, energy consumption, high water requirements, and the use of agrochemicals.

PSC meetings

Project implementation began in May 2007 and the first PSC meeting was held on 28 May 2007. Members appreciated the relevance of the project to the ongoing EU-ACP EPA negotiations. The project was expected to provide input on environmental aspects to strengthen the capacity of Ugandan negotiators to integrate issues of biodiversity and the environment into the negotiations so that the EPA with the EU took into account environmental concerns. This is considered very important for promoting sustainable trade. In the ongoing Uganda EU-ACP EPA negotiations, issues of biodiversity had not been addressed. EPRC was designated as the national research institution designated to undertake the IA while the NEMA was responsible for project supervision and coordination.

The PSC meeting was attended by members from National Fisheries Resources Research, the Technical Committee on Biodiversity Conservation Institute, EPRC, UEPB, MFPED, MoGLSD, MAAIF, MTTI, NEMA and a representative from UNEP's Regional Office for Africa in Nairobi

The PSC was expanded to include the following additional stakeholders: UNDP, HORTEXA, Makerere University Institute of Environment and Natural Resources, Nature Uganda and the Uganda Cleaner Production Centre. These institutions had been recommended by stakeholders during the PSC meeting, the launch and the capacity building workshop.

By the time the second international review meeting was held (1-3 July 2008 in Geneva, Switzerland), three more PSC meetings had been held, as follows:

15 November 2007 – During the second PSC meeting members discussed progress on implementation of the project since May 2007.

22 April 2008 – At the third PSC meeting a report of the first international review meeting (26-29 November 2008 in Geneva, Switzerland) was presented and discussed. Ms Alice Ruhweza and Mr. Francis Ogwal attended and Mr. Cornelius Kazoora from the Sustainable Development Centre attended in his capacity a member of the experts group. A revised draft IA report was presented by EPRC and PSC members provided input for EPRC to incorporate into the report. It was decided that the title of the report and the report format should be re-structured to help ensure proper flow of information. A comprehensive work plan for the remaining activities (up to December 2008 when the project ends) was also presented and discussed at the third PSC meeting.

12 June 2008 – the fourth PSC meeting was held to discuss the revised IA report before it was presented at the second international review meeting (1-3 July 2008 in Geneva, Switzerland). The title of the report was modified to "An Integrated Assessment of the Potential Impacts of the EU-ACP EPA on Uganda's Biodiversity: A Case Study on the Horticulture Sector"

Stakeholder consultations

The following stakeholder consultations were held during the preparation of the IA report:

8 November 2007 – consultative meeting with stakeholders from the floriculture sector;
18 December 2007 – meeting with stakeholders from the horticulture sector;
30 April 2008 – stakeholders review workshop to discuss the draft IA report.

Other achievements

- The draft IA report was presented on 22 May 2008 at a side event in Bonn, Germany during the ninth meeting of the Conference of the Parties to Convention on Biological Diversity. Ms Alice Ruhweza and Mr. Francis Ogwal presented the report.

- The revised IA report was presented during the second international review meeting which took place on 1-3 July 2008 in Geneva, Switzerland.

- The IA report was completed in July 2009.

Annex 4: EU 27 imports of fresh fruits and vegetables from Uganda by value (€'000) and by volume (metric tonnes), 2000-2006

Categories of fresh fruits and vegetables		2000	2001	2002	2003	2004	2005	2006
FFV	value	3 173	3 985	4 736	4 431	5 356	6 467	6 289
	volume	2 444	2 566	3 120	3 471	3 821	6 469	3 562
Vegetables	value	2 957	3 427	4 321	3 925	4 583	5 280	3 649
	volume	2 335	2 302	2 895	3 205	3 408	5 750	2 051
Chillies	value	487	616	823	648	944	1 114	1 592
	volume	234	321	260	394	589	2 853	824
Other vegetables	value	2 192	2 684	3 443	3 228	3 554	4 086	2 004
	volume	1 914	1 902	2 406	2 785	2 761	2 848	1 200
Other	value	278	127	55	49	85	80	53
	volume	187	79	26	26	58	49	27
Fruit	value	216	558	415	506	773	1 187	2 640
	volume	108	264	224	265	412	719	1 511
Banana	value	119	278	241	231	356	622	1 832
	volume	55	122	132	133	202	442	1 128
Pineapple	value	84	121	136	158	317	475	511
	volume	49	105	60	83	167	242	262
Passion fruit	value	13	15	15	41	56	55	139
	volume	4	4	5	13	19	20	44
Other	value	1	41	23	76	44	35	159
	volume	-	33	27	36	24	15	77
Nuts	value	65	-	-	-	1	11	1
	volume	47	-	-	-	1	18	1

Source: EC Help Desk (2007).

Annex 5: Yield, price and income per hectare of flowers produced

Details of yield, income and expense	Value
Yield (stem per m^2)	400
Yield (stem per ha)	4 000 000
Price per stem (US$/stem)	0.06
Income (US$/ha)	240 000
Total operating expenses (US$/ha)	114 500
Expenses to total income	0.48
Net income (US$/ha)	125 500
Expenses to net income	0.91
External capital used (US$/ha)	140 000
Net income to external capital	0.90
Interest rate (per cent)	10
Amount of interest (US$/ha)	14 000

Source: UEPB (2006).

Annex 6: CBD 2010 Biodiversity targets

Focal Area: Protect the components of biodiversity
Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes
Target 1.1: At least 10 per cent of each of the world's ecological regions effectively conserved.
Target 1.2: Areas of particular importance to biodiversity protected
Goal 2. Promote the conservation of species diversity
Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups
Target 2.2: Status of threatened species improved.
Goal 3. Promote the conservation of genetic diversity
Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.

Focal Area: Promote sustainable use
Goal 4. Promote sustainable use and consumption.
Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and Production areas managed consistent with the conservation of biodiversity.
Target 4.2: Unsustainable consumption, of biological resources, that impacts upon biodiversity, reduced.
Target 4.3: No species of wild flora or fauna endangered by international trade.

Focal Area: Address threats to biodiversity
Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.
Target 5.1: Rate of loss and degradation of natural habitats decreased.
Goal 6. Control threats from invasive alien species.
Target 6.1: Pathways for major potential alien invasive species controlled.
Target 6.2: Management plans in place for major alien species that threaten ecosystems, habitats or species.
Goal 7. Address challenges to biodiversity from climate change, and pollution.
Target 7.1: Maintain and enhance resilience of the components of biodiversity to adapt to climate change
Target 7.2: Reduce pollution and its impacts on biodiversity

Focal Area: Maintain goods and services from biodiversity to support human well being
Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods
Target 8.1: Capacity of ecosystems to deliver goods and services maintained.
Target 8.2: Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.

Focal Area: Protect traditional knowledge, innovations and practices
Goal 9 Maintain socio-cultural diversity of indigenous and local communities
Target 9.1 Protect traditional knowledge, innovations and practices
Target 9.2: Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing

Focal Area: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources
Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources
Target 10.1: All transfers of genetic resources are in line with the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements.
Target 10.2: Benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources.

Focal Area: Ensure provision of adequate resources

Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention

Target 11.1: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20

Target 11.2: Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.

Source: Secretariat for the Convention on Biological Diversity (2007) Convention on Biological Diversity: Goals and sub-targets. http://www.cbd.int.